

COMPARING RESEARCH OUTPUT IN LIBRARY & INFORMATION SCIENCE: A BIBLIOMETRIC STUDY OF PANJAB UNIVERSITY AND GURU NANAK DEV UNIVERSITY

Rupak Chakravarty*, Jyoti Sharma**

*Assistant Professor, Department of Library & Information Science, Panjab University, Chandigarh, India.
Email: rupak@pu.ac.in

**Research Scholar, Department of Library & Information Science, Panjab University, Chandigarh, India.
Email: jyotisharma@pu.ac.in

Abstract *The present study focuses on analysis of research output in the discipline of Library and Information Science at Panjab University, Chandigarh and Guru Nanak Dev University, Amritsar till 31 December 2014. The curriculum vitae (CV) and publication details of faculty members of Department of Library and Information Science were obtained by personal visit to universities and bibliographic information on their papers were recorded. The study deals with 152 publications of Panjab University, Chandigarh and 111 publications of Guru Nanak Dev University, Amritsar, in the field of Library and Information Science. It examines the Library and Information Science output 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 for publications.*

Keywords: *Library and Information Science, Authorship pattern, Relative Growth Rate (RGR), Doubling Time $D(t)$ and Bibliometric/ Scientometric Analysis, Panjab University, Guru Nanak Dev University*

INTRODUCTION

Research productivity in higher education is gaining importance from past one decade in India. Faculty members of the universities have two functions to perform, teaching and research. Research has now become very significant aspect of scholarly communication involving theses, dissertation, conference proceedings, books, patents, and journal articles, etc. It is important to undertake the analysis of the research output in the discipline. The term 'Bibliometric' and 'Scientometric' were almost simultaneously introduced by Pritchard and by Nalimov and Mulchenko in 1969. Scientometric can be defined as the "quantitative study of science, communication in science, and science policy". Bibliometric 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. Bibliometric has now emerged as a well-established interdisciplinary research field. In this study authors use bibliometric indicators like document type, authorship pattern, degree of collaboration, relative growth rate of publications and doubling time for publications for comparative analysis of Panjab University, Chandigarh and Guru Nanak Dev University, Amritsar.

OBJECTIVES

1. To analyse the distribution of documents.
2. To examine the Relative Growth Rate (RGR) and Doubling Time (Dt) for publications.
3. To find out the degree of collaboration by analysing authorship pattern.
4. To compare the above said values for PU and GNDU.

SCOPE

The authors have considered the research output of Library and Information Science faculty members working on a permanent basis in the Panjab University (PU), Chandigarh and Guru Nanak Dev University (GNDU), Amritsar. The Department of Library and Information Science, Panjab University was established in 1960. It offers two-year integrated course leading to Masters of Library & Information Science having four semesters and Ph.D. There are currently three faculty members (Professor - 1, Assistant Professors - 2) in the department.

The Department of Library and Information Science, Guru Nanak Dev University was established in 1973. It offers Bachelor of Library Science and Master of Library Science Courses as separate degrees. The department also offers Ph.D. There are currently three faculty members in the Department of Library and Information Science. Like PU, it also has 1 Professor and 2 Assistant Professors as faculty member of the department.

For the purpose of study, the publications upto December 31, 2014 have been included wherein, the publications prior to joining their current position in the concern department have been considered.

METHODOLOGY

Survey method was deployed for the collection of data. The bibliographic details of publications were collected directly from faculty members of Department of Library and Information Science as well as the websites. Wherever required, the curriculum vitae (CV) and other publication details of faculty members were obtained by personal visits. The authors were able to obtain necessary information regarding 152 publications from Panjab University, Chandigarh and 111 publications from Guru Nanak Dev University, Amritsar. Spreadsheet software was used for the purpose of data analysis.

Various statistical formulas pertaining to the field of bibliometric which were used in the study have been briefly explained below:

Relative Growth Rate

Relative Growth Rate is a measure to study the increase in number of articles/pages per unit of time. It has derived originally from the study of the rate and of interest in the financial investment (Blackman, 1919) and from the study of growth analysis of individual plants effectively applied in the field of Botany (Hunt, 1978). The mean Relative Growth Rate (R) over the specific period of interval can be calculated as given below:

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

Where,

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

Doubling Time

From the calculation, it is found that there is a direct equivalence existing between the relative growth rate and doubling time. 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 by Subramanyam (1983) has been used. It is expressed as

$$DC = \frac{Nm}{Nm + Ns}$$

Where,

- DC = Degree of collaboration of faculty members
- Nm = Number of multiple authored papers in the discipline
- Ns = Number of single authored papers in the discipline

RESULTS AND DISCUSSION

Distribution of Total Documents

Fig. 1 below presents the distribution of total documents published by the LIS faculty members of PU and GNDU.

For the purpose of study three types of documents have been considered i.e. journal articles, conference proceedings, and book/book chapters. The figure indicates that PU has published 78 articles (51.32%) in journals, whereas, GNDU has published 66 articles (59.46%). In case of conference proceedings, the share of PU is 56 (36.84%) whereas, the contribution of GNDU is 27 (24.32%). Also, it is evident that both PU & GNDU have published same number of B/BC i.e. 18 (11.84% & 16.22% respectively). The figure indicates that the total output of PU (152) more than GNDU (111). Thus, we can find that faculty members of both PU & GNDU has published more in journals (144 i.e. 54.75%) than CP (83 i.e. 31.56%) and book/book chapters (36 i.e. 13.69%).

Authorship Pattern

Fig. 2 shows the authorship pattern of the universities under study. To attain the objective of the paper authors identify the nature of the publications by single authored, double authored, and three & more authored publications. The figure indicates that PU has published 59 articles (38.82%) as single authored, whereas, GNDU has published 90 articles (81.08 %) as single authored. In case of double authored the contribution of PU is 80 (52.63%) whereas, the contribution of GNDU is 28 (25.23%). Further, it is observed that both PU & GNDU have published same number papers with three authors i.e. 3 (1.97% & 2.70% respectively). The figure reveals that the GNDU has published more publications as single authored than PU, whereas, PU has more publications

with two authors. Both universities have published same number of publication in books/book chapters.

Degree of Collaboration (DC)

The authors also calculated the Degree of Collaboration (DC) by applying following formula.

DC (PU): $N_m = 93$ and $N_s = 59$, thus

$$DC = \frac{93}{93 + 59} = \frac{93}{152} = 0.61$$

Thus the DC of PU is 0.61.

DC (GNDU): $N_m = 31$ and $N_s = 80$

$$DC = \frac{31}{31 + 80} = \frac{31}{111} = 0.28$$

Thus the DC of GNDU is 0.28.

The above calculated values of degree of collaboration of PU and GNDU has been depicted in Fig. 3. Hence, it can be noted that the Degree of Collaboration of PU is higher than that of GNDU.

Table 1 presents the values of Relative Growth Rate (RGR) and Doubling time (Dt) of PU along with mean RGR and mean Dt respectively. Fig. 4 reveals that RGR has falling trend till 2010. After that 2011 and 2012 it rises then become constant in the year 2013 & 2014. From figure it is clear that

Fig. 1: Distribution of Total Documents

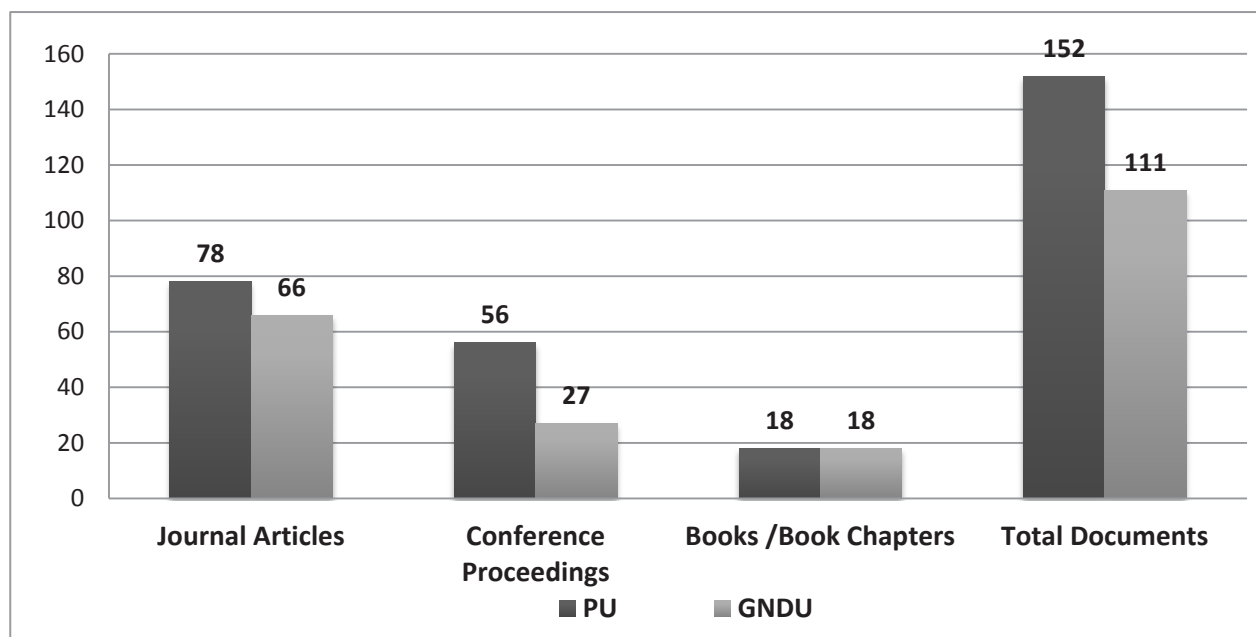
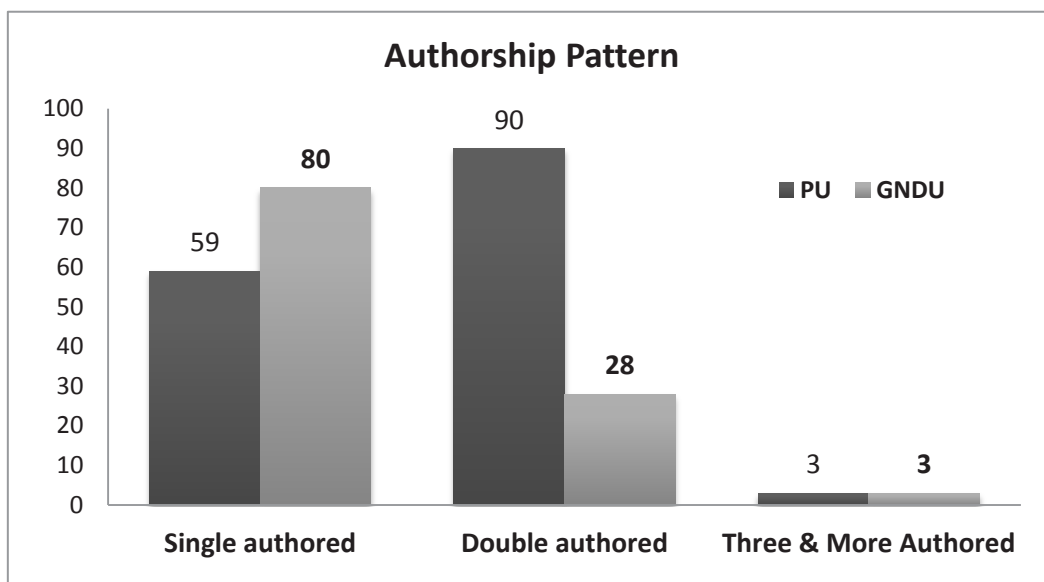


Fig. 2: Authorship Pattern



the RGR of both PU and GNDU is portraying a fluctuating tendency with rise and fall. GNDU has minimum RGR value in 2011 (0.01) and has attained its peak in 2014 (0.16). In case of PU, the maximum RGR is recorded in 2012 while it attains its lowest value in 2010.

Fig. 5 presents the Doubling time (Dt) of PU and GNDU. From the figure it can be inferred that Dt of PU has shown

increasing trend till 2010 then in the year 2011 & 2012. From 2012 onwards, it displays a slight rising trajectory. However, in the case of GNDU the Doubling time (Dt) is highest in 2011 (69.3) with only one publication recorded in this year. It is evident from that figures and tables that the data confirms to the fact that rise in publication implies higher RGR and lower doubling time for the publications.

Fig. 3: Degree of Collaboration

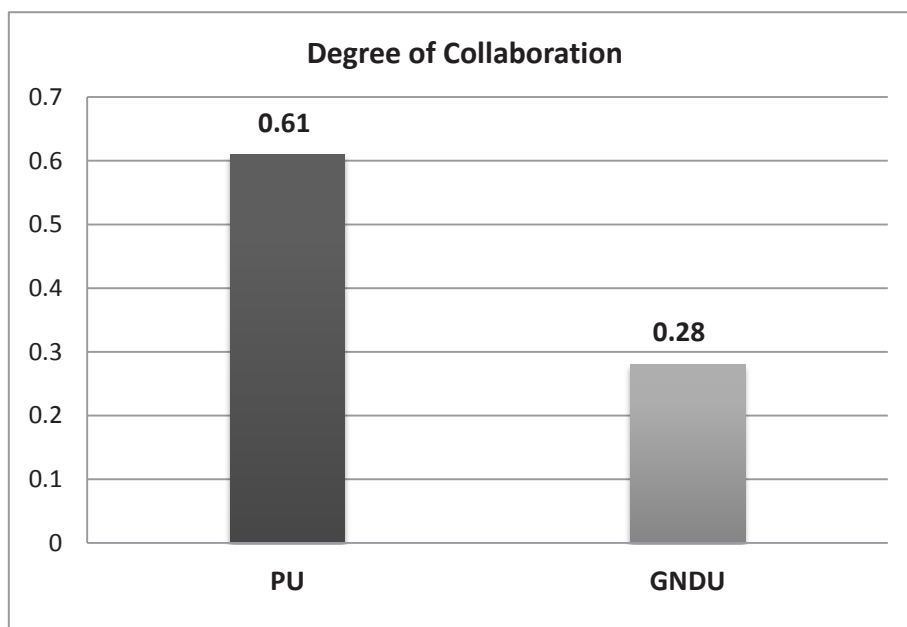


Fig. 4: Relative Growth Rate (RGR) of PU and GNDU

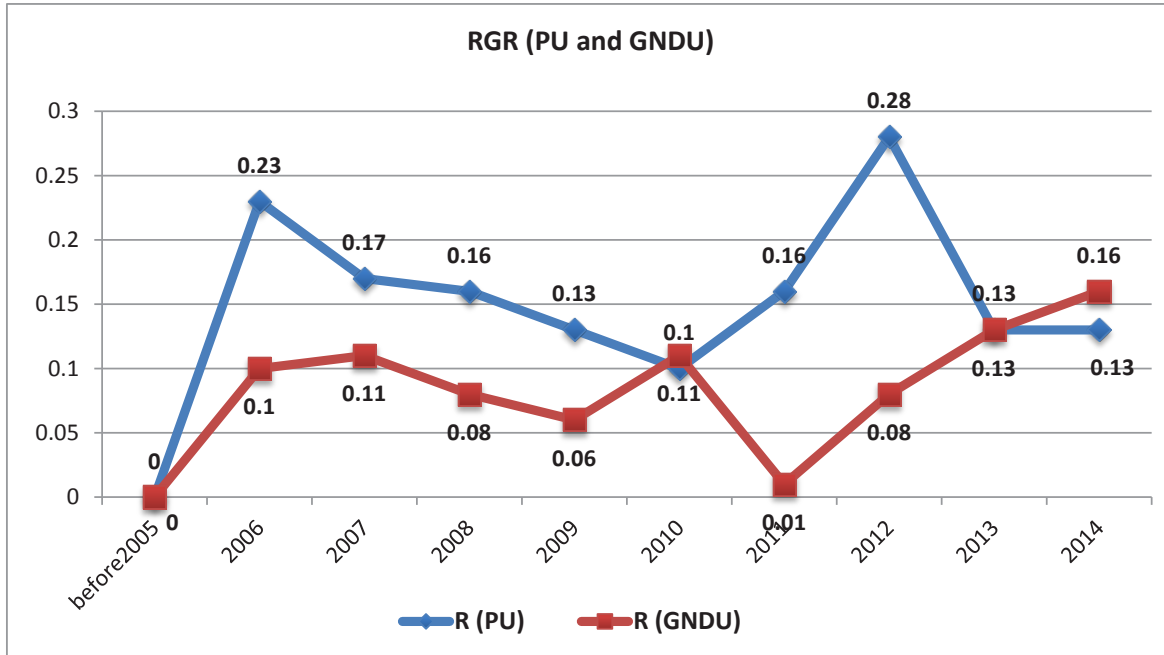


Fig. 5: Doubling Time (Dt) of PU and GNDU

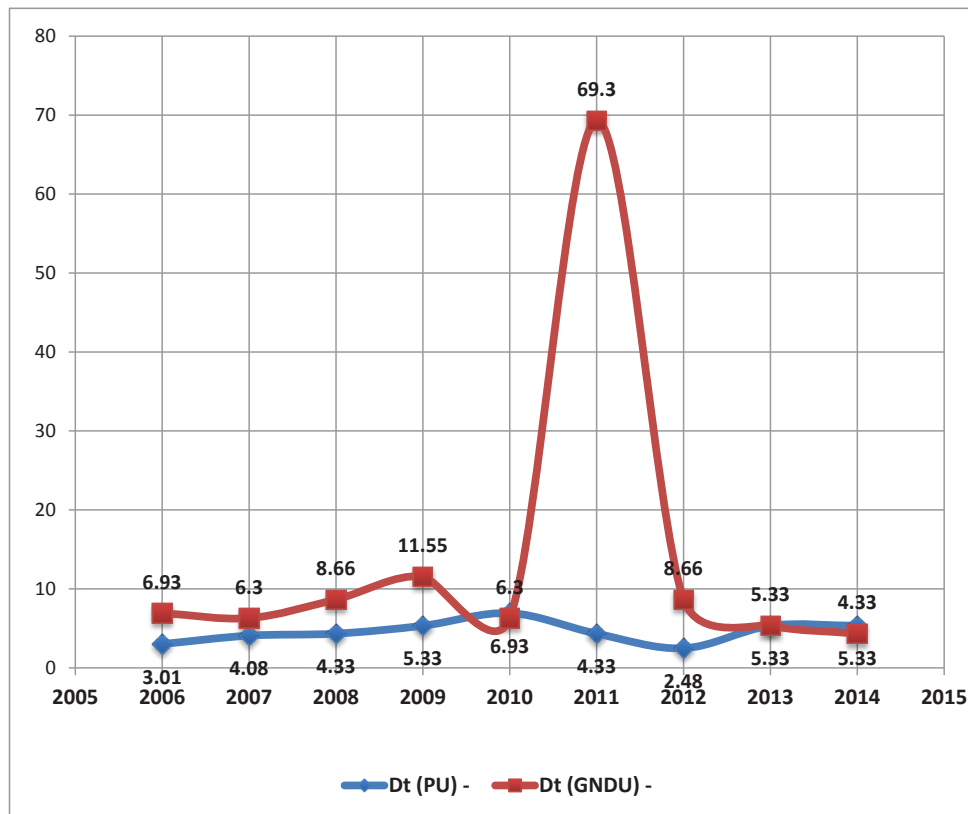


Table 1: Relative Growth Rate and Doubling Time of Publication of Panjab University, Chandigarh

Year	Number of Publications (PU)	Cumulative Sum	W 1	W2	Relative Growth Rate	Mean R	Dt	Mean Dt
Before 2005	34	34	-	3.53	-		-	
2006	9	43	3.53	3.76	0.23		3.01	
2007	8	51	3.76	3.93	0.17		4.08	
2008	9	60	3.93	4.09	0.16		4.33	
2009	8	68	4.09	4.22	0.13	0.14	5.33	3.35
2010	7	75	4.22	4.32	0.10		6.93	
2011	13	88	4.32	4.48	0.16		4.33	
2012	29	117	4.48	4.76	0.28		2.48	
2013	18	133	4.76	4.89	0.13		5.33	
2014	17	152	4.89	5.02	0.13	0.16	5.33	4.88

Table 2: Relative Growth Rate and Doubling Time of Publication of Guru Nanak Dev University, Amritsar

Year	Number of Publications (GNDU)	Cumulative Sum	W 1	W2	Relative Growth Rate	Mean R	Dt	Mean Dt
Before 2005	48	48	-	3.87	-		-	
2006	5	53	3.87	3.97	0.10		6.93	
2007	6	59	3.97	4.08	0.11		6.30	
2008	5	64	4.08	4.16	0.08		8.66	
2009	4	68	4.16	4.22	0.06	0.07	11.55	6.69
2010	8	76	4.22	4.33	0.11		6.30	
2011	1	77	4.33	4.34	0.01		69.3	
2012	6	83	4.34	4.42	0.08		8.66	
2013	12	95	4.42	4.55	0.13		5.33	
2014	16	111	4.55	4.71	0.16	0.10	4.33	18.78

Fig. 6: Comparison of Mean RGR and Mean Dt

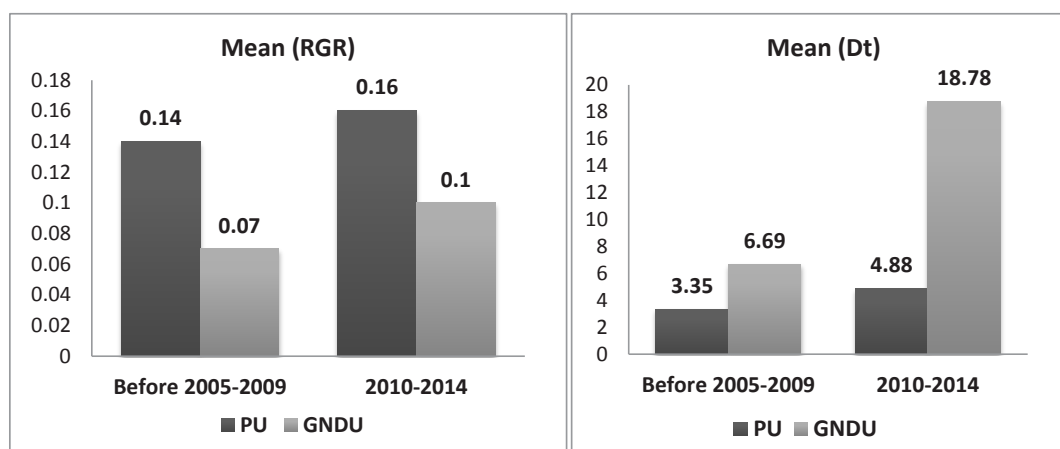


Fig. 6 displays the mean of RGR and Dt of the both universities under study. The mean RGR and of PU is 0.14, 0.16 for the time period of 2005-2009 and 2010 – 2014 respectively. In case of GNDU, the mean RGR has the corresponding values of 0.07 and 0.1 respectively. It can be seen that the mean RGR has higher value for PU than GNDU. Accordingly, the mean value of doubling time of publications per unit time, Dt is higher for GNDU for both the time periods considered.

CONCLUSION

In this study authors have calculated document type, authorship pattern, degree of collaboration, relative growth rate and doubling time of Panjab University (PU) and Guru Nanak Dev University (GNDU). It was observed that GNDU has published more articles in journals, whereas, PU has published more in conference proceeding. The study demonstrated that the total output of PU (152) is higher than GNDU (111). The study also revealed that the faculty members of both PU & GNDU have published preferred journals (144 i.e. 54.75%) than conference proceedings (83 i.e. 31.56%) and book/book chapters (36 i.e. 13.69%). PU has maximum publications in double authorship. The degree of collaboration (DC) of PU (0.61) was found to be higher than that of GNDU (0.28). The mean of RGR and Dt of PU is 0.14, 0.16 and 3.35, 4.88 respectively, whereas, the mean of RGR and Dt of GNDU is 0.07, 0.10 and 6.69, 18.78 respectively. Bibliometric studies help to evaluate the quality and quantity of research output and the visibility of these publication outputs which helps to find out the strength and weakness in infrastructure and other problems. It can be concluded that both the Universities considered in the present study can attain high quality research and this in turn will enhance the reputation of the universities.

REFERENCES

- Aswathy, S., & Gopikuttan, A. (2015). Bibliometric observation of publication output of university teachers: A study with special reference to physics. *Journal of Scientometric Research*, 4(1), 14-19.
- Baskaran, C. (2013). Research Productivity of Alagappa University during 1999-2011: A Bibliometric Study. *DESIDOC Journal of Library & Information Technology*, 33(3), 236-242.
- Blackman, H. V. (1919). Compound interest law and plant growth. *Ann Bot*, 33, 353-356.
- Gndu.ac.in. (2015). *GURU NANAK DEV UNIVERSITY*. Retrieved from <http://www.gndu.ac.in/gndu2014/ShowFacultyDetailProforma.asp?D=20>
- Hunt, R. (1978). *Plant growth analysis*. USA: Edward Arnold.
- Khan, N. A., Jan, A., & Amin, I. (2014). Research trends in select science faculties of University of Jammu. *Library Philosophy and Practice*. (e-journal). Paper 1068.
- Kumbar, M., Gupta, B. M., & Dhawan, S. M. (2008). Growth and impact of research output of University of Mysore, 1996-2006: A case study. *Annals of Library & Information Studies*, 55(3), 3.
- Librarianscience.puchd.ac.in, (2015). *Department of Library & Information Science Panjab University Chandigarh India*. Retrieved 21 October 2015, from <http://library-science.puchd.ac.in/>
- Maharana, R. K., & Sethi, B. B. (2013). A Bibliometric Analysis of the Research Output of Sambalpur University's Publication in ISI Web of Science during 2007-11. *Library Philosophy and Practice*, 15.
- Mittal, R. (2011). Library and information science research trends in India. *Annals of library and Information Studies*, 58, 319-325.
- Patra, S. K., & Chand, P. (2006). Library and information science research in India: A bibliometric study. *Annals of Library and Information Studies*, 53(4), 219-223.
- Ponnudurai, R., & Thilakar, S. (2013). Mapping of crop science research output: A scientometric analysis. *Journal of Advances in Library and Information Science*, 2(3), 134-137.
- Subramanyan, K. (1983). Bibliometric studies of research collaboration: A review. *Journal of Information Science*, 6(1), 33-38.