Authorship and Collaborative pattern: A Bibliometric study of the Research outputs by faculties in S.R.T.M. University, Nanded

Smita S. Patil
University Assistant Librarian
S.R.T.M.U.N. Sub-Centre, Latur- 413531
(Maharashtra), India
E-mail: smitapatil379@gmail.com

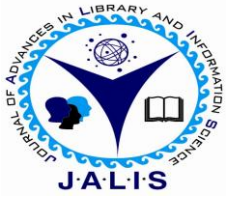
Abstract

The purpose of this study was to facilitate faculty research productivity in an established university in Maharashtra. Growing external pressures have forced universities and colleges to ask faculty to continually increase their levels of productivity with the fewer resources. The present study is conducted to evaluate the research productivity of faculties from six different schools of SRTM University, Nanded. Total number of 762 research publications has been taken into consideration to analyze the data as per the objectives of the study. This paper identified the year wise authorship pattern, Categories of authors and collaborative research of faculties of SRTM University, Nanded. The study further examines the degree of author collaboration, relative growth rate and doubling time of author productivity. The present paper also finds out top ten most productive authors within schools of the university.

Keywords

Bibliometrics; Year wise growth; Research publications; SRTM University Nanded; Research collaboration; growth of literature.

Electronic access
The journal is available at www.jalis.in



Journal of Advances in Library and Information Science
ISSN: 2277-2219 Vol. 10. No.3. 2021. pp.169-176

1. INTRODUCTION

Bibliometric is the study of published literature and its usage. This includes studies of impact, diffusion of innovation, bibliographic coupling, citation and co-citation patterns, content analysis and other statistical regularities in scientific and scholarly productivity and communication. Bibliometric is a set of methods used to study or measure texts of information. Citation analysis and content analysis are commonly used bibliographic methods. While, bibliometric methods are most often used in the field of library and information science, bibliometric have wide applications in other areas. Bibliometric now used in quantitative research assessment exercises of academic output which is starting to threaten practice based research.

Bibliometrics as a technique has extensive applications in identifying the research trends in a subject, trends in authorship and collaboration in research, core periodicals, obsolescence and dispersion of scientific literature useful in estimating the comprehensiveness of secondary periodicals, studying the author productivity and impact of research, distribution of scientific publications by Universities, citation studies and so on. Most of these studies pertain to Universities, faculty members, disciplines and documents. Further, bibliometrics could be usded in the idenfication of emerging research areas.

2. REVIEW OF LITERATURE

Maharana & Das (2013) studied a bibliometric analysis of research papers of Utkal University published in various reputed research journal which were indexed in SCOPUS during 2008 to 2012. The study revealed that out of 1702 contributor only 680 were from Utkal Univesity with 1.53 average authors per paper and 0.66 productive per author. It revealed that a total of 1702 authors produced 447 papers with an average of 3.8 authors per paper & 0.26 paper per author. Visakhi and Gupta (2013) Analyzed total number of 186 research papers published & indexed in SCOPUS International database by the researchers and faculty of Institute of Science Education and Research (IISER), Mohali during 2008-2012. The study further stated the Institute has increased their productivity by 18 papers to 65 papers during the period under study, which noted an Annual average growth rate of 44.98% of publications. The average citation impact per paper recorded for all its

publications on a three year citation window was 3.40. Subramanian (2014) Identified a total of 1795 publications authored by 3521 authors during the period 1960-2012 (inclusive) derived from SCOPUS database to identify the authorship patterns and degree of collaboration of SriLanka in Humanities and Social Science research. The present study analyzed that the majority of the publications are contributed by multiple authors. Degree of collaboration was increased from 0.33 to 0.80 over the study span. Baskaran (2013) analyzed bibliometric study of Alagappa University during 1999-2011. The study aims to evaluate the research outputs of faculties retrieved from Web of Science (WoS) database in the field of Science and Technology. Year-wise research output growth gradually increased. An increase in the number of publications were published in 1999 (3.99%) and in 2011 (12.5%). The DT has increased & decreases from 0.010 to 0.533 during the period of study. Kumbar, Gupta and Dhawan (2008) describes the growth contribution and impact of Research carried out by the scientists of University of Mysore in Science and Technology during 1996- 2006. A total of 1518 research papers in different disciplines of of science andTechnology retrieved from the Scopus database. The research activity growing with an average rate of 23% per annum. The average citations per paper have risen from 1.53 in 1996 to 2.62 in 2003. The collaborative research activity is the largest with USA (51%) followed by Germany (23%) and Japan (10%), Canada (6%).

The same studies have been carried out by the different authors; Akakandelwa (2009); Wang, et al. (2011); Jung (2012); Okiki (2013); Ogbomo (2010); Nagarkar (2014); Kumar; Dora and Desai (2015); Chikate & Waddhwana (2014); Veer & Kale (2014); Kumar; Dora & Desai (2015); Khandare (2014); Kandalkar (2014); Vasishta Seema (2011); Aswathy & Gopikuttan (2013); Khaparde (2013). While, some studies on Nigeria conducted by Uzun (2002); Aina and Mabawonku (1998); Arnachallam (1992); Nwagwu (2007); Chiemeke et al. (2009); Braimoh (1999); Agboola and Oduwole (2005); Ramsden (1994); Athey and Plotnicki (2000); Okafor and Dike (2010).

3. STATEMENT OF THE PROBLEM

The statement of the Research problem for the present study as "Authroship and Collaborative pattern: A Bibliometric study of the Research outputs by faculties in S.R.T.M. University, Nanded".

4. DEFINITIONAL ANALYSIS

Bibliometrics
Merton and Garfield defined it as "the field of inquiry given over to the quantitative analysis of science and scientific field".

Scientometrics

Sengupta viewed Scientometrics as "Organisation, classification and quantitative evaluation of publication pattern of all macro and micro communications along with their authorship by mathematical and statistical calculus". Broadus defined "Scientometrics is the quantitative study of physical published units or of bibliographic units or of surrogates of either".

University and Higher Education

India has one of the largest higher education systems in the World (UNESCO, 2006). Central government is responsible for major policy relating to higher education in the country. It provides grants to University Grants Commission (UGC) and establishes central Universities in the country. State governments are responsible for establishment of State University & colleges and provide plan grants for their development and non-plan grants for their maintenance through the Central Advisory Board of Education (CABE).

5. SCOPE AND LIMITATIONS OF THE STUDY

The following are the limitations of the present study

- This study is confined to the research output of faculties from six different schools only.
- Publications data published from 2009 to 2014 only taken up for the study.
-

6. OBJECTIVES OF THE STUDY

The major objectives of the study are as follows:

1. To identity the Year wise Authorship pattern
2. To know the Categories of Authors and Collaborative Research
3. To find out the Degree of Author Collaboration
4. To analyze the Relative Growth Rate [R(P)] And Doubling Time [Dt(p)]

5. To determine the Top ten most productive Authors

7. RESEARCH METHODOLOGY

The primary data for the present study has been collected through questionnaire and survey method and descriptive research method has been used. The collected data has been classified by using MS-Excel Software and statistical techniques such as frequency distribution, percentage analysis, degree of collaboration; relative growth rate and doubling time etc. have been employed.

8. DATA ANALYSIS AND INTERPRETATION

The data was analyzed using MS-Excel software based on the objectives of the present study. Further, it was presented in the form of tables, figures and graphs as per the various parameters. To measure productivity of faculties the collected data has been analyzed under following parameter, viz.

- Year wise Authorship pattern
- Categories of Authors and Collaborative Research
- Degree of Author Collaboration
- Relative Growth Rate [R(P)] And Doubling Time [Dt(p)]
- Top ten most productive Authors

8.1 Year wise Authorship Pattern

Table 8.1 shows the year wise authorship pattern of the research publications during the study period.

Table 8.1: Year wise Authorship pattern

Authorship pattern	2009	2010	2011	2012	2013	2014	Total	Percentage
Single	30	63	102	143	124	127	589	77.30%
Two	8	12	14	39	37	18	128	16.80%
Three	4	5	4	6	7	6	32	4.20%
More than three	2	1	2	3	3	2	13	1.70%
Total	**44** 5.77%	**81** 10.63%	**122** 16.01%	**191** 25.07%	**171** 22.44%	**153** 20.08%	**762** 100%	**100%**

It can be seen from *Table No. 8.1 and Figure No. 8.1* that year wise authorship pattern of publications during the study period taken. It was analyzed Single authored publications are higher with 589 (77.30%) publications followed by two authors i.e. 128 (16.80%) and 32 (4.20%) contributions was made by three authors respectively and only 13 (1.70%) contributions was made by more than three authors. The present analysis reveals that Single authorship is predominant on multi-authorship; as faculties were more likely to publish their research work as solo than collaborative research.

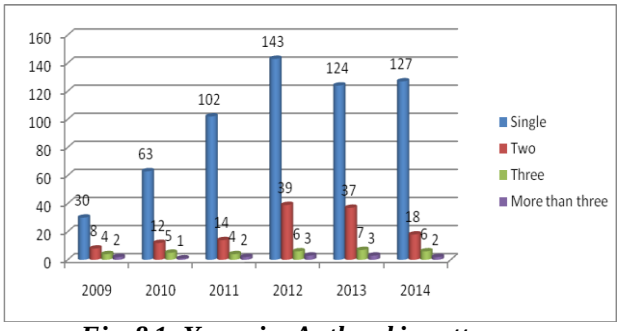


Fig. 8.1: Year wise Authorship pattern

8.2.Categories of Authors and Collaborative Research

Table 8.2 examines the Categories of Authors and Collaborative Research pattern among the faculties.

Table. 8.2: Categories of authors and Collaborative Research

Authorship pattern	Total Research Publications	&	Cumulative Res Publications	&
Single	589	77.30%	589	77.29%
Two	128	16.80%	717	94.09%
Three	32	4.20%	749	98.29%
More than three	13	1.70%	762	100%
Total	**762**	**100%**	--	--

It is seen from *Table No. 8.2 and Figure No. 8.2* that out of 762 research publications during the period of study, there were 589 (77.30%) articles written by single authors, 128 (16.80%) belonged to two-authored, 32 (4.20%) articles by three authors and

very less i.e. only 13(1.70%) articles were written by more than three authors. While, only 173 (22.70%) articles written by co-authors or multiple authors. It reveals that collaborative research was least preferred by the faculties.

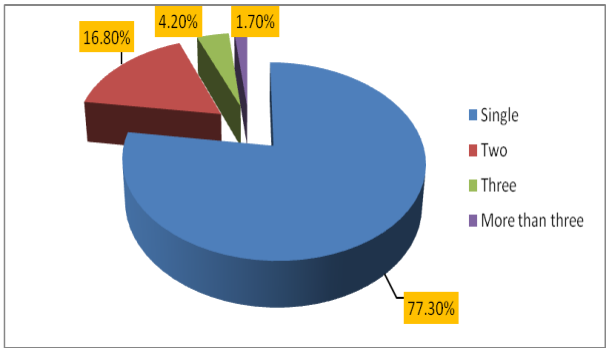


Fig. 8.2: Categories of authors and Collaborative Research

8.3 Collaborative Co-efficient Authorship Pattern

Table 8.3 analyzes Collaborative Co-efficient Authorship Pattern of the publications during the study period.

Table 8.3: Collaborative Co-efficient Authorship pattern

Number of authors' publications	Total Number of publications	Percentage of total publications	Value of per g_p = Nm / Nm+ Ns	Mean value	DC
Number of personal author publications	762	--	--		
Number of single author publications	589 (Ns)	77.29 %	0.77		
Number of Co-author publications	173 (Nm)	22.71 %	0.23	0.203	0.228
Tow authors publications	128	16.79 %	0.17		
Three authors publications	32	4.20%	0.04		
More than three authors publications	13	1.71%	0.01		

It is seen from *Table No. 8.3 and Figure No. 8.3* that out of 762 research publications during the period of study, single authored articles was 589 (77.30%), tow authored articles was 128 (16.80%) and three authored articles was 32 (4.20%) whereas; multiple authored articles was only 13(1.70%). It further shows that Single author publications were 77.29% and Co authored or collaborative publications were only 22.71%. While, It reveals that collaborative research was least preferred by the faculties. The mean value of group co-efficient (g^p) was only 0.203 while, DC= Degree of Collaboration is seen 0.228.

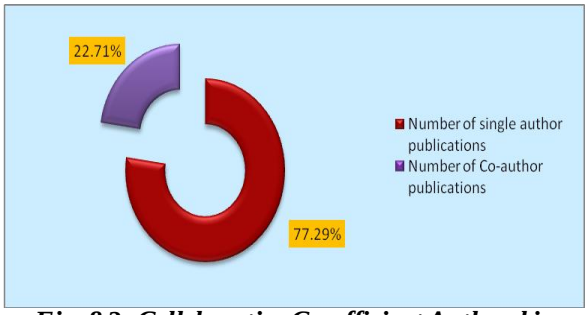


Fig. 8.3: Collaborative Co-efficient Authorship pattern

8.4 Degree of Author Collaboration

Table 8.4 analyzes Degree of Author collaboration of the publications during the study period. It can be seen that the Single authorship was predominant on of multi-authorship. The percentage of Single-authored papers was 77.30% and multi-authored papers were 22.71%. The Single authored papers are highest as compared to multi-authored papers as shown in the table. The C= Degree of collaboration (collaboration coefficient) among authors is measured mathematically as;

$$C = \frac{N_m}{N_m + N_s}$$

Where,

C = is the Degree of collaboration
Nm = is number of multi-authored papers and
Ns = is number of single-authored papers

Here,

C = NM / (NM + NS)
C = 173 / (589+173)
= 173 / 762
C = **0.228**

Table 8.4: Degree of Author Collaboration

Year	NS =No. of Single Authored publications	NM= No. of Multi Authored publications	Total	Degree of Collaboration C=NM/(NM+NS)	Mean Value
2009	30	14	44	0.31%	
2010	63	18	81	0.22%	
2011	102	20	122	0.16%	
2012	143	48	191	0.25%	0.228
2013	124	47	171	0.27%	
2014	127	26	153	0.16%	
Total	**589** (77.30%)	**173** (22.70%)	**762** (100%)	**1.37%**	

It is found from *Table No. 8.4 and Figure No. 8.4* that during the period under study the degree of author collaboration of publications is calculated and it varies from 0.31 to 0.16 and the total is found 1.37%. The mean value i.e. C= Degree of author collaboration is found to be 0.228. Therefore, the scope of collaborations was not much admired by the faculties under study as the degree of collaboration among the co-authors was very lowest and the authors prefer to work separately.

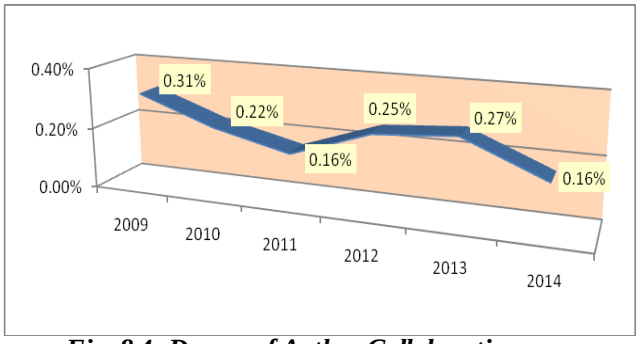


Fig. 8.4: Degree of Author Collaboration

8.5 Relative Growth Rate [R(P)] And Doubling Time [Dt(p)]

Table 8.5 derived The Relative Growth Rate [R(P)] and Doubling Time [Dt(P)] of publications. The relative growth rate (RGR) is the increase in number of articles/pages per unit of time. The Mean relative growth rate (R) over the specific period of interval can be calculated from the following equation.

Relative growth Rate (RGR)

$$\frac{1\text{-}2^{R}\ \text{Log}_{e\ 2}W\text{-}\log_{e\ 1}W}{2^{T}\text{-}1^{T}}$$

Here,

R(P) =Relative growth rate of articles over the specific period of time.

Log_e 1P = Log of initial number of articles.

Log_e 2P = Log of final number of articles.

$2^T - I^T$ = the unit differences between the initial time and final times.

Doubling time (Dt) is directly related to relative Growth rate (RGR). It is the time required for articles/pages to become double of the existing amount. Further, if the number of articles in subject doubles during a given period then difference between the logarithms of numbers at the beginning and at the end of the period must be the logarithm of the number 2 (Mahapatra, 1985). If number logarithm is used the value of Log2 is 0.693.

So the corresponding doubling time is calculated mathematically as:

$$Dt\ (p) = Log2/R\ (p) = 0.693/\ R(p)$$

In 2010,

$$0.693\ /1.04 = 0.66$$

Table 8.5: Relative Growth Rate [R(P)] And Doubling Time [Dt(p)]

Year	No. of Publications	Cumulative No. of Publications	Loge 1p	Loge 2p	[R(P)]	Mean [R(P)]	[Dt(P)]	Mean [(Dt(P)]
2009	44	44	-	3.78	-			

2010	81	125	3.78	4.82	1.04		0.66	
2011	122	247	4.82	5.5	0.68		1.01	
2012	191	438	5.5	6.08	0.58	**0.475**	1.19	**1.351**
2013	171	609	6.08	6.41	0.33		2.1	
2014	153	762	6.41	6.63	0.22		3.15	

It is observed from Table No. 8.5 and Figure No. 8.5 that Relative Growth Rate of publication [R (P)] decreased from the rate 1.04 in 2010 to 0.22 in 2014. The mean Relative Growth for the six years (i.e. 2009 to 2014) showed a growth rate of 0.475. The data reveals that Doubling Time [Dt (P)] steadily increased from 0.66 in 2009 to 3.15 in 2014. The mean Doubling Time was increased to 1.351 during the study period. Thus, as the rate of growth of publication was decreased, the corresponding Doubling Time was increased.

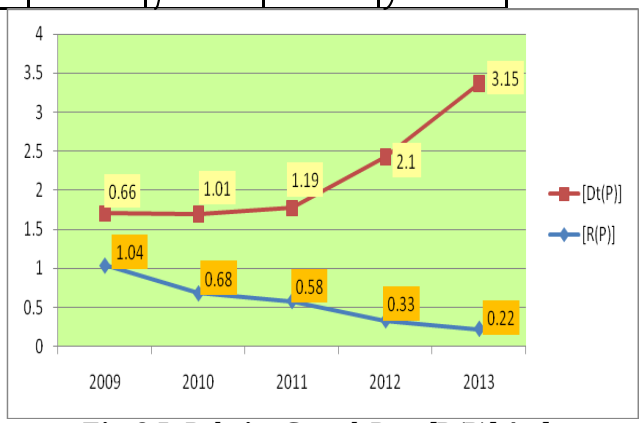


Fig. 8.5: Relative Growth Rate [R(P)] And Doubling Time [Dt(p)]

8.6 Top Ten Most Productive Authors during 2009-2014

Table 8.6 describes the top ten most productive authors during the study period. out of 45 Core faculty members taken under study the most productive Author during 2009-2014 having more than 60 publications

Table 8.6: Top ten most Productive authors during 2009-2014

Rank	Name of the Author	Journal articles	Conf. proceedings	Work shops	Books/Book chapters	Total	Percentage
I	Dr. Sinku Kumar S.	31	14	7	13	65	6.82
II	Dr. S. D. Pathak	24	9	6	4	43	4.51
III	Dr. (Mrs)V. N. Laturkar	16	15	7	2	40	4.20
IV	Dr. (Mrs.) V.N. Patil	23	10	4	2	39	4.09
V	Dr. D. M. Shinde	19	8	7	3	37	3.88
VI	Dr. J. V. Joshi	12	10	6	5	33	3.46
VII	Dr. R. D. Biradar	11	16	3	1	31	3.25
VIII	Dr. (Mrs) M.S. Deshpande	9	14	6	1	30	3.15
IX	Dr. B. R. Suryawanshi	8	15	6	0	29	3.04
IX	Prof. Prithviraj Taur	4	9	4	12	29	3.04
X	Dr. D.M. Khandare	5	12	6	5	28	2.94
X	Dr. (Mrs) S.Y. Patil	14	8	2	4	28	2.94

X	Mrs. U. S. Sarode	2	13	12	1	28	2.94
XI	Prof. B. S. Jadhav	3	14	8	2	27	2.83
XII	Dr. B. S. Mudholkar	9	8	7	0	24	2.52
XII	Dr. P. Vitthal	3	7	4	10	24	2.52
XIII	Dr. N. C. Dhande	10	7	4	1	22	2.31
XIV	Dr. C. R. Baviskar	4	10	4	3	21	2.20
XV	Prof. B. D. Kengale	7	9	4	0	20	2.10
XV	Prof. G. S. Yelne	8	7	3	2	20	2.10
XVI	Dr. V. R. Uttarwar	7	7	5	0	19	1.99
XVI	Dr. Ramesh Dhage	9	5	4	1	19	1.99
XVII	Dr. M. M. Joshi	4	7	4	3	18	1.89
XVII	Dr. A.P. Gingine	4	5	5	4	18	1.89
XVIII	Dr. R. N. Gonarkar	4	7	6	0	17	1.78
XIX	Dr. U. C. Sahoo	4	5	5	2	16	1.68
XIX	Dr. P. P. Lonarkar	7	6	3	0	16	1.68
XX	Dr. G. P. Mudholkar	4	6	5	0	15	1.57
XX	Dr. K. S. Deshmukh	4	5	2	4	15	1.57
XX	Dr. Bhagwan S. Jadhav	4	7	2	2	15	1.57
XX	Dr. (Mrs) S. B. Wadikar	3	5	3	4	15	1.57
XXI	Mohd. Zishan Ali	2	6	5	2	15	1.57
XXII	Dr. B. K. Mohan	3	6	4	1	14	1.47
XXII	Dr. U. D. Chavan	4	5	3	2	14	1.47
XXIII	Dr. R.V. Tehra	5	6	2	0	13	1.36
XXIII	Dr. B. C. Barik	3	6	2	2	13	1.36
XXIV	Dr. D. V. Chavan	3	5	2	2	12	1.26
XXIV	Mrs. Nina Gogate	3	5	4	0	12	1.26
XXIV	Dr. A. I. Shaikh	3	5	2	2	12	1.26
XXV	Dr. V. S. Anmulwad	3	4	3	1	11	1.15
XXV	Prof. S. M. Narangale	3	5	3	0	11	1.15
XXVI	Dr. (Mrs) Y. S. Satarkar	2	4	3	1	10	1.05
XXVI	Mrs. S. U. Kadam	4	4	2	0	10	1.05
XXVII	Prof. N.B.Bodhgire	1	2	2	0	5	0.52
XXVIII	Prof. Ramchandra Shelke	0	0	0	0	0	0.00
Total	**315**	**343**	**191**	**104**	**953**	**100%**	

It is seen from *Table No. 8.6 and Figure No. 8.6* that the Ist position was hold by Dr. Sinku Kumar S. from School of educational Sciences and was the most productive author among the faculties with largest publications i.e. 65 (6.82%) during the study period. The IInd position occupied by Dr. S. D. Pathak, School of Media studies having 43 (4.51%) publications followed by IIIrd position hold by Dr. (Mrs.) V.N. Laturkar School of Commerce & Management having 40 (4.20%) research contributions. Further, the IVth and Vth position secured by Dr. (Mrs.) V.N. Patil and Dr. D. M. Shinde having 39 (4.09%) and 37 (3.88%) contributions respectively. This is followed by Dr. J. V. Joshi and Dr. R. D. Biradar having 33 (3.46%) and

31 (3.25%) contributions each and so on. It can be revealed that more experience of faculty members involved doing more research activities.

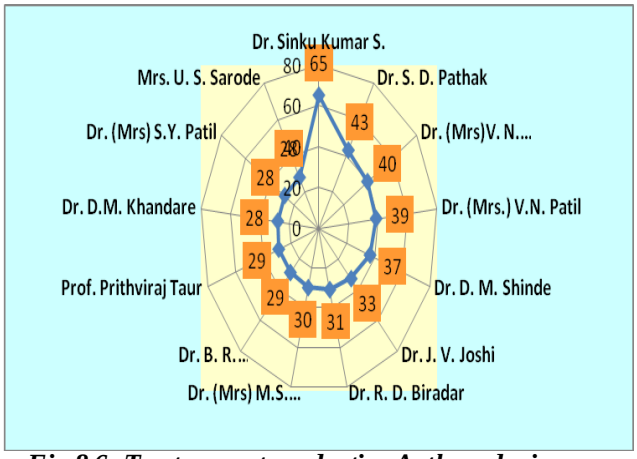


Fig.8.6: Top ten most productive Authors during 2009-2014

9. MAJOR FINDINGS AND CONCLUSIONS

1. It was seen that Single authored publications are higher with 589 (77.30%) publications.

2. It was found that Out of 762 research publications during the period of study, there were 589 (77.30%) articles written by single authors, 128 (16.80%) by two-authores, 32 (4.20%) articles by three authors.
3. The mean value of group co-efficient (g^p) was only 0.203 while, DC= Degree of Collaboration is seen 0.228.

4. The degree of author collaboration of publications is calculated and it varies from 0.31 to 0.16 and the total is found 1.37%.

5. The mean Relative Growth for the six years (i.e. 2009 to 2014) showed a growth rate of 0.475. The data reveals that Doubling Time [Dt (P)] steadily increased from 0.66 in 2009 to 3.15 in 2014.

6. It was revealed that Ist position was hold by Dr. Sinku Kumar S. from School of educational Sciences and was the most productive author among the faculties with largest publications i.e. 65 (6.82%) during the study period.

References

[1.] Sengupta, I.N. (1990). Bibliometrics and its applications. In Information Science and libraries, edited by Pushpa Dhyani. New Delhi: Atlantic, P. 256.

[2.] Broadus, R.N. (1987). Definition of Bibliometrics. Scientometrics, 12 (5-6), Pp. 373-79.

[3.] Merton, R.K. & Garfield, E. (1963). Foreword to little Science-big science and beyond by D.J. Solla Price. New York: Columbia University.

[4.] Pritchard, Alan (1969). Statistical bibliography or bibliometrics. *Journal Documentation*, 25(4), 348- 349.

[5.] Ramakrishna, J. & Ramesh babu (2007). Literature on hepatitis (1984-2003): A bibliometric analysis. *Annals of Library and Information Studies*, 54 (4), pp. 195-200.

[6.] Maharana, Rabindra K. & Das, Prangya (2013). Research publication trend of Utkal University's researchers indexed in Scopus during 2008 to 2012: a bibliometric analysis. *Library Philosophy and Practice (e-journal)*. Paper- 999. Available at: http://digitalcommons.unl.edu/libphilprac/999

[7.] Visakhi, P. & Gupta Ritu (2013) contribution and Impact of Faculty and Scholars of IISER, Mohali (A Scientometric study, 2008-2012). *Library Philosophy & Practice (e-journal)*, paper 1025.

[8.] Navaneethakrishnan Subramanian (2014) Authorship patterns & degree of Collaboration of Sri Lankan Scientific publications in Social Sciences & Humanities- A picture from SCOPUS. *Library Philosophy & Practice*. Paper 153.

[9.] Baskaran, C. (2013). Research Productivity of Alagappa University during 1999-2011: A Bibliometric study. *DESIDOC Journal of Library & Information technology*, 33 (3), 236-242.

[10.] 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), 3-3.