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# **Authorship and Collaboration Pattern of Annals of Library and Information Studies Journal during 2009-2018: Scientometrics Mapping**

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## **Abstract**

This paper presents a scientometric analysis of the journal titled Authorship and Collaboration Pattern of Annals of Library and Information Studies Journal during 2009-2018: Scientometrics Mapping. The analysis focused on the distribution pattern of articles, author's productivity, collaboration pattern and Collaborative coefficient and citation impact over time. It showed that the highest 12.57% of articles were published in the year 2010. The majority of articles are double authored with 47.03% of the total contribution. The degree of collaboration among the authors was found 0.66, which means collaborated papers are increasing. Total 2886 citations were appended where the highest number of 704 citations was appended in the starting year 2009 having 20.71 citations per paper.

**Keywords:** *Scientometric; Bibliometric; Annals of Library and Information Studies; ALIS journal; Authorship pattern; Modified collaborative co-efficient; Co-authorship Index.*

## **1. Introduction**

The term 'Bibliometrics' originated from the Latin term 'biblio' and the Greek term 'metrics', which means the application of Mathematics in the study of bibliography. It is the use of mathematics and statistics in books and other media of communication. The term was recommended by Alan Pritchard in the year 1969 (Pritchard, 1969)<sup>1</sup>. The term Scientometrics was coined by Vassily V Nalimov and Z M Mulchenko in 1969 which is equivalent to the Russian term 'Naukometriya'. As per Tague-Sutcliffe<sup>2</sup> Scientometrics is the study of the quantitative measures of science as a subject. The focus point of Scientometrics is the assessment of science and is in this way measurement of the growth, arrangement,

interrelationship, and efficiency of subjects (Hood and Wilson, 2001)<sup>3</sup>. Scholarly publications are the expressions of the scholarly ideas communicated through distributed writings whose key goal is to converse inventive thoughts to a particular field of information towards the further advancement of a subject. In this regard, scientometric study is viewed as one of the significant means of exploration in the field of Library and Information Science. In addition, scientometrics study utilized as an instrument in the assortment building strategy by giving the exact and truly necessary data to the collection managers to make the correct choice in the right time with regards to choose the documents and to archive them in their libraries. Relevantly, the current study endeavors to quantify the distribution pattern of a leading Indian alluded journal “Annals of Library and Information Studies (ALIS) from 2009 to 2018.

## **2. Source journal**

National Institute of Science Communication and Information Resources (NISCAIR)<sup>4</sup> appeared on 30 September 2002 with the merging of National Institute of Science Communication (NISCOM) and Indian National Scientific Documentation Center (INSDOC). Both NISCOM and INSDOC, the two head organizations of the Council of Scientific and Industrial Research (CSIR), were dedicated to the distribution and documentation of S&T information.

Annals of Library and Information studies which finished 64 years of journey in 2017 is the oldest enduring English language library and Information science journal published from India. The journal was started in 1954 by the past Indian National Scientific Documentation Center (INSDOC) as Annals of Library science with the Father of Indian Library Science, Dr. SR Ranganathan as its originator - Editor. In the ten years that he was Editor, he contributed 87 articles for this journal. In 1964, the journal was renamed as Annals of Library science and Documentation and in 2001 it was given its present name, Annals of Library and Information studies. (Source: <http://nopr.niscair.res.in/handle/123456789/66>)

## **3. Scope of the study**

The scope of the present study is limited to analyze the collaborative and authorship pattern of research papers published in Annals of Library and Information Studies journal based on scientometric parameters. The scope is further limited to the period of 10 years i.e. from 2009 to 2018.

#### 4. Review of literature

Yadav, Singh and Verma (2019)<sup>5</sup> have examined the authorship and collaboration pattern in SRELS Journal of Information Management for the period of 2008-2017. They have found that two authors' publications were dominating having 382 (66.09%) publications out of the total of 578 publications. Which means the journal is eminent for multiple authored publications. The analysis shows that the average collaboration coefficient, the collaboration index and degree of collaboration are 0.36, 1.86, and 0.66 respectively. Over all it can be say that the specifically high collaborative works has been initiated in this journal largely during the study period.

Mondal & Jana (2018)<sup>6</sup> examined collaboration and authorship patterns in leading Indian LIS journals. In this study, the authors considered the articles the published in leading LIS journal during 2012-2017. It was found that two authored papers are in the lead position having 48% compared to others. But multi-authored papers received more citations. It observed that the highest collaboration arises in intra-institutional and inter-institutions inside state level and recommended that the library and information science departments are also considered inter-departmental collaboration to bring out added excellence works for developing and advanced Research.

Singh (2017)<sup>7</sup> on a study authorship pattern and collaboration coefficient of Biotechnology research for sixteen years (2001-2016) in India using Scopus database, 18918 articles were considered for the study. He observed the mean author's article. He has used 5 scientometric tools to analyze the data and found that the collaboration coefficient was 0.63 for the study period in India. Multi-authored papers were dominating over the single-author paper. Maximum co-operative works were done rather than an individual. The average activity index of India was found to be 91.78 during the study and the year 2016 with 180.3 activity index was the highest and lowest with 42.38 in 2001.

Naheem and Shibu (2015)<sup>8</sup> investigated a study on Authorship Patterns and Collaborative Research in the Journal of Knowledge and Communication Management from (2011-2014). In which an aggregate of 46 articles was distributed in the journal and the examination look at and tracked down that the most noteworthy 22 articles (47.83%) were distributed by single writers, the normal number of writers each article of the general commitment is 1.67 and normal profitability each creator is 0.60, and the normal level of creator coordinated effort is 0.52.

Jeyasekar and Saravan (2014)<sup>9</sup> tried to comprehend the collaboration arrangement in forensic science researched published from India. A total of 2096 data was retrieved from the Scopus for the study. VOS viewer and Pajek software were used for visualization and data analysis. International collaboration Index for India was found 7.68 and the highest affinity Index affinity rate of 34.16.

Deshmukh (2011)<sup>10</sup> conducted a study on Annals of Library and Information Studies and analyzed a total of 326 articles and received a total number of 4141 citations during the period 1997 to 2010. Out of this, 4141 citations, 54.34% from journals, 17.47% from books, 12.25% from web resources, 6.79% from conference proceedings, 5.97% from institute publications, 1.49% from theses or dissertations, and so on. He also reported that the journal half-life period was 9.

## **5. Objectives of the Study**

The Objective of present study is to:

1. Identify the year-wise publication distribution and authorship pattern of Annals of Library and Information Studies (ALIS) journal during 2009-2018
2. Analyse the collaboration pattern, Collaborative coefficient, modified collaborative coefficient of ALIS journal
3. Examine the Co-authorship Index value and Visualize the co-authorship network of ALIS journal during study period
4. Ranked the most prolific authors of ALIS journal with their h-index
5. Analyse the citation impact of papers published in ALIS journal

## **6. Methodology**

The present study based on 342 articles distributed in 10 volumes published in ALIS Journal between the years 2009-2018. To accumulate the data all the articles within the timeframe were downloaded from main the website (<http://nopr.niscair.res.in>) of the source journal. The applicable data were arranged as per the necessity for analysis. The data were tabulated and analysed by using MS-Excel software and for visualization biblioshiny software was used. The data were scanned to study different aspects relating to collaboration index (CI), collaboration coefficient (CC), modified collaboration coefficient (MCC), degree of collaboration (DC) and Co-authorship index (CAI), Citation impact were calculated with by using respected equations and formulae.

## 6.1 Formulae used for analysis

- a. **Degree of collaboration (DC):** Subramanyam<sup>11</sup> in 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,

$$DC = Nm / (Ns + Nm)$$

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.

- b. **Collaboration index (CI):** Collaboration Index has been calculated by using the formula given by Lawani<sup>12</sup> in 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 the discipline during a certain period of time

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

- b. **Collaborative coefficient**

Ajiferuke<sup>13</sup> et. al. in 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 the higher the value of CC, means the higher the probability of multi-authored papers.

- c. **Modified collaborative coefficient (MCC)**

CC differentiates single and multiple authors. But it fails to yield 1 for maximal collaboration except when many authors are infinite. It was rectified by Savanur and Srikanth<sup>14</sup> in 2010 by the factor  $(1 - 1/A)$  with CC and enunciated as

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

- d. **Co-authorship Index**

Schubert and Braun<sup>15</sup> in 1986 elaborated CAI for the first time.

$$CAI = \frac{N_{ij}/N_{io}}{N_{oj}/N_{oo}} * 100$$

**Where**

N<sub>ij</sub> = Number of publications having j author for a particular block

N<sub>io</sub> = Total output for the particular block

N<sub>oj</sub> = Number of papers having j authors for all blocks

N<sub>oo</sub> = Total number of papers for all authors and all blocks

CAI = 100 The number of publications corresponds to the average within a co-authorship pattern.

CAI >100 The number of publications are higher than the average

CAI <100 The number of publications are lower than the average

**7. Data Analysis:**

**7.1 Year-wise distribution of contributions**

Table 1 depicts the year-wise distribution of the publication in Annals of Library and Information Studies (ALIS) from 2009 to 2018. It was observed that there are a total of 342 articles published in 10 volumes during the study period out of which the highest 43 (12.57%) articles published in the year 2010 followed by the year 2015 having 38 (11.11%) publications and the year 2011 having 36 (10.53%) publications. The lowest publication has been observed in the year 2012 with 27 (7.89%) publications.

**Table-1: Year-wise distribution of contributions**

Year	Vol.no.	Total publication	Percentage
2009	56	34	9.94
2010	57	43	12.57
2011	58	36	10.53
2012	59	27	7.89
2013	60	37	10.82
2014	61	35	10.23
2015	62	38	11.11
2016	63	32	9.36
2017	64	32	9.36
2018	65	28	8.19
	Total	342	100

## 7.2 Year-wise Authorship pattern of distribution

Table 2 described the year wise authorship distribution of publication published in the SRELS Journal of Information Management during the period of study and reveals that the highest 36 articles published in the year 2011 by double authors, highest 25 articles published by a single author in the years 2012 & 2013 both, in the year 2013 highest 11 articles published by three authors, in the year 2016 highest 6 articles published by four authors and in the year 2012 & 2014 highest 2 articles published by five authors.

**Table-2: Year-wise Authorship pattern of distribution**

Year	No. of Authors						Total
	1	2	3	4	5	6	
2009	6	20	8	0	0	0	34
2010	17	18	8	0	0	0	43
2011	14	14	7	0	0	1	36
2012	11	10	6	0	0	0	27
2013	12	18	5	0	1	1	37
2014	12	18	3	2	0	0	35
2015	18	14	4	1	1	0	38
2016	8	18	3	2	1	0	32
2017	9	17	6	0	0	0	32
2018	8	16	2	2	0	0	28
<b>Total</b>	<b>115</b>	<b>163</b>	<b>52</b>	<b>7</b>	<b>3</b>	<b>2</b>	<b>342</b>

## 7.3 Degree of collaboration

Table 3 shows the degree of collaboration of publications published during 2009- 2018 in the journal Annals of library and information studies. In the degree of collaboration total of 115 articles are singled authored and 227 articles are multiple-authored. In the year 2009, there is highest (0.82) degree of collaborations followed by in the year 2016 having DC=0.75, degree of collaborations is lowest (0.52) in the year 2015. From the study, it was found that the average degree of collaboration is 0.66, which means multiple authors are dominating over the single author publications during the period of study. The value of the degree of collaboration increases means the domination of joint author papers increases.



**Table-3: Degree of collaboration**

Year	Single authored publications ( $N_s$ )	Multiple authored publications ( $N_m$ )	( $N_s+N_m$ )	Degree of collaboration (DC)
2009	6	28	34	0.82
2010	17	26	43	0.60
2011	14	22	36	0.61
2012	11	16	27	0.59
2013	12	25	37	0.67
2014	12	23	35	0.65
2015	18	20	38	0.52
2016	8	24	32	0.75
2017	9	23	32	0.71
2018	8	20	28	0.71
Total	115	227	342	Average:0.66

**7.4 Collaboration Index**

Table 4 depicts that the collaboration index of the publications which are published during the study period. The average collaboration index of 1.91 has been recorded during the study period 2009-2018. The highest CI 2.05 was observed in the year 2009 and the lowest CI 1.76 was found in the year 2015. From the table, the study tells that the average Collaboration index is 1.91, which means the average author per paper is more than 1 but less than 2.

**Table- 4: Collaboration Index**

Year	No.of Authors						Total	Collaboration Index(CI)
	1	2	3	4	5	6		
2009	6	20	8	0	0	0	34	2.05
2010	17	18	8	0	0	0	43	1.83
2011	14	14	7	0	0	1	36	1.91
2012	11	10	6	0	0	0	27	1.81
2013	12	18	5	0	1	1	37	2.02
2014	12	18	3	2	0	0	35	1.85
2015	18	14	4	1	1	0	38	1.76
2016	8	18	3	2	1	0	32	2.09
2017	9	17	6	0	0	0	32	1.90
2018	8	16	2	2	0	0	28	1.92
Total	115	163	52	7	3	2	342	Average: 1.91

7.5

### Collaborative coefficient

Table 5 shows a better understanding of the collaborative coefficient during the period of study. The average collaborative coefficient of 0.36 was found during the year 2009-2018. The highest collaborative coefficient of 0.45 was counted in the year 2009, followed by the years 2016, 2017, 2018 with 0.42, 0.39, 0.38 respectively, and the lowest collaborative coefficient was found in the year 2015 with 0.29. As the result shows that the value of the collaborative coefficient lies between 0 and 1, and it is tending towards the 1, which clearly shows that multi-author papers are more dominating over the single-author paper.

**Table-5: Collaborative coefficient**

Year	No. of Authors						Total	Collaborative Coefficient(CC)
	1	2	3	4	5	6		
2009	6	20	8	0	0	0	34	0.45
2010	17	18	8	0	0	0	43	0.33
2011	14	14	7	0	0	1	36	0.34
2012	11	10	6	0	0	0	27	0.33
2013	12	18	5	0	1	1	37	0.37
2014	12	18	3	2	0	0	35	0.35
2015	18	14	4	1	1	0	38	0.29
2016	8	18	3	2	1	0	32	0.42
2017	9	17	6	0	0	0	32	0.39
2018	8	16	2	2	0	0	28	0.38
Total	115	163	52	7	3	2	342	Average: 0.36

### 7.6 Modified collaborative coefficient

Table 6 shows a better understanding of the modified collaborative coefficient during the period of study. The average modified collaborative coefficient of 0.37 was counted during the year 2009-2018. The highest modified collaborative coefficient was found in the year 2009 with 0.46, followed by the years 2016, 2017, and 2018 with 0.43, 0.40, and 0.39 respectively. The lowest modified collaborative coefficient was in the year 2015 with 0.30.

**Table- 6: Modified collaborative coefficient**

Year	1	2	3	4	5	6	Total	Modified Collaborative Coefficient(MCC)
2009	6	20	8	0	0	0	34	0.46
2010	17	18	8	0	0	0	43	0.34
2011	14	14	7	0	0	1	36	0.35
2012	11	10	6	0	0	0	27	0.34
2013	12	18	5	0	1	1	37	0.38
2014	12	18	3	2	0	0	35	0.36
2015	18	14	4	1	1	0	38	0.30
2016	8	18	3	2	1	0	32	0.43
2017	9	17	6	0	0	0	32	0.40
2018	8	16	2	2	0	0	28	0.39
<b>Total</b>	<b>115</b>	<b>163</b>	<b>52</b>	<b>7</b>	<b>3</b>	<b>2</b>	<b>342</b>	<b>Average: 0.37</b>

### 7.7 Co-authorship Index (CAI)

Table 7 specifies the calculated values of the Co-authorship Index (CAI) for publications having a single author, two authors, three authors, four authors, five authors, and six authors. From the table, we can see that the value of CAI for single authors is increasing gradually. The lowest 52.48 was observed in the year 2009 and the highest 121.16 was observed in the year 2012. This means there is a large increase in the single authorship concerning the overall output. In the case of double authorship, the highest CAI was found in the year 2009 and it was gradually going down except in some of the years. For three co-authors, it was above average in 2009-2012 but was de contributions 2013-2016, which means three authors' participation was decreasing. In the case of four authored papers, there were no contributions during 2009-20year concerning2014-2018 the participation came and CAI increased from 279.18 to 348.98. The highest CAI among all was found during the year 2011 concerning authors' contribution having six authored papers.

**Table-7: Co-authorship Index (CAI)**

Years	1 Authored Paper	CAI for 1 Author	2 Authored Paper	CAI for 2 Author	3 Authored Paper	CAI for 3 Author	4 Authored Paper	CAI for 4 Author	5 Authored Paper	CAI for Five Author	6 Authored Paper	CAI for Six Author	Total Papers
2009	6	52.48	20	123.42	8	154.75	0	0.00	0	0.00	0	0.00	34
2010	17	117.57	18	87.83	8	122.36	0	0.00	0	0.00	0	0.00	43
2011	14	115.65	14	81.60	7	127.88	0	0.00	0	0.00	1	475.00	36
2012	11	121.16	10	77.71	6	146.15	0	0.00	0	0.00	0	0.00	27
2013	12	96.45	18	102.07	5	88.88	0	0.00	1	308.11	1	462.16	37
2014	12	101.96	18	107.91	3	56.37	2	279.18	0	0.00	0	0.00	35
2015	18	140.87	14	77.30	4	69.23	1	128.57	1	300.00	0	0.00	38
2016	8	74.35	18	118.02	3	61.66	2	305.36	1	356.25	0	0.00	32
2017	9	83.64	17	111.46	6	123.32	0	0.00	0	0.00	0	0.00	32
2018	8	84.97	16	119.89	2	46.98	2	348.98	0	0.00	0	0.00	28

### 7.8 Most Prolific authors

During the study period 2009 to 2018, a total of 723 authors were contributed to ALIS journal. In Table 8, it represents the most productive author Sen, B. K. (26 articles; 127 citations), followed by Garg, K. C. (15 articles; 151 citations), Gupta, B. M. (12 articles; 180 citations), Dutta, Bidyarthi (9 articles, 31 citations) and so on. It also specified the top ten authors and their publication, received the citation, citation per paper, and h-index as found from the Google Scholar database. From the table, it was observed that Sen, B. K., Garg, K. C., and Gupta, B. M. published the maximum number of articles and they received the highest citation. So, we can say that they have been senior researchers in this subject field. Mukherjee, Bhaskar (6 articles; 59 citations) and Dutt, Bharvi (6 articles; 58 citations) published a small count of papers but their average citation per paper were 9.83 and 9.67 respectively.

**Table-8: Top 10 Authors**

Authors	No. of publications	Total Citation	Citation per paper	H-Index
Sen, B.K	26	127	4.88	20
Garg, K.C	15	151	10.07	23
Gupta, B.M	12	180	15	-
Dutta, Bidyarthi	9	31	3.44	6

Ray, Partha Pratim	7	7	1	2
Mukharjee, Bhaskar	6	59	9.83	14
Dutt, Bharvi	6	58	9.67	12
Kumar, Suresh	6	31	5.17	-
Nikin, Khaiser	5	48	9.6	7
Ram, Shir	5	33	6.6	8

### 7.9 Collaboration network of authors

The collaborative network of authors shown in figure 1 generated through ‘Biblioshiny App’ of ‘Bibliometrix’ software demonstrates that 7 main clusters given no normalization, an automatic network layout, Louvain clustering algorithm, removal of isolated nodes, a minimum of 2 edges, and 20 labels were considered. The main authors of each cluster were Sen, B.K, Garg, K.C, Kumar,V, Dhawan, S.M, Harinarayan, N.S, Dutt, B, Nishy, P. The network shows that Sen, B.K has a strong and highest collaboration with three other authors Dutta, B, Ray, P.P and Koley, S in the same cluster. A weak collaboration was observed between the author Nishy,P and Dutta, N.S in the journal of Annals of library and information studies.

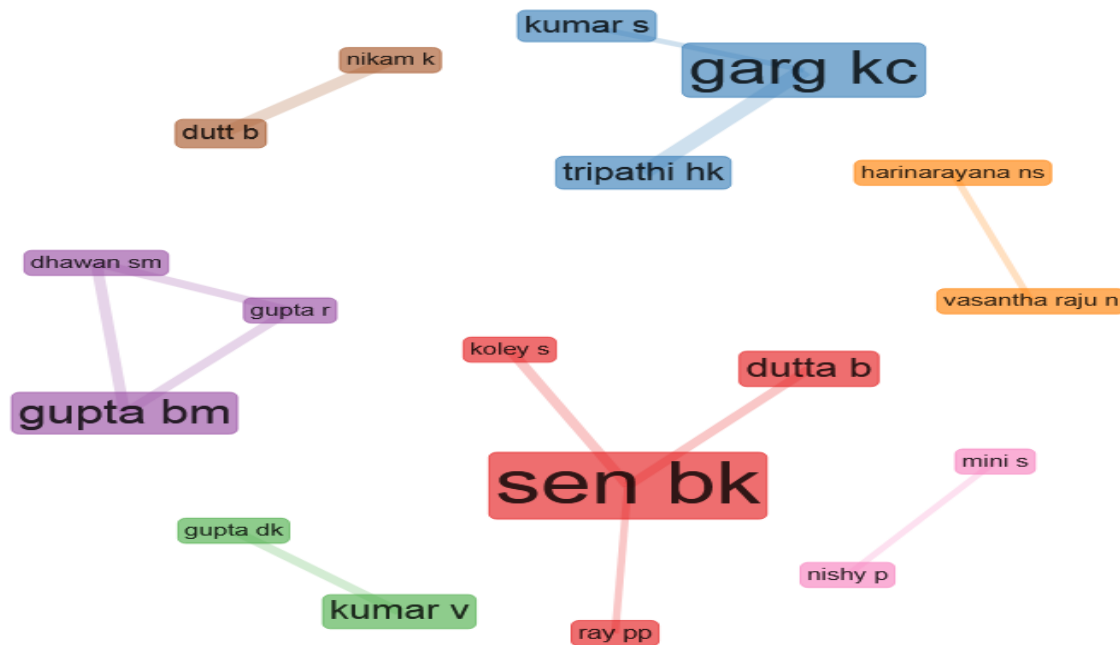


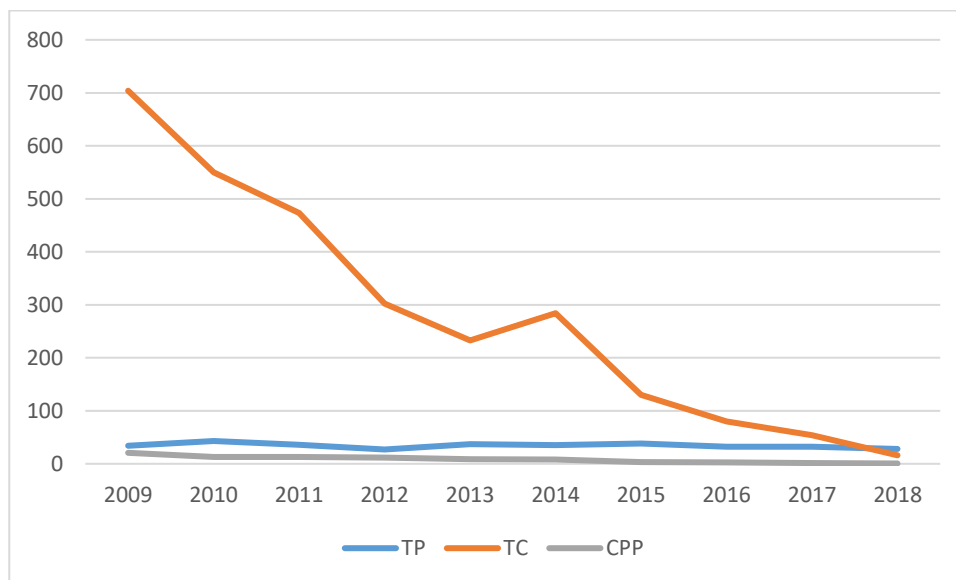
Figure-1: Collaboration network of authors

### 7.10 Citation impact wise distribution

During the study period, contributors across the globe received a total number of 2886 citations from various Top journals. Though, out of 2886 citations, the highest citation was observed in the years 2009 and 2008 correspondingly. Table 10 and Figure 2 showed that, in the year 2009, 34 articles got 704 citations and an average of 20.71 citations received per paper. In the current few years, the citation acceptance tendency constantly decreasing due to the journal citation half-life.

**Table-10: Year-wise citation**

Year	TP	TC	CPP
2009	34	704	20.71
2010	43	550	12.79
2011	36	473	13.14
2012	27	302	11.86
2013	37	233	8.63
2014	35	284	8.11
2015	38	130	3.42
2016	32	80	2.5
2017	32	54	1.69
2018	28	16	0.57
Total	342	2886	Average: 8.34



**Figure-2: Year-wise citation**

## 8. Discussion and conclusion

The study ascertained the collaboration pattern of one of the most reputed journals published from India namely Annals of Library and Information studies. For the study, a total number of 342 articles were considered from the source journal during the study period and assumed that publications are in a small range. The trend in co-authorship pattern was growing in nature was observed from the values of collaboration co-efficient and co-authorship index value and analysis of the collaborative behaviour of authors of the journal which implies that authors are interested to work collaboratively rather than individually. The more collaboration work led to get more visibility worldwide and get the most citation to increase the value of paper as well the reputation of the journal. A total number of 2886 citations received from 342 articles having an average citation of 8.34. The analysis of findings reveals that an acceptable research output has been observed in the study and suggest that publishing good works in this journal will increase the potential of the work and can also be recommended to get subscribed by the different LIS schools to get the intellectual idea to conduct other scholarly research in LIS field.

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