

Mapping Library and Information Science Research Output: A Bibliometric Study of Panjab University, Chandigarh

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ABSTRACT

This paper focuses on analysing the research output in the discipline of Library and Information Science (LIS), Panjab University (PU), Chandigarh during the year 1991–2014. The detailed curriculum vitae of faculty members of Department of LIS were obtained and bibliographic information of their papers was recorded. The study deals with 152 publications of PU, Chandigarh in the field of LIS. It examines the LIS output by different ways like document type, authorship pattern and degree of collaboration. The study also examines the relative growth rate of publications, doubling time for publications, annual growth rate (AGR) of the publications and compound AGR of publications.

Keywords: Panjab University, Chandigarh, Library and information science, Authorship pattern, Degree of collaboration relative growth rate, Doubling time, Bibliometric/scientometric analysis

INTRODUCTION

Research plays a vital role in the educational process as a source of latest information. The main aim of research is to find out the truth which is hidden and, which has not been revealed as yet. Each research study has its own specific purpose. In short, research can be conceptualised as diligent, protracted investigations using adequate methods to discover new knowledge, to develop unique applications of existing knowledge or to explain relationships between ideas or events. Research has now become the very significant aspect of scholarly communication involving theses, dissertation, conference proceedings, books, patents and journal articles and others. It is important to undertake the analysis of the research output in the discipline.

The terms 'bibliometric' and 'scientometric' were almost simultaneously introduced by Pritchard and by Nalimov and Mulchenko in 1969. Scientometrics can be defined as the 'quantitative study of science, communication in science, and

science policy'. Bibliometrics can be defined as 'the application of mathematical and statistical methods to measure quantitative and qualitative changes in different media'. Pritchard assigned the purpose of bibliometric as 'to shed light on the process of written communication and of the nature and course of development of a descriptive means of counting and analysing the various facets of written communication'. Researchers may use bibliometric methods of evaluation to determine the influence of a single writer or to describe the relationship between two or more writers or works. Bibliometrics has now emerged as a well-established interdisciplinary research field.

In this study, authors use bibliometric indicators to find out document type, authorship pattern, degree of collaboration, relative growth rate (RGR) of publications and doubling time (Dt) for publications in LIS of Panjab University (PU), Chandigarh.

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PANJAB UNIVERSITY: INTRODUCTION

PU, Chandigarh, was established in 1882. It has 75 teaching and research departments. It offers courses and research in science, engineering and technology, humanities, commerce, social sciences, performing arts and sports. According to the Times Higher Education's World University Rankings 2013-2014, PU is the highest ranked Indian institution. The rankings are based on universally recognised primary core missions such as teaching, research, knowledge transfer and international outlook. PU also got first in India and 13th place in the BRICS (Brazil, Russia, India, China and South Africa) and Emerging Economies Ranking 2014 [<http://puchd.ac.in/>].

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

The university instituted the Master of Library Science course from the academic session 1970-1971 which was redesignated as Master of Library and Information Science course from the academic session 1988-1989. Ph.D. in library science was introduced from the academic year 1972-1973, which was also redesignated as Ph.D. in library and information science (LIS) from the academic year 1988-1989. Keeping in view the recommendations of the Curriculum Development Committee of the UGC, a 2-year integrated course leading to Masters of LIS had been started with effect from the academic session 2003-2004.

As per the July 2014 UGC guidelines, the department started offering Bachelor of LISs (1-year semester system postgraduate course) from the academic session 2016-2017 and Master of LISs (1-year semester system) from the academic session 2017-2018 <http://libraryscience.puchd.ac.in/index.php>].

Following table shows the details of faculty:

Designation	Number of Faculty Members
Professor	1
Assistant professor	1
Assistant professor	1

OBJECTIVES

- ❖ To analyse the distribution of documents.
- ❖ To examine the RGR and Dt for publications.
- ❖ To find out the degree of collaboration through the authorship pattern.

METHODOLOGY AND SCOPE

In this study, the following methodology is used:

- Data collection source: Questionnaire and university website
- Document type: Articles, conference papers and books/book chapters only
- Time span: 1991-2014
- Subject covered: LIS
- Department/University: Department of LIS, PU, Chandigarh.

LIMITATIONS OF THE STUDY

- The authors have considered the publication of presently working faculty members excluding those who have retired.

Delimitations of the Study

- The study is confined to a period 1991-2014 and subject covered is LIS only.

DATA ANALYSIS AND INTERPRETATION

Forms of Publications

Table 1 and Figure 1 reveal that the major source of publications of LIS in PU is Journal articles with 78 publications (51.32%) followed by conference proceedings paper with 56 publications (36.84%). Books/Book chapter rank in the last with 18 (11.84%) publications. The results indicate that faculty members of Department of LIS, PU, Chandigarh of the period covered by the study prefer to publish in the form of journal articles.

Table 1: Forms of publications

Total Documents	152
Journal articles	78
Conference proceedings	56
Books/Book chapter	18

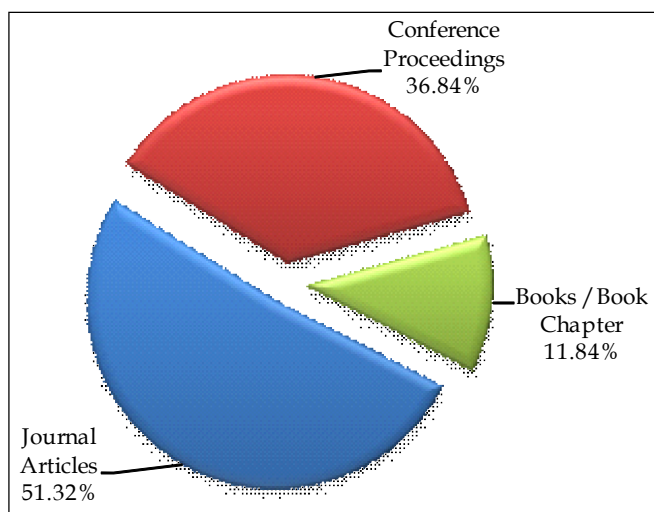


Figure 1: Forms of publications

Table 2: Growth of publications

Year	Number of Publications	Percentage
1991	3	1.97
1992	1	0.66
1993	2	1.32
1994	2	1.32
1995	1	0.66
1996	5	3.29
1997	1	0.66
1998	4	2.63
1999	1	0.66
2000	1	0.66
2001	2	1.32
2002	4	2.63
2003	1	0.66
2004	3	1.97
2005	3	1.97
2006	9	5.92
2007	8	5.26
2008	9	5.92
2009	8	5.26
2010	7	4.61
2011	13	8.55
2012	29	19.08
2013	18	11.84
2014	17	11.18
Total	152	100.00

GROWTH OF PUBLICATIONS

Table 2 and Figure 2 reveal that during the period of 1991-2014, a total of 152 publications were published by LIS faculty members. The highest number of publications is 29, published in 2012. The years 1992, 1995, 1997, 1999, 2000 and 2003 are having only single publication. The average number of publications published per year was 6.33. But it is seen in the table that there is a fluctuating trend of growth of publications in the study period.

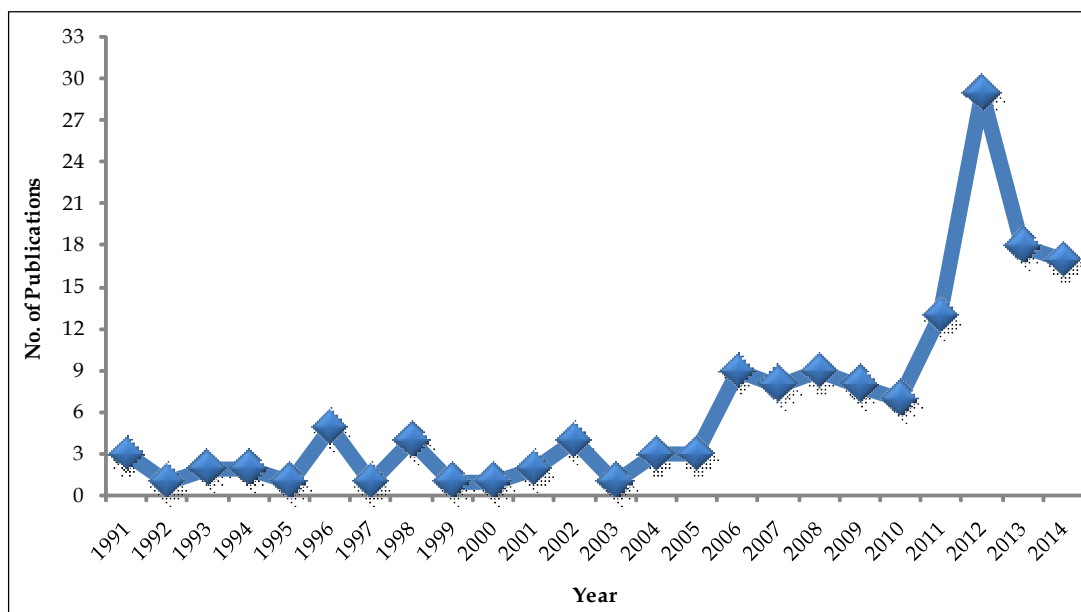


Figure 2: Growth of publications

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ANNUAL GROWTH RATE (AGR) OF THE PUBLICATIONS

Table 3 provided the annual growth rate (AGR) of the number of documents for period 1991–2014 (Kumar and Kaliyaperumal, 2015).

$$AGR = \frac{\text{end value} - \text{first value}}{\text{first value}} \times 100$$

Table 3 shows that the AGR of the total publications calculated year wise. Fluctuation is seen in throughout the study period. The reason for the fluctuation is that there is no constant growth of publications in every year except the years 1994, 2000 and 2005. Table 3 reveals positive AGR in the years 1993, 1996, 1998, 2001, 2002, 2004, 2006, 2008, 2011 and 2012, whereas rest of the years are showing negative AGR. Highest AGR is in the year 1996 (400).

Table 3: Annual growth rate of publications

Year	Number of Publications	AGR
1991	3	
1992	1	-66.67
1993	2	100.00
1994	2	0.00
1995	1	-50.00
1996	5	400.00
1997	1	-80.00
1998	4	300.00
1999	1	-75.00
2000	1	0.00
2001	2	100.00
2002	4	100.00
2003	1	-75.00
2004	3	200.00
2005	3	0.00
2006	9	200.00
2007	8	-11.11
2008	9	12.50
2009	8	-11.11
2010	7	-12.50
2011	13	85.71
2012	29	123.08
2013	18	-37.93
2014	17	-5.56

The bold values in the below table indicates the growth of ARG as compare to previous year

COMPOUND ANNUAL GROWTH RATE (CAGR) OF PUBLICATIONS

The compound annual growth rate (CAGR) is calculated by taking the *n*th root of the total percentage growth rate, where *n* is the number of years in the period being considered. This can be written as follows: (Fuhrmann, 2014 and Kumar & Kaliyaperumal, 2015).

$$CAGR = (\text{ending value}/\text{beginning value})^{1/\# \text{ of years}} - 1$$

Table 4: Compound annual growth rate of publications

Year	Number of Publications	Cumulative Frequency	CAGR (%)
1991	3	3	–
1992	1	4	300.00
1993	2	6	73.21
1994	2	8	58.74
1995	1	9	73.21
1996	5	14	22.87
1997	1	15	57.04
1998	4	19	24.93
1999	1	20	45.42
2000	1	21	40.25
2001	2	23	27.66
2002	4	27	18.96
2003	1	28	32.01
2004	3	31	19.68
2005	3	34	18.94
2006	9	43	10.99
2007	8	51	12.27
2008	9	60	11.81
2009	8	68	12.62
2010	7	75	13.29
2011	13	88	10.03
2012	29	117	6.87
2013	18	135	9.59
2014	17	152	9.99

The CAGRs of the publications are also showing fluctuating trend in publications. CAGR is calculated on the bases of *n*th root. Here, *n* = 1 to 23, starts from 1992 and so on. CAGR is highest in the year 1992 (300) (because, it is the first year in the table, so, *n* = 1) and lowest in the year 2012 (6.87) (Table 4).

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RELATIVE GROWTH RATE AND DOUBLING TIME OF PUBLICATION OF PANJAB UNIVERSITY, CHANDIGARH

The RGR and Dt model developed by Mahapatra was applied to examine the growth rate of research publications. The RGR is increase in the number of publications per unit of time (Figure 3). A specified period of interval can be calculated from the following equations: (Joshi *et al.*, 2016).

$$RGR = \frac{W2 - W1}{T2 - T1}$$

Where, RGR is the relative growth rate over the specific period of interval, *W1* is the Log *W1*: (natural log of initial number of publications), *W2* is the Log *W2*: (natural log of final number of publications), *T2 - T1* is the unit difference between the initial time and final time.

The growth of PU, Chandigarh is analysed by RGR and Dt. RGR is a measure to study the increase in the number of articles on time and the Dt is directly related to RGR. It is the time required for articles to become double of the existing amount. Table 5 shows that the RGR of PU, Chandigarh research output in Department of LIS decreases is highest in 1996 (0.442) and lowest in 2003 (0.036).

Doubling Time

From the calculation, it is found that there is a direct equivalence existing between the RGR and Dt. 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 (Beaie and Acol, 2009).

Table 5: Relative growth rate and doubling time of publication

Year	Number of Publications	Cumulative Sum	<i>W2</i>	<i>W1</i>	RGR	Dt
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

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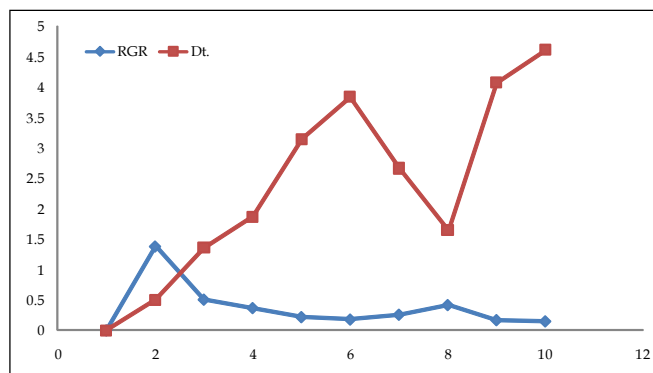


Figure 3: Relative growth rate (RGR) and doubling time (Dt) of publication

The corresponding Dt for publications and pages can be calculated by using the following formula:

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

AUTHORSHIP PATTERN AND DEGREE OF COLLABORATION

The formula suggested by Subramanianm (1983) is used. It is expressed as

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

Where, C is the degree of collaboration of faculty members, NM is the number of multiple authored papers, NS is the number of single authored papers.

To identify the nature of authorship pattern in research output made in Department of LIS, PU, Chandigarh, above formula has been used. It is evident from Table 6 that two-authored papers cover 59% of the whole. There are 39% publications single authored and only 2% publications are three authored. The degree of collaboration among authors is the ratio of the number of papers published in a discipline during certain period of time. So far degree of collaboration is concerned, Department of LIS, PU,

Table 6: Authorship pattern and degree of collaboration

Total Documents	Single Authored	Two Authored	Three Authored	Degree of Collaboration
152	59	90	3	0.61

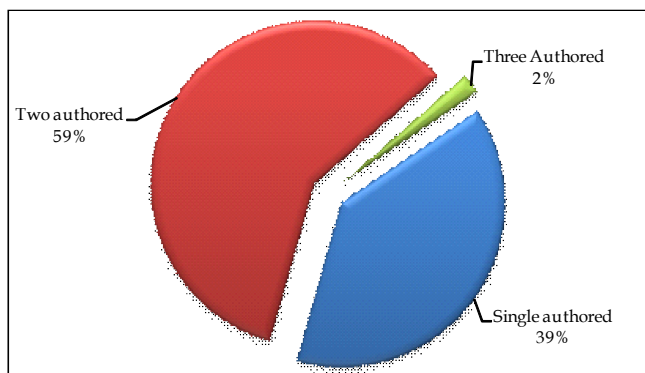


Figure 4: Authorship pattern and degree of collaboration

Chandigarh, is 0.61. This means 61% of the total publications are with collaboration (Figure 4).

CONCLUSION

In the end, the researcher concludes that the faculty members of Department of LIS prefer to publish their article in Journals. The RGR of PU, Chandigarh, research output in Department of LIS decreases is highest in 1996 (0.442) and lowest in 2003 (0.036). The authors identify that two-authored papers cover 59% of the whole, 2% publications are three authored and rest publications are single authored. There are 61% of the total publications with collaboration.

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