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Publication and Collaboration Pattern of College and Research Libraries Journal during 2009-2018: A Scientometric Analysis

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Abstract

This paper presents a scientometric analysis of the journal titled College and Research Libraries for the period between 2009 to 2018. The analysis focused on the distribution pattern of articles, the author's productivity, collaboration pattern and Collaborative coefficient, Relative Growth rate and doubling time. It showed that the highest 14.47% of articles were published in the year 2015. The majority of articles are singled authored with 35.02% of the total contribution. The degree of collaboration among the authors was found decent, the average growth rate was in an upward direction from beginning to latest years. Total 14942 citations were appended where the highest number of 2464 citations was appended in the year 2018 having 51.33 citations per paper.

Keywords: *Scientometric; Bibliometric; College and research libraries; Authorship pattern; Authorship Index; Modified collaborative co-efficient; Relative growth rate; Doubling time.*

1. INTRODUCTION

The word 'Bibliometrics' is derived from the Latin words 'Biblio' and the Greek word 'metrics', which means the application of Mathematics to the study of bibliography. It is the application of mathematics and statistics to books and other media of communication. The term was suggested by Alan Pritchard in the year 1969 (Pritchard,1969). The application of bibliometrics was used to analyze scientific communication of various aspects. Bibliometrics is a quantitative evaluation of publication patterns of all macro and micro communication along with their authorship by mathematical and statistical calculation. (Sengupta,1985)

Scientometric studies are used to identify the different patterns of publications, author productivity, citation impact, coverage, etc.

1.1 College and Research libraries journal

College and Research Libraries is a journal covering the technologies/fields/categories associated with Library and Information Sciences. It was established in December 1939 and was published by the Association of College and Research Libraries. It published quarterly for its first 18 years, then bi-monthly since 1956. The journal intended to help academic librarians to provide better services to the users. The journal is open to access since 2011 and freely accessible (<https://crl.acrl.org>). The journal is indexed in Scopus, Social Science Citation Index, and in many more databases. According to SCImago Journal Rank (SJR), this journal is ranked 1.674. The impact factor (IF) 2018 of College and Research Libraries is 1.76, which is computed in 2019. The h-index of the journal is 50 which means 50 articles of this journal have more than 50 citations. The main purpose of taking this journal for the study is that, it was found in the top open access library science journal indexed in the scopus database. (Source:<https://www.scimagojr.com/journalrank>)

2. REVIEW OF LITERATURE

A decent number of studies have been carried out in the top library science journals to notice the authorship trends, collaboration pattern, relative growth rate of different journals. The main purpose of taking those review of literature was to understand the different parameters and tools they have used in their study, so that it can give an idea to frame the objectives of the study. Some of the reviews are presented below.

Shukla and Verma (2018) analyzed the journal of Library Herald of 10 years (2008-2017). In their study, they examined and analyzed a total of 222 published articles for authorship pattern, most productive authors, geographical distribution, reference distribution, and authorship pattern of references. Based on their analysis they found that single-authored papers were most dominating by contributing 97 (43.68%) articles, followed by two authors with 87(39.18%) contributions. Out of all the countries, India has the highest number of contributions having 161(80.5%) publications, followed by Iran with 17 (8.50%) contributions. Dr. K.P. Singh was the most prolific author having 11 (31.43%) contributions securing the first rank. (Shukla & Verma, 2018)

Moyon and Shukla (2017) in their study of bibliometric analysis on International Research- Journal of Library and Information Science during the period (2011-2015) have found a total of 218 articles were published in the journal during their study period. The study examines and analyzed various bibliometric patterns such as authorship pattern, degree of collaboration, and geographical distribution of articles. They found that the two author's papers have the highest number of contributions having 45.87%. The average degree of collaboration is 0.66. based on geographical contribution national contribution was 69.72% and the rest 30.28% belongs to international contribution. (Moyon & Shukla, 2017)

Singh and Bebi (2014) in their bibliometric study of the journal Library Herald during the period of 2003-2012 and found that 234 journal articles were published, 114 (48.72%) articles were single-authored followed by double authored paper 90 (38.50%) articles, Nosrat Riahinia is the most productive author having the contribution of 16 articles during the period of study. (Singh & Bebi 2014)

Arik (2013) in his study 'A Bibliometric Analysis of a National Journal: The Case of the Turkish Journal of Psychology' found that 84.65% of total articles published in the journal are in Turkish. The single-authored paper was maximum and the highest number of authors were from Turkey followed by the USA and Canada. (Arik, 2013S)

Barik & Jena (2013) in their study a bibliometric study on the Journal of Knowledge Management Practice from the period 2008-2012. The study was of 180 articles from 21 volumes and found that the highest 23.3% articles were published in the year 2011. Single author contribution was highest. Based on geographical contribution USA has contributed the highest number of articles. (Barik & Jena, 2013)

Roy & Basak (2013) in their paper on the bibliometric study of 'Journal of Documentation: 2005-2010', observed that multi-authored papers are more than single-authored papers. Based on geographical distribution the United Kingdom has contributed the maximum number of papers. (Roy & Basak, 2013)

3. OBJECTIVES OF THE STUDY TO

- Find out the number of contributions, year-wise distribution, and growth of publication during the period of study.
- Identify authorship pattern, author's productivity.
- Examine the collaboration pattern, Collaborative coefficient, modified collaborative coefficient.
- Analyze the Relative Growth rate and Doubling time
- Find out the distribution of citations, length of references of published articles.

4. METHODOLOGY

This study is based on the articles published in College and research libraries during the period of 10 years i.e. 2009-2018. The data was collected from the website of C&RL (<https://crl.acrl.org>). A total number of 394 publication was found in 10 volumes. The data data was analyzed by MS excel 2013 software and tabulated for analysis. Further, the following scientometric tools have been employed to analyze the data.

ANNUAL GROWTH OF PUBLICATION

According to (Arora and Trivedi, 2012), The growth rate is calculated with the help of the following formula:

$$r = \frac{P1-P0}{P0} \times 100$$

Where, r = Publication growth in percentage

P0 = Number of publication in the base year

P1 = Number of publication in the present year

DEGREE OF COLLABORATION (DC): (Subramanyam, 1980) propounded the DC, a measure to calculate the proportion of single and multi-author papers and to interpret it as a degree. According to Subramanyam,

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

Where,

Nm = the number of multi-authored papers

Ns = the number of single-author papers

DC varies from 0 when all the papers have a single author to 1 when all the papers have more than one author. It can be easily calculated and can also be easily interpreted.

COLLABORATIVE COEFFICIENT

Ajiferuke et al. (1988) put forward the formula for collaboration coefficient (CC) as

$$CC = 1 - \frac{\sum_{j=1}^A \left(\frac{1}{j}\right) f_j}{N}$$

f_j denotes the number of j authored research papers

N denotes the total number of research papers published

k is the greatest number of authors per paper

It is detected by Ajiferuke, that the value of CC will be zero when single-authored papers dominant. This implication shows that higher the value of CC, means higher the probability of multi-authored papers.

MODIFIED COLLABORATIVE COEFFICIENT (MCC)

CC differentiates single and multiple authors. But it fails to yield 1 for maximal collaboration except when a number of authors is infinite. It was rectified by Savanur and Srikanth, (2010) by the factor $(1 - 1/A)$ with CC and enunciated as

$$MCC = (A/A-1) * \left\{ 1 - \frac{\sum_{j=1}^A \left(\frac{1}{j}\right) f_j}{N} \right\}$$

COLLABORATION INDEX (CI): Collaboration Index has been calculated by using the formula given by Lawani (1980). The Collaboration Index (CI) is the simplest index presently used to explore the literature, which is to be interpreted as the mean number of authors per paper.

$$CI = \frac{\sum_{j=1}^A j f_j}{N}$$

Where,

f_j is the number of J authored papers published in discipline during a certain period of time

N is the total number of research papers published in discipline during a certain period of time

Relative Growth Rate and Double Time

The growth rate of publication has been calculated based on RGR and Dt model, which is developed by Mahapatra in 1985. (Mahapatra, 1985)

The relative growth rate and doubling time is calculated using the following formula:

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

Where,

RGR = Growth Rate over the specific period of the interval,

W1 = Loge (natural log of the initial number of contributions)

W2 = Loge (natural log of the final number of contributions)

T1 = the unit of initial time

T2 = the unit of the final time

$$DoublingTime(Dt) = \frac{0.693}{R}$$

Where,

R= Growth rate

5. DATA ANALYSIS AND FINDINGS

5.1 Volume-wise distribution of contributions

Volume wise distribution states the number of publication published in different volumes of the particular year during the study period.

Table-1: Volume-wise distribution of contributions

Year	Vol.no.	Issue no.	Total publication	Percentage
2009	70	6	30	7.61
2010	71	6	33	8.38
2011	72	6	30	7.61
2012	73	6	30	7.61

2013	74	6	33	8.38
2014	75	6	41	10.41
2015	76	7	57	14.47
2016	77	6	43	10.91
2017	78	7	49	12.44
2018	79	7	48	12.18
	Total	63	394	100

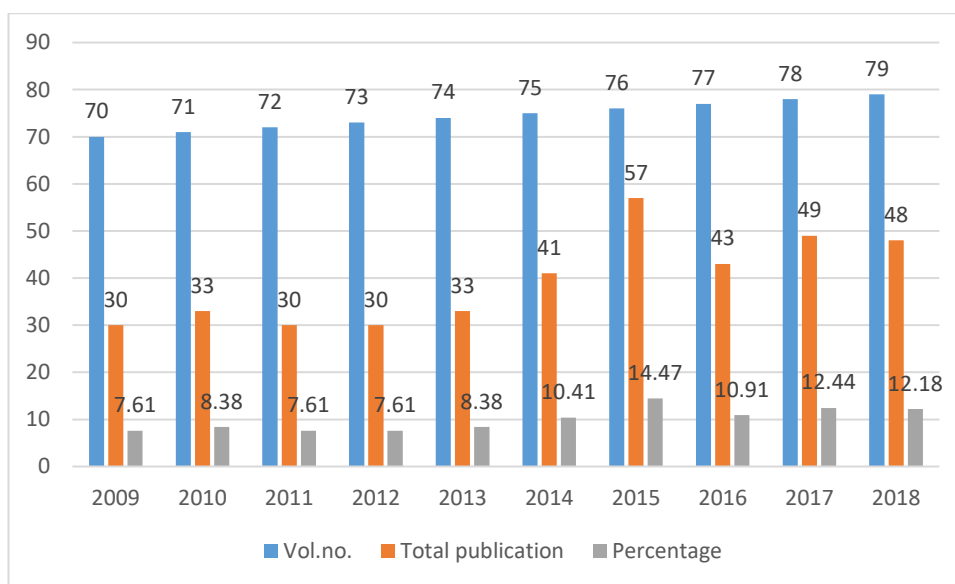


Figure-1: Volume-wise distribution of contributions

Table 1 and figure 1 depicts the volume-wise distribution of articles published from 2009 to 2018 and found that a total of 394 articles was published in 10 volumes with an average of 39.4 articles per year. The highest number of publications was observed in the year 2015 with 57 (14.47%), followed by 2017 with 49(12.44%) publications, 2018 with 48 (12.18%) publications. The lowest number of publications was found in the years 2009, 2011, and 2012 having the same number of publications with 30(7.61). The total number of the issue was 63 and on average published 6 papers per issue. It was noticed that the publication was gradually increasing from the early stage of publication year to later period. If we compare the highest and lowest year of publication it was more than 80% increased. It shows a positive uptrend in publication.

5.2 Annual growth of publication

Annual growth of publication denote the yearly growth of the publication of any journal from early period to later period.

Table-2: Annual growth of publication

Year	Total No. of papers	Annual Growth	Publication growth rate (%)
2009	30	0	0
2010	33	3	10.00
2011	30	-3	-9.09
2012	30	0	0.00
2013	33	3	10.00
2014	41	8	24.24
2015	57	16	39.02
2016	43	-14	-24.56
2017	49	6	13.95
2018	48	-1	-2.04
			Average: 6.15

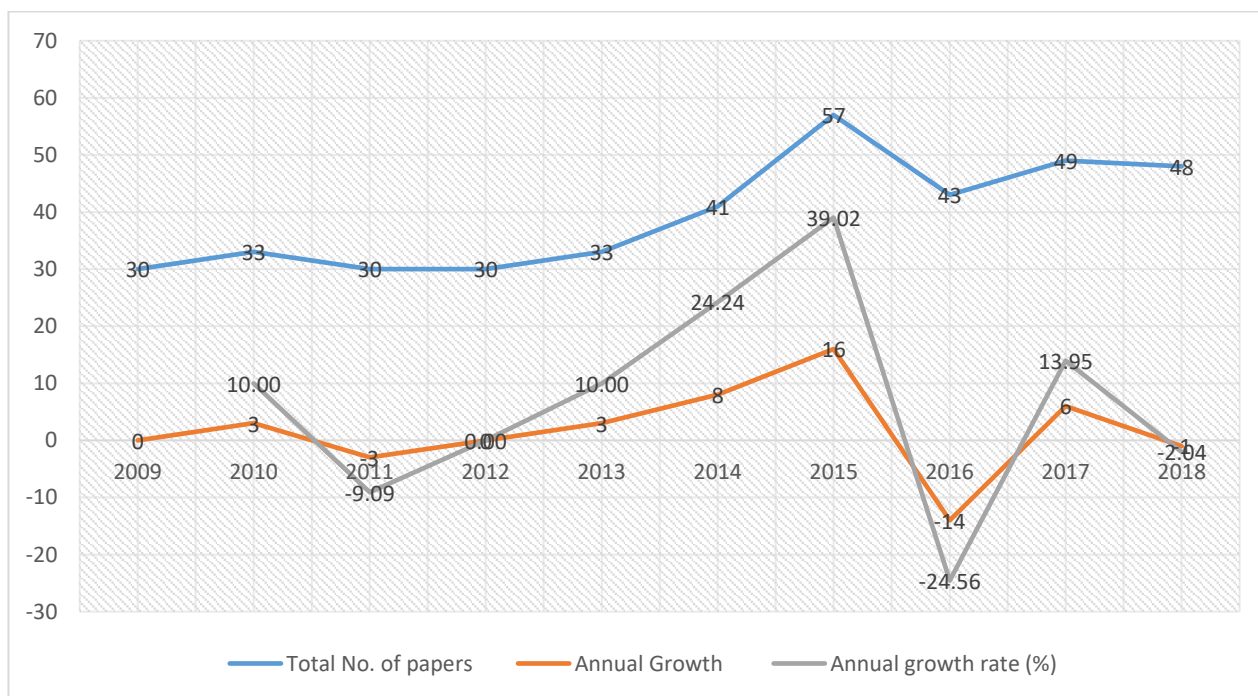


Figure-2: Annual growth of publication

To attain a summary of publication, the number of documents published during 2009-2018 shown in Table-2 and figure-2, which displays the variation in publication. A total of 394 articles were published with an annual average growth rate of 6.15%. From the study, it is found that years 2009 to 2010, 2012 to 2016, and 2016 to 2017 growth is positive but in the year 2010-2011, 2015 to 2016, and 2017 to 2018 growth are negative. The highest growth rate recorded in the year 2015 having a growth rate of 39.02% followed by the year 2014 having 24.24%. The result of annual growth depicts that in the maximum year the annual growth was positive except some of years. It clearly indicates that the publication was increasing yearly and researcher are also interested to publish their work in the journal.

5.3 Authorship pattern

Authorship study is a bibliometric study concentrated on authorship patterns. They portray writer qualities and creation of articles and level of joint effort of a particular gathering of writers.

Table-3: Authorship pattern wise distribution

Year	Number of author								Total
	1	2	3	4	5	6	7	More than 7	
2009	12	8	7	1	1	0	1	0	30
2010	17	9	5	2	0	0	0	0	33
2011	9	14	3	3	0	0	1	0	30
2012	12	11	5	1	1	0	0	0	30
2013	9	15	4	2	2	1	0	0	33
2014	13	12	9	5	0	1	0	1	41
2015	23	19	10	3	0	1	1	0	57
2016	14	16	9	2	1	1	0	0	43
2017	14	15	15	2	1	2	0	0	49
2018	15	15	9	4	3	2	0	0	48
Total	138	134	76	25	9	8	3	1	394
Percentage	35.02	34.01	19.28	6.35	2.28	2.03	0.76	0.25	

Table-3 shows the authorship pattern of articles published in college and research libraries journal and exposes that majority of publications are in form of a single author. There is a total of 394 papers published during 2009-2018 where 138 (35.02%) articles are single author, followed by two authors having 134(34.01%) publications, three authors having 76(19.28%) publications, four authors having 25 (6.35%) publications, five authors having 9 (2.28%) publications, six authors having 8 (2.03%) publications, seven authors having 3 (0.76%) publications and least more than seven authors only 1 (0.25%) publication out of total paper published

during the period. From the study it was revealed that single authors are much more active than joint authors to publish their article but two authors paper were also nearly equal to the single author publication.

5.4 Author productivity

Author productivity is the measurement where productivity of per author per paper and productivity of per paper per author of a particular year can be calculated.

Table-4: Author productivity wise distribution

Year	Total no. of papers	Total no. of authors	Average author per paper(AAPP)	Productivity per Author(PPA)
2009	30	65	2.16	0.46
2010	33	58	1.75	0.56
2011	30	65	2.16	0.46
2012	30	58	1.93	0.51
2013	33	75	2.27	0.44
2014	41	98	2.39	0.41
2015	57	116	2.03	0.49
2016	43	92	2.13	0.46
2017	49	114	2.32	0.42
2018	48	115	2.39	0.41
Total	394	856	2.17	0.46

Table 4 shows the data concerning author productivity and average author per paper. It was found that the average number of authors per article is 2.17 for 394 articles published between the periods 2009-2018. It is also clear from Table 4 that for the years 2009 & 2011 and 2014 & 2018 equal average number of authors per article was recorded i.e., 2.16 and 2.39 respectively. The average productivity per author for the period 2009-2018 is 0.46. The years 2009, 2011 & 2016 and 2014 & 2018 have recorded equal productivity per author i.e., 0.46 and 0.41 respectively.

From the above table it was found that per year the participation of authors are almost double to the publication and contribution of per paper per author is almost half i.e. less than one.

5.5 Degree of collaboration

The degree of collaboration is the proportion of the total number of publication published collaboratively to the total number of publication in the particular field during a specific period of time. Degree of collaboration varies from 0 when all the papers have a single author to 1 when all the papers have more than one author

Table-5: Degree of collaboration

Year	Single authored publications (N_s)	Multiple authored publications (N_m)	(N_s+N_m)	Degree of collaboration (DC)
2009	12	18	30	0.60
2010	17	16	33	0.48
2011	9	21	30	0.70
2012	12	18	30	0.60
2013	9	24	33	0.73
2014	13	28	41	0.68
2015	23	34	57	0.60
2016	14	29	43	0.67
2017	14	35	49	0.71
2018	15	33	48	0.69
Total	138	256	394	Average: 0.64

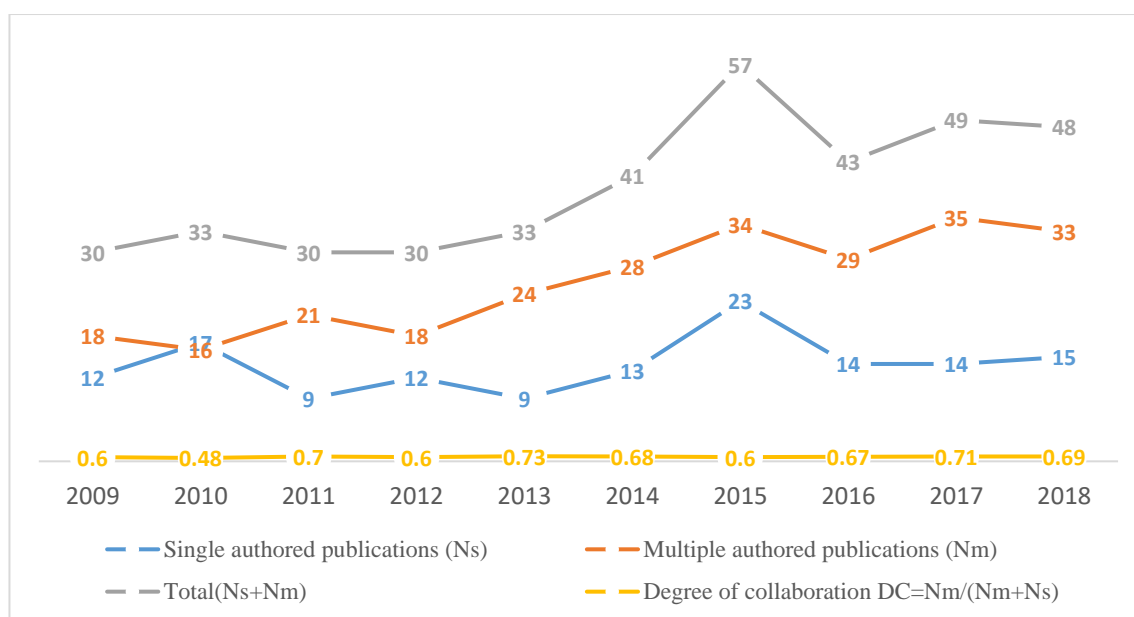


Figure-3: Degree of collaboration

Table-5 and figure-3 revealed the degree of collaboration of publications published during 2009- 2018 in the journal college and research libraries. In the degree of collaboration total of 138 articles are singled authored and 256 articles are multiple authored and the overall degree of collaboration is (DC=0.64). In the year 2013, there is highest (0.73) degree of collaborations followed by in the year 2017 having DC=0.71, degree of collaborations is lowest (0.48) in the year 2010. From the study it was found that average degree of collaboration is 0.64, which means multiple authors are dominating over the single author publications during the period of study. The value of degree of collaboration increases means domination of joint author papers increases.

5.6 Collaboration Index (CI)

Collaboration Index has been calculated by using the formula given by Lawani (1980). The Collaboration Index (CI) is the simplest index presently used to explore the literature, which is to be interpreted as the mean number of authors per paper.

Table- 6: Collaboration Index

Year	Number of author									Collaboration Index(CI)
	1	2	3	4	5	6	7	More than 7	Total	
2009	12	8	7	1	1	0	1	0	30	2.17
2010	17	9	5	2	0	0	0	0	33	1.76
2011	9	14	3	3	0	0	1	0	30	2.17
2012	12	11	5	1	1	0	0	0	30	1.93
2013	9	15	4	2	2	1	0	0	33	2.27
2014	13	12	9	5	0	1	0	1	41	2.39
2015	23	19	10	3	0	1	1	0	57	2.04
2016	14	16	9	2	1	1	0	0	43	2.14
2017	14	15	15	2	1	2	0	0	49	2.33
2018	15	15	9	4	3	2	0	0	48	2.40

Total	138	134	76	25	9	8	3	1	394	2.16
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Table 6 reveals that the collaboration index of the publications which are published during the study period. The average collaboration index of 2.16 has been recorded during the study period 2009-2018. The highest CI 2.40 was found in the year 2018 and the lowest CI 1.76 was found in the year 2010. From the above table the study reveals that average Collaboration index is 2.16, which means the average author per paper is more than 2 but less than 3.

5.7 Collaborative Coefficient

Collaborative coefficient was detected by Ajiferuke, which means the value of CC will be zero when single-authored papers dominant. This implication shows that the higher the value of CC means the higher the probability of multi-authored papers.

Table-7: Collaborative coefficient

year	Number of author									Collaborative coefficient(CC)
	1	2	3	4	5	6	7	8	Total	
2009	12	8	7	1	1	0	1	0	30	0.37
2010	17	9	5	2	0	0	0	0	33	0.28
2011	9	14	3	3	0	0	1	0	30	0.40
2012	12	11	5	1	1	0	0	0	30	0.35
2013	9	15	4	2	2	1	0	0	33	0.43
2014	13	12	9	5	0	1	0	1	41	0.43
2015	23	19	10	3	0	1	1	0	57	0.35
2016	14	16	9	2	1	1	0	0	43	0.40
2017	14	15	15	2	1	2	0	0	49	0.44
2018	15	15	9	4	3	2	0	0	48	0.43
Total	138	134	76	25	9	8	3	1	394	0.39

Table 7 revealed a better understanding of the collaborative coefficient during the period of study. The average collaborative coefficient of 0.39 was found during the year 2009-2018. The highest collaborative coefficient of 0.44 was counted in the year 2017, followed by the year 2013, 2014, 2018 with 0.43, and the lowest collaborative coefficient was in the year 2010 with 0.28. As the result shows that the value of collaborative

coefficient lies between 0 and 1, and it is tending towards the 1, which clearly shows that multi author papers are more domination over the single author paper.

5.8 Modified Collaborative Coefficient (MCC)

Collaborative Coefficient differentiates single and multiple authors. But it fails to yield 1 for maximal collaboration except when many authors are infinite.

Table- 8: Modified collaborative coefficient

year	Number of author									Modified Collaborative coefficient (MCC)
	1	2	3	4	5	6	7	8	Total	
2009	12	8	7	1	1	0	1	0	30	0.38
2010	17	9	5	2	0	0	0	0	33	0.29
2011	9	14	3	3	0	0	1	0	30	0.42
2012	12	11	5	1	1	0	0	0	30	0.36
2013	9	15	4	2	2	1	0	0	33	0.44
2014	13	12	9	5	0	1	0	1	41	0.44
2015	23	19	10	3	0	1	1	0	57	0.36
2016	14	16	9	2	1	1	0	0	43	0.41
2017	14	15	15	2	1	2	0	0	49	0.45
2018	15	15	9	4	3	2	0	0	48	0.44
Total	138	134	76	25	9	8	3	1	394	0.40

Table 8 revealed a better understanding of the modified collaborative coefficient during the period of study. The average modified collaborative coefficient of 0.40 was counted during the year 2009-2018. The highest

modified collaborative coefficient was found in the year 2017 with 0.45, followed by the years 2013, 2014, and 2018 with 0.44. The lowest modified collaborative coefficient was in the year 2010 with 0.29.

5.9 Relative Growth Rate and Double Time

Table- 9: Relative growth rate and double time of publication

year	Total No. of papers	Cumulative no. of articles	W1	W2	Relative Growth Rate(RGR)	Mean RGR	Doubling time (Dt)	Mean Dt
2009	30	30	0	3.40	-----	0.41	---	2.03
2010	33	63	3.40	4.14	0.74		0.93	
2011	30	93	4.14	4.53	0.39		1.78	
2012	30	123	4.53	4.81	0.28		2.48	
2013	33	156	4.81	5.05	0.24		2.92	
2014	41	197	5.05	5.28	0.23	0.19	2.97	4.00
2015	57	254	5.28	5.54	0.25		2.73	
2016	43	297	5.54	5.69	0.16		4.43	
2017	49	346	5.69	5.85	0.15		4.54	
2018	48	394	5.85	5.98	0.13		5.33	

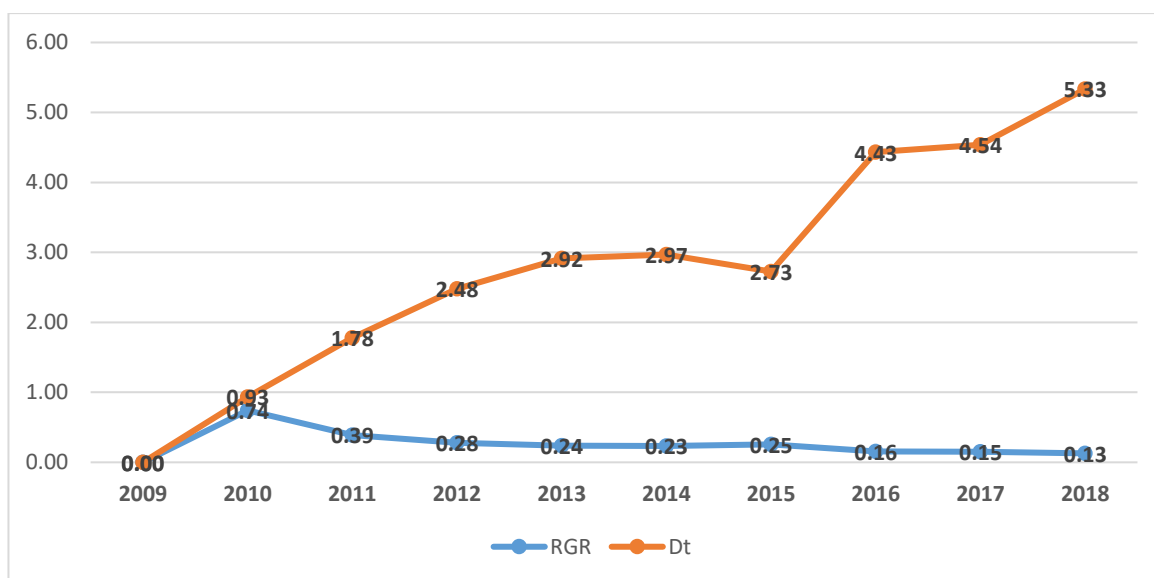


Figure-4: Relative growth rate and double time of publication

Table 9 and figure 4 shows that the relative growth rate and doubling time of publications published in college and research libraries journal during 2009-2018. It has been counted that the relative growth rate decrease from the rate of 0.74 to 0.13 from 2009 to 2018. The mean relative growth rate for the first five years during 2009-2013 is 0.41 whereas the remaining five years' mean growth rate is reduced to 0.19. It shows that there is a big difference in comparison to the first block. The corresponding doubling time (Dt) for different years is gradually increasing from 0.93 to 5.33 from 2009 to 2018. The mean rate of doubling time for the first five years is 2.03 and the remaining five years is 4.00. The rate of relative growth rate is decreasing when the corresponding doubling time is increasing during the study period. The study period has seen overall mean relative growth rate of publications is 0.30. It very well may be derived from the above table that the mean relative growth of article yield has demonstrated a declining pattern and doubling time shows an inclining pattern from later to early stage during period of study.

Table- 10: Relative Growth Rate and Double Time of Pages

Year	Publications	pages	Cumulative no. of pages	W1	W2	RGR	Mean RGR	Dt	Mean Dt
2009	30	412	412	0	6.02	----	0.35		1.5
2010	33	456	868	6.02	6.77	0.75		0.93	
2011	30	467	1335	6.77	7.20	0.43		1.61	
2012	30	498	1833	7.20	7.51	0.32		2.19	
2013	33	520	2353	7.51	7.76	0.25		2.77	
2014	41	856	3209	7.76	8.07	0.31	0.21	2.23	3.63
2015	57	935	4144	8.07	8.33	0.26		2.71	
2016	43	740	4884	8.33	8.49	0.16		4.22	
2017	49	882	5766	8.49	8.66	0.17		4.17	
2018	48	908	6674	8.66	8.81	0.15		4.74	

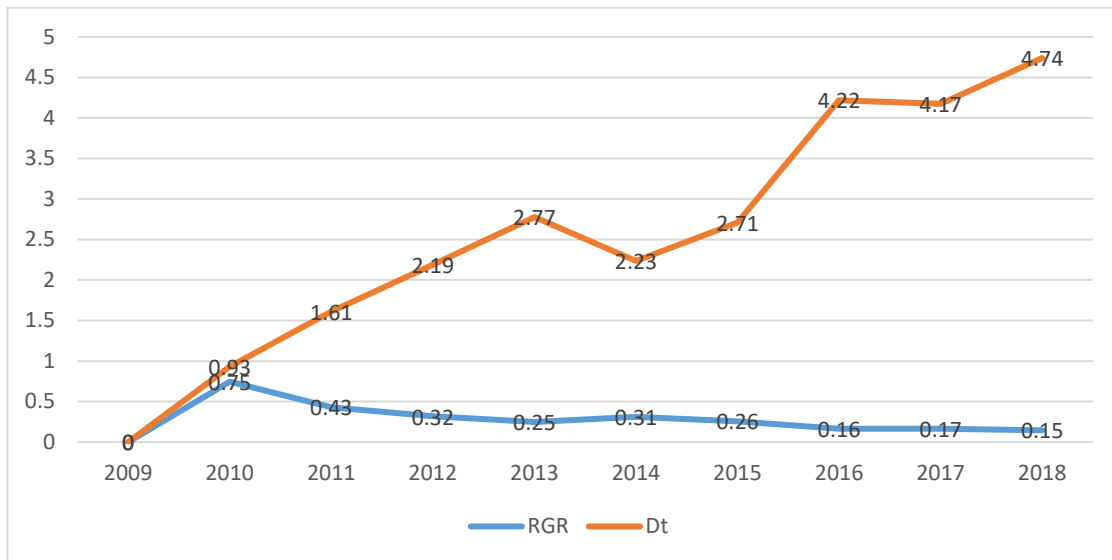


Figure-5: Relative growth rate and double time of pages

Table 10 and figure 5 shows that the relative growth rate and doubling time of pages of publications published in college and research libraries journal during 2009-2018. It has been counted that the relative growth rate decrease from the rate of 0.75 to 0.15 from 2009 to 2018. The mean relative growth rate for the first five years during 2009-2013 is 0.35 whereas the remaining five years' mean growth rate is reduced to 0.21. It shows that there is a big difference in comparison to the first block. The corresponding doubling time (Dt) for different years is gradually increasing from 0.93 to 4.74 from 2009 to 2018. The mean rate of doubling time for the first five years is 1.5 and the remaining five years is 3.63. The rate of relative growth rate is decreasing when the corresponding doubling time is increasing during the study period. The study period has seen overall mean relative growth rate of pages is 0.28. It very well may be derived from the above table that the mean relative growth of article yield has demonstrated a declining pattern and doubling time shows an inclining pattern.

5.10 Appearance of citations

Table-11: Year-wise appearance of citations

Year	Total publication	No.of citation	CPP
2009	30	915	30.50
2010	33	1138	34.48
2011	30	1053	35.10
2012	30	1011	33.70

2013	33	1155	35.00
2014	41	1868	45.56
2015	57	2013	35.32
2016	43	1515	35.23
2017	49	1810	36.94
2018	48	2464	51.33
Total	394	14942	Average: 37.92

Table 11 revealed the year wise appearance of citations during the period of study. It was found that in 394 publications total of 14942 citations were appended. The highest number of 2464 citations was appended in the year 2018 having 51.33 citations per paper, followed by 2013 citations in the year 2015 having 35.32 citations per paper. The year 2009 recorded the least number of citations 915 having 30.50 citations per paper. The average number of citations per paper is almost 38 (i.e, 37.92) citations per paper. It indicates that the authors have used different types of resources in their publications.

6. CONCLUSION

From the study scientometric analysis of college and research libraries journal, it was found that a total of 394 articles were published during the period 2009-2018. The highest (14.47%) articles were published in the year 2015. The average publication rate is (6.15%), whereas the highest (39.02%) was in the year 2015. The majority of articles are with a Single authorship pattern having 138(35.02%) of the total publication. In the collaborative authorship pattern, double authorship patterns were found maximum having 134(34.01%) publications. During the study average, author per paper was found at 2.17. Degree of collaboration, Collaboration index, collaborative coefficient, modified collaboration coefficient, relative growth rate, and doubling time was calculated by using different formulae from the data which was published during the study period. It was found that the average degree of collaboration 0.64, the average collaboration index was 2.16, the average collaboration coefficient 0.39, the average modified collaborative coefficient was 0.40 and the average relative growth rate, average doubling rate of publication were 0.30 and 3.01 respectively. It was found that in 394 publications total of 14942 citations were appended where the highest number of 2464 citations were appended in the year 2018 having 51.33 citations per paper. The study concludes that publications of articles in the studied journal are increasing day by day, authors are trying to increase the collaborative writings and they are using different sources for their articles which also increase other's citation index.

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