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Authorship and Collaboration Pattern in SRELS Journal of Information Management during 2008-2017: An Evaluation

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Abstract

The present study is an evaluation of authorship and collaboration pattern in SRELS Journal of Information Management during 2008-2017. Total 578 articles published during the study period out of which 196 articles are published by single author and rest 386 articles are published by two or more than two authors. It is clear from the study that multiple authorship pattern is prominent in the journal. In the study it has been counted that the average collaboration index is 1.86, average collaboration coefficient is 0.36, average degree of collaboration is 0.66, average relative growth rate is 0.32 and average doubling time is 3.40 during 2008-2017. The highest activity index for India is counted in the year 2009 and lowest activity index is counted in the year 2013.

Keywords: Collaboration Index, Degree of Collaboration, Collaboration Coefficient, Modified Collaboration Coefficient, Relative Growth Rate, Doubling Time, Activity Index, Authorship Pattern, SRELS Journal of Information Management

Introduction

Collaboration coefficient (CC) is a measure of collaboration in research that reproduces in the mean number of authors per paper and the proportion of multi-authored papers. Writing of articles with co-authorship is one of the indicators of reliability in scientific articles. Generally the recent researches are shows that the research output has vastly with joint authors compared than the individual contribution. Scientific cooperation is one of the main features of the scientific research that is increasing rapidly and research collaboration in writing articles is one of the indicators that study credit for scientific articles. Due to growing of scientific articles it makes more dynamic to the researchers to do a joint researches. Scientific collaboration between writers is in the development process of scientific research collaboration of all researchers and scientists. Thus, collaboration is one of the implements of

scientific growth so that collaboration of researchers in generating scientific articles have complex structure. The relationship between collaboration and productivity depending on the number of partners in present scenario the major trends in collaboration are increasing. The main advantages of scientific collaboration are accessing the various ideas and sources, exchange of information, learning new skills, more efficiency and higher quality of results and improve the quality of the articles.

SRELS Journal of Information Management: An Overview

The SRELS Journal of Information Management was founded in 1964 by Dr. S. R. Ranganathan and was known as 'Library Science with a slant to Documentation' . The title was changed to 'Library Science with a slant to Documentation and Information Studies' from Vol. 25 in 1988 and then to 'SRELS Journal of Information Management' from Vol. 37 in 2000. This journal is peer-reviewed and publishes scholarly articles in the fields of library and information science and services. The SRELS Journal of Information Management is published bimonthly and completed 50 years of publication in 2013. The leading goals of this journal have enhanced the library and information services in India, train library and information service workforces, promote the provision of proficient library and information service and apply research results of library and information studies (http://www.srels.org/).

Literature Review

Mondal & Jana (2018) mapped to depict the collaboration and authorship trend in leading Indian LIS journal. In this paper the published articles in leading LIS journal are consider during the years 2012-2017. The study evaluated the collaborative authorship trend on using different parameters and it was found that two-authored articles are dominating with (48%) in LIS publications and multi-authorship is also received highest average citation in collaboration. It found that the maximum collaboration occurs in intra-institutional and inter-institutions within state level and suggested that the LIS schools are also consider inter-departmental collaboration to produce more quality works for emerging and innovative research.

Singh (2017) examine authorship pattern and collaboration coefficient of India in Biotechnology research for sixteen years (2001-2016) with 18918 articles which were collected from the Scopus database. Five scientometric tools were used for the data analysis. It was found that the average number of authors per articles for India was 4.92. The collaboration coefficient was 0.63 for the study period in India. It found that multi-authored articles are higher in average in the comparison of single-authored articles. The relative growth rate was decreasing and the corresponding doubling time was gradually increased

during the study period. The majority of the researchers was collaborative research rather than individual research. The average activity index of India was 91.78 during the study period and the highest activity index was counted in the year 2016 with 180.3 while the lowest counted in the year 2001with 42.38.

Garg & Dwivedi (2014) examine the collaboration pattern in the discipline of Japanese encephalitis. The study was based on 2074 articles indexed by Science Citation Index published by various countries in the discipline of Japanese encephalitis during 1991-2010. It found that Japanese encephalitis is a highly collaborative discipline as values of co-authorship index and the collaboration coefficient for different countries. About two-thirds were written in collaboration from total published articles during the period of study. The domestic collaboration was very high which is 478 (23%) out of all the published articles and 478 (23%) was with international collaboration. USA is the most collaborating country among all the countries. The study also indicates that collaboration was increased four times during 2001-2010 as compared to 1991-2000. The highest six institutions from India was highly collaborative among all the 17 institutions and Liverpool University had the highest internationally collaboration.

Siamaki et al. (2014) conducted a study on collaboration and co-authorship patterns in library and information science studies in Iran between the year 2005-2009. Total 942 articles were published in Iranian library and information science journals during the study period out of which 506 (53.70%) articles were published by single researchers and 436 (46.30%) were collaborative between two or more authors. It found that the average collaboration coefficient was 0.23 during the period of study. The highest average collaboration index was 1.92 authors per articles was seen in the year 1388. During the study, it was found that the national journal of librarianship and information organization have the top rank among all the journal during the study.

Heidari & Safavi (2013) conducted a survey for collaborative coefficient of articles publishes in Iranian journal of pathology during 2006-2012. It was found that total 288 articles with 1078 authors published during the period of study. The average number of authors was 3.75±1.65 and maximum articles were written by three authors. The collaborative coefficient was higher in the year 2008 and average collaboration coefficient was 0.69 during the study period. It found that the collaboration pattern was high during the study period.

Heydari & Safavi (2012) examine the server of collaborative coefficient of article authors in the journal of research in medical sciences since 2007 to 2011. The study was a cross-sectional study on the research society and it included all the articles published during the study period which was published in the journal of research in medical sciences. Total 250

articles were published by the 1020 authors and the average number of authors for each article was 4.08±1.94. From the total author female authors was 35.39% during the study period. The average collaboration coefficient was 0.71.

Savanur & Srikanth (2010) define modified collaborative coefficient which was a new measurement for measuring degree of collaboration in the field of research. In this research, it proposed a simple modification of collaboration coefficient which was called modified collaboration coefficient and discuss many mathematical measurements for collaboration coefficient. It also suggested that if modified collaboration coefficient tends to 1 then the degree of collaboration becomes maximum and collaboration is 100%.

Objectives of the Study

1. To know the year wise publication distribution pattern.
2. To measure the collaboration index, collaboration coefficient, degree of collaboration and modified collaboration coefficient.
3. To measure the activity index.
4. To find out authorship pattern.
5. To know the relative growth rate and doubling time.

Methodology

The current study based on 578 articles published in SRELS Journal of Information Management between the years 2008-2017. In order to collect the data all the articles were downloaded with a personal computer from the main website (http://www.srels.org/) of the proposed journal then the data were examined and analyzed with the help of MS-Excel software. The data was compiled and scanned to study various aspects pertaining to collaboration index (CI), collaboration coefficient (CC), modified collaboration coefficient (MCC), degree of collaboration (DC) and relative growth rate was calculated with the help of respected equations.

Data Analysis

Year Wise Distribution of Publication

Table 1 shows that year wise distribution of publication in SRELS Journal of Information Management during the period of 2008-2017. It found that there are total 578 articles published during the study period out of which maximum 71 (12.28%) articles are published in the year 2013 followed by the year 2012 is second highest publications with 68 (11.76%) articles and year 2016 is a third highest publication with 64 (11.07%) articles. The lowest publication has been counted in the year 2017 with 47 (8.13%) articles.

Table- 1: Year Wise Distribution of Publication

Year	Total No. of articles	Percentage
2008	50	8.65
2009	48	8.30
2010	62	10.73
2011	62	10.73
2012	68	11.76
2013	71	12.28
2014	46	7.96
2015	60	10.38
2016	64	11.07
2017	47	8.13
Total	**578**	**100.00**

Year Wise Authorship Distribution of Publication

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 year 2011 by double authors, highest 25 articles published by single author in year 2012&2013 both, in year 2013 highest 11 articles published by three authors, in year 2016 highest 6 articles published by four authors and in year 2012&2014 highest 2 articles published by five authors.

Table- 2: Year Wise Authorship Distribution of Publication

Year	Single Authored Paper	Two Authored Paper	Three Authored Paper	Four Authored Paper	Five Authored Paper	Total
2008	18	26	5	1	0	50
2009	19	26	3	0	0	48
2010	18	31	10	3	0	62
2011	19	36	4	2	1	62
2012	25	33	8	0	2	68
2013	25	35	11	0	0	71
2014	9	25	10	0	2	46
2015	21	32	6	1	0	60
2016	24	26	8	6	0	64
2017	18	22	6	1	0	47
Total	**196**	**292**	**71**	**14**	**5**	**578**

Collaboration Index

Table 3 shows that the collaboration index of the publications which are published during the study period. The average collaboration index 1.86 has been counted during the study period 2008-2017. The highest CI 2.15 found in the year 2014 and the lowest CI 1.67 found in the year 2009.

The collaboration Index (CI) counted by the formula which is suggested by the Lawani (1980) as:

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

Where,

j = the number authors in an article i.e. 1, 2, 3 ……

fj = the number of j authored articles

N = the total number of articles published in a year, and

A = the total number of authors per articles

Hence, table 3 is calculated by the using above formula thus:

CI for 2008 is

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

$$= \frac{(1 \times 18) + (2 \times 26) + (3 \times 5) + (4 \times 1) + (5 \times 0)}{50}$$

$$= \frac{(18) + (52) + (15) + (4) + (0)}{50}$$

$$= \frac{89}{50}$$

$$= 1.78$$

Similarly, the value of CI is calculated for all the corresponding years.

Table- 3: Collaboration Index

Year	Single Authored Paper	Two Authored Paper	Three Authored Paper	Four Authored Paper	Five Authored Paper	Total	Collaboration Index
2008	18	26	5	1	0	50	1.78
2009	19	26	3	0	0	48	1.67
2010	18	31	10	3	0	62	1.97
2011	19	36	4	2	1	62	1.87
2012	25	33	8	0	2	68	1.84
2013	25	35	11	0	0	71	1.80
2014	9	25	10	0	2	46	2.15
2015	21	32	6	1	0	60	1.78
2016	24	26	8	6	0	64	1.94
2017	18	22	6	1	0	47	1.79

Total	**196**	**292**	**71**	**14**	**5**	**578**	**1.86**

Degree of Collaboration

Table 4 determines the degree of collaboration during the study period. The average degree of collaboration 0.66 has been counted during the period of study. The maximum average degree of collaboration is in the year 2014 which is 0.80, followed by 0.71 is in the year 2010. The lowest average degree of collaboration is 0.62 is in the year 2017.

The degree of collaboration (DC) counted by the formula which is suggested by the Subramanyam (1983) as mention below:

$$\mathrm{DC} = 1 - \frac{f1}{N}$$

Where,

f_1 = the number of single-authored articles

N = the total number of articles published in a year

Hence,

DC for the year 2008 is:

$$\mathrm{DC} = 1 - \frac{f1}{N}$$
$$= 1 - \frac{18}{50}$$
$$= 1 - 0.36$$
$$= 0.64$$

Similarly, the value of DC is calculated for all the corresponding years.

Table- 4: Degree of Collaboration

Year	Single Authored Paper	Multiple Authored Paper	Total	Degree of Collaboration
2008	18	32	50	0.64
2009	19	29	48	0.60
2010	18	44	62	0.71
2011	19	43	62	0.69
2012	25	43	68	0.63
2013	25	46	71	0.65
2014	9	37	46	0.80
2015	21	39	60	0.65
2016	24	40	64	0.63
2017	18	29	47	0.62
Total	**196**	**382**	**578**	**0.66**

Collaboration Coefficient

Table 5 has been shaped with the assessment to give a better understanding of collaboration coefficient during the period of study. The average collaboration coefficient 0.36 has been counted during the year 2008-2017. The highest collaboration coefficient is counted in the year 2014 with 0.45, followed by the year 2010 with 0.39 and the lowest collaboration coefficient is in the year 2009 with 0.31.

The collaboration coefficient (CC) counted by the formula which is suggested by the Ajiferuke et al. (1988) as mention below:

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

Where,

j = the number authors in an article i.e. 1, 2, 3 ……

fj = the number of j authored articles

N = the total number of articles published in a year, and

A = the total number of authors per articles

Thus, table 5 is calculated by the using above formula thus:

CC for 2008 is

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

$$= 1 - \frac{\left(\frac{1}{1}\times 18\right) + \left(\frac{1}{2}\times 26\right) + \left(\frac{1}{3}\times 5\right) + \left(\frac{1}{4}\times 1\right) + \left(\frac{1}{5}\times 0\right)}{50}$$

$$= 1 - \frac{(18) + (13) + (1.67) + (0.25) + (0)}{50}$$

$$= 1 - \frac{32.92}{50}$$

$$= 1 - 0.66$$

$$= 0.34$$

Similarly, the value of CC is calculated for all the corresponding years.

Table- 5: Collaboration Coefficient

Year	Single Authored Paper	Two Authored Paper	Three Authored Paper	Four Authored Paper	Five authored Paper	Total	Collaboration Coefficient (CC)
2008	18	26	5	1	0	50	0.34
2009	19	26	3	0	0	48	0.31
2010	18	31	10	3	0	62	0.39
2011	19	36	4	2	1	62	0.37

2012	25	33	8	0	2	68	0.34
2013	25	35	11	0	0	71	0.35
2014	9	25	10	0	2	46	0.45
2015	21	32	6	1	0	60	0.35
2016	24	26	8	6	0	64	0.36
2017	18	22	6	1	0	47	0.34
Total	**196**	**292**	**71**	**14**	**5**	**578**	**0.36**

Modified Collaboration Coefficient

Table 6 has been shaped with the assessment to give a better understanding of modified collaboration coefficient during the period of study. The average modified collaboration coefficient 0.36 has been counted during the year 2008-2017. The highest modified collaboration coefficient is counted in the year 2014 with 0.46, followed by the year 2010 with 0.40 and the lowest modified collaboration coefficient is in the year 2009 with 0.32.

The modified collaboration coefficient (MCC) counted by the formula which is suggested by Savanur and Srikanth (2010) as given below:

$$\mathrm{MCC} = \left(\frac{N}{N-1}\right)\left\{1 - \frac{\sum_{\mathrm{j=1}}^{\mathrm{A}}\left(\frac{1}{j}\right)fj}{N}\right\}$$

Thus, table 6 is calculated by the using above formula thus:

MCC for 2008 is

$$\mathrm{MCC} = \left(\frac{N}{N-1}\right)\left\{1 - \frac{\sum_{\mathrm{j=1}}^{\mathrm{A}}\left(\frac{1}{j}\right)fj}{N}\right\}$$

$$= \left(\frac{50}{49}\right)\left\{1 - \frac{\left(\frac{1}{1}\times 18\right) + \left(\frac{1}{2}\times 26\right) + \left(\frac{1}{3}\times 5\right) + \left(\frac{1}{4}\times 1\right) + \left(\frac{1}{5}\times 0\right)}{50}\right\}$$

$$= (1.02)\left\{1 - \frac{(18) + (13) + (1.67) + (0.25) + (0)}{50}\right\}$$

$$= (1.02)\left\{1 - \frac{32.92}{50}\right\}$$

$$= (1.02)\{1 - 0.66\}$$

$$= 1.02 \times 0.34$$

$$= 0.35$$

Similarly, the value of MCC is calculated for all the corresponding years.

Table- 6: Modified Collaboration Coefficient

Year	Single Authored Paper	Two Authored Paper	Three Authored Paper	Four Author Paper	Five author Paper	Total	Modified Collaboration Coefficient (MCC)
2008	18	26	5	1	0	50	0.35
2009	19	26	3	0	0	48	0.32
2010	18	31	10	3	0	62	0.40
2011	19	36	4	2	1	62	0.38
2012	25	33	8	0	2	68	0.35
2013	25	35	11	0	0	71	0.36
2014	9	25	10	0	2	46	0.46
2015	21	32	6	1	0	60	0.36
2016	24	26	8	6	0	64	0.37
2017	18	22	6	1	0	47	0.35
Total	**196**	**292**	**71**	**14**	**5**	**578**	**0.36**

Authorship Pattern

Table 7 shows that the authorship pattern of publication which is published during the study period. The authorship pattern shows that 196 (18.25%) singled authors published 196 (33.91%) articles while 584 (54.38%) double authors published 292 (50.52%) articles which are covered more than fifty percent of the publication during 2008-2017. It shows that two authorship pattern dominates on other authorship patterns. It also shows that four and five authorship pattern cover few authorship and articles during the period of study.

Table- 7: Authorship Pattern

Sl. No.	Number of authors	No. of Articles	Total No. of Authors	Percentage(%) of articles	Percentage(%) of Authors
1	Single	196	196	33.91	18.25
2	Two	292	584	50.52	54.38
3	Three	71	213	12.28	19.83
4	Four	14	56	2.42	5.21
5	Five	5	25	0.87	2.33
Total		**578**	**1074**	**100.00**	**100.00**

Relative Growth Rate and Double Time of Publication

Table 8 and figure 1 demonstrate that the relative growth rate and doubling time of publications published in SRELS Journal of Information Management during 2008-2017. "The growth rate of publication has been calculated on the basis of RGR and Dt model, which is developed by Mahapatra in 1985." It has been noticed that the relative growth rate decrease from the rate of 1.40 to 0.09 from 2008 to 2017. The mean relative growth rate for first four years during 2008-2011 is 0.55 whereas remaining two blocks of three years mean growth rate is reducing continuously and in the last block mean growth rate is 0.12 it shows

that there is a big difference in comparison to the first block. The corresponding doubling time (Dt) for different years are gradually increasing from 0.50 to 7.70 from 2008 to 2017. The mean rate of doubling time for the first four years is 1.02. Remaining two blocks for three years has been taken within a three-year time span and it increased from 1.02 to 6.14 from 2008 to 2017. The rate of relative growth rate is decreasing when corresponding doubling time is increasing during the study period.

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

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

Where,

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

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

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

T1 = the unit of initial time

T2 = the unit of final time

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

Where,

R= Growth rate

Table- 8: Relative Growth Rate and Double Time of Publication

Year	No. of Articles	Cumulative No. of Article	Log1e	Log2e	RGR	Mean RGR	Dt	Mean Dt
2008	50	50	0	3.19	-		-	
2009	48	98	3.19	4.59	1.40	0.55	0.50	1.02
2010	62	160	4.59	5.08	0.49		1.41	
2011	62	222	5.08	5.4	0.32		2.17	
2012	68	290	5.4	5.67	0.27		2.57	
2013	71	361	5.67	5.89	0.22	0.20	3.15	3.83
2014	46	407	5.89	6.01	0.12		5.77	
2015	60	467	6.01	6.15	0.14		4.95	
2016	64	531	6.15	6.27	0.12	0.12	5.78	6.14
2017	47	578	6.27	6.36	0.09		7.70	

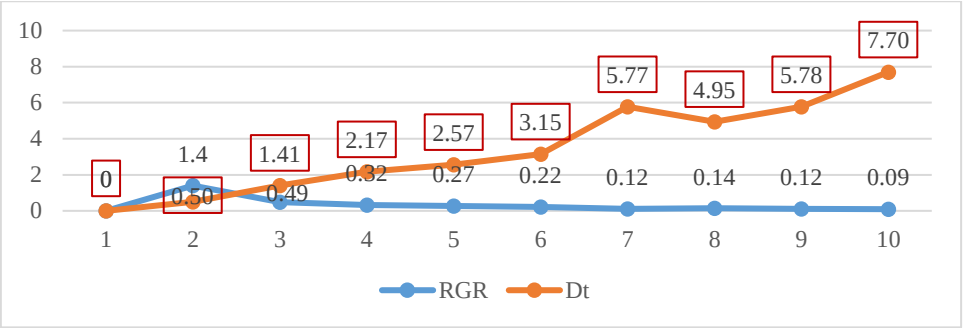

Figure 1: Relative Growth Rate and Double Time

Activity Index

Table 9 represents the activity index of the publications during study period 2008-2017. Activity index calculated on the basis of publication which published by Indian authored articles and world authored articles in SRELS Journal of Information Management during the period of study. Activity index describes the relative research efforts in a given field of research. The highest activity index has been counted in Indian articles is 107.04 in the year 2009 and lowest 84.42 is in the year 2013. The highest world activity index has been counted in the year 2013 which is 321.35 and the lowest is 0.00 in the year 2009.

The activity index has been counted by the formula which is suggested by Braun (1986). Which is given below:

$$\mathbf{AI = \{(Ii/Io)/ (Wi/Wo)\} \times 100}$$

Where,

Ii = Indian output in the year i

Io = Total Indian output

Wi = World output in the year i

Wo = Total output

Table- 9: Activity Index

Year	No. of Articles (India Only)	No. of Articles World	Total No. of Articles	Activity Index (India)	Activity Index (World)
2008	46	4	50	98.47	121.68
2009	48	0	48	107.04	0.00
2010	60	2	62	103.58	49.07
2011	60	2	62	103.58	49.07
2012	66	2	68	103.89	44.74
2013	56	15	71	84.42	321.35
2014	44	2	46	102.38	66.13
2015	57	3	60	101.69	76.05
2016	60	4	64	100.35	95.07
2017	43	4	47	97.93	129.45
Total	**540**	**38**	**578**	**100.00**	**100.00**

Conclusion

The trend toward collaboration research can be seen during the study period 2008-2017 in SRELS Journal of Information Management and total 578 articles published. It is found that the majority of articles are with collaboration and maximum articles are with two author collaboration which is 292 (50.52%). Out of 578 articles, 382 (66.09%) articles contributed by two or more authors. Collaboration index, the degree of collaboration, collaboration coefficient, modified collaboration coefficient, activity index, relative growth rate and doubling time were calculated from the data which was published during the period of study. It found that the average collaboration index was 1.86, the average degree of collaboration 0.66, average collaboration coefficient 0.36, average relative growth rate 0.32 and average doubling time was 3.40.

From the study, it is clear that the majority of joint authorship and high collaboration coefficient in SRELS Journal of Information Management which reveals that team research is predominant during the study.

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