

AN EVALUATIVE STUDY OF LIBRARY & INFORMATION SCIENCE RESEARCH DURING 1987 -2020 BASED ON AUTHORSHIP AND CO-CITATION ANALYSIS

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Abstract -

This analysis intends to investigate research collaborations and authorship patterns in Library & Information Science Research journals from 1987 to 2020. The data was collected from the Scopus database. MS-Excel, VOS Viewer, and R. Programming ware used for tabulation analysis and visualized data. In this paper, the researchers have analyzed the degree of collaboration, author productivity, collaboration coefficient, and research trends. The result shows that the maximum number of articles published in 2015 is 45 (8.80%) and a large number of publications are single-authored, and the average degree of collaboration is 0.56.

Keywords - Activity Index, Authorship Pattern, Co-Authorship Index, Collaboration Coefficient, Collaboration Index, Degree of Collaboration, Doubling Time, Key Word Analysis Library and Information Science Research, Relative Growth Rate,

INTRODUCTION

The authors' collaboration analysis is an important aspect that plays a vital role in disseminating and exchanging information. Due to the increase of modern technology and the need for answers in the current era of rapid innovation, recent research trends show that it is more data-intensive than past research. Author productivity in Research and Development (R& D) is usually used to measure technical and scientific productivity. The publication process is the primary way of author communication, as it allows authors to verify the accuracy of the information, determine the relative value of a contribution, and gain critical feedback on their work. Authors earn professional recognition and regard, as well as rewards, improvements, and funding, as a result of their publications to future research work.

The importance of publication to an author's output seems to be that his study should only be a "work" when it assumes a traditional physical form that can be accepted, analyzed, and recognized by the scientific community. Individual scientists are not the only ones that collaborate; institutions, communities, and nations are all involved. The idea of cooperation is popular these days because of various funding agencies.

Library & Information Science Research: An Overview

Library & Information Science Research (LISR) is a cross-disciplinary, peer-reviewed journal that emphasises the research process in library science, particularly uprisings of novel techniques and theoretical perspectives, as well as novel enhancements or implementations of well-known tools and techniques. The journal is published quarterly and indexed by INSPEC, ISA (Information Science Abstracts), PAIS Bulletin, Science Direct, Scopus, Social Sciences Citation Index, Information Science Abstracts, Library Literature, LISA, OCLC.

REVIEW OF LITERATURE

Research Collaboration means two or more authors share their knowledge, data, ideas and resources to create a collaborative work. Through bibliometric study, researchers find out the Degree of Collaboration (DC), Collaborative Index (CI), and Collaboration Coefficient (CC) of the Authors participations. Nikzad, Jamali, and Hariri (2011) have found out the co-authorship patterns in social science research. In their research, they find out that most of the Iranian authors collaborate with US authors in PSY,

while authors collaborate with UK authors in the field of LIS & MNG. Roy (2019) has conducted a Scientometrics analysis on Biological Science. Researchers find out the authorship pattern, research growth rate, research trends and collaboration trends. Their paper also examined Lotka's law of author productivity and collaborative author index (CAI). Mohan and Kumbar (2021) have conducted a Scientometrics study to find planetary research trends of planetary science in India. They collect 20 years of data from the web of science bibliographic databases and data analysis on biblioshiny data analytics tools. They find out that research growth is 9.66% in this field, and the most collaborative research country is the USA. Ajiferuke, Burell, and Tague (1988) conduct a study finding out the degree of collaboration in research in a particular discipline. For this study, they had used the Collaborative Coefficient technique to find the desired results. Zafrunnisha and Pullareddy (2009) also show in their paper about collaborative research trends in the psychology discipline. They find out that the degree of collaboration among authors in the psychology discipline is 0.53. Garg and Padhi (1999) have also examined research trends and research growth rates on the discipline of Laser through Scientometrics analysis. Khaparde and Pawar (2013) have also conducted a bibliometric study to determine the collaborative authorship pattern and research growth in the Information technology discipline. Savanur and Srikanth (2010) have described the degree of research collaboration and research growth in their paper. Siamaki, Geraei, and Zare-Farashbandi (2014) have examined co-authorship patterns and scientific collaboration on library and information science from 2005 to 2009 in Iran.

OBJECTIVES OF THE STUDY

- To find out the authorship pattern and year-wise publication distribution.
- To determine the collaboration among authors through the CI, CC, MMC, CAI, and DC analysis.
- To find out the activity index, RGR, and DT
- To find out the research trend in the LIS discipline.

METHODOLOGY

The present study is analyzed 962 articles that have been published in LISR from 1987-2020. All of the publication's data were collected from the Scopus Database. MS-Excel, VOS Viewer, and R Programming were used to tabulate, analyze and visualize the data. For the analysis of data, different parameters and formulas are also used.

Data Analysis and Results

Year-wise authorship and publication distribution pattern

A total of 962 articles was published in 1987-2020, out of which 45 (8.80%) articles were published in 2015. The second position is in 1994, 2011, and 2016 with 43 (8.02%) articles and the third position with 41 (7.43%) articles of the year 2013.

Table 1 shows the highest 32 articles published by a single author in 1994, the highest 22 articles published in 2015 by two authors, and 11 articles in 2020 were published by three authors,

Annual Growth Rate of Publications

The Annual Growth Rate (AGR) of publications in the field of LISR throughout time (1987-2020). Table 1 shows that the maximum AGR of 186.7% was reported in 1994, followed by 60.71% AGR in 2015 and a low of -53.5 AGR in 1995. The Annual Growth Rate (AGR) formula was given in 2015 by Kumar and Kaliyaperuma's

$$AGR = \frac{(End\ Value - First\ Value)}{(First\ Value)} \times 100$$

Table 1: Year Wise Authorship and Publication Distribution Pattern, AGR, CAGR, CC, DC, and MCC

Year	One Author Paper	Two Authore Paper	Three Authore Paper	Four Authore Paper	Five Authore Paper	Total	AGR	CAGR	CC	DC	MCC
1987	8	4	0	1	1	14	0	0	0.25	0.43	0.27
1988	14	3	3	0	0	20	42.86	19.52	0.18	0.3	0.18
1989	9	5	2	0	0	16	-20	-13.8	0.24	0.44	0.26
1990	8	7	2	2	0	19	18.75	13.76	0.33	0.58	0.35
1991	12	4	2	1	0	19	0	0	0.21	0.37	0.23
1992	14	7	0	0	0	21	10.53	8.698	0.17	0.33	0.18
1993	10	3	1	1	0	15	-28.6	-25.1	0.19	0.33	0.21
1994	32	9	1	0	1	43	186.7	151.3	0.14	0.26	0.14
1995	12	6	2	0	0	20	-53.5	-49.4	0.22	0.4	0.23
1996	9	5	3	0	0	17	-15	-13.6	0.26	0.47	0.28

1997	12	4	0	0	0	16	-5.88	-5.36	0.13	0.25	0.13
1998	13	3	1	0	0	17	6.25	5.715	0.13	0.24	0.14
1999	13	4	1	1	1	20	17.65	16.19	0.21	0.35	0.22
2000	8	13	1	0	0	22	10	9.254	0.33	0.64	0.34
2001	18	4	3	0	1	26	18.18	16.87	0.18	0.31	0.19
2002	14	6	3	1	0	24	-7.69	-7.23	0.24	0.42	0.25
2003	11	12	1	0	2	26	8.333	7.824	0.32	0.58	0.33
2004	7	19	3	0	0	29	11.54	10.86	0.4	0.76	0.41
2005	7	19	4	0	0	30	3.448	3.264	0.41	0.77	0.42
2006	11	16	2	2	2	33	10	9.477	0.38	0.67	0.39
2007	13	13	4	1	1	32	-3.03	-2.89	0.33	0.59	0.35
2008	12	18	3	1	0	34	6.25	5.958	0.35	0.65	0.36
2009	14	15	3	1	0	33	-2.94	-2.82	0.31	0.58	0.32
2010	13	17	3	2	0	35	6.061	5.801	0.34	0.63	0.35
2011	20	11	8	3	1	43	22.86	21.85	0.32	0.53	0.33
2012	10	16	8	3	3	40	-6.98	-6.72	0.45	0.75	0.46
2013	13	20	5	2	1	41	2.5	2.406	0.38	0.68	0.39
2014	11	10	2	3	2	28	-31.7	-30.8	0.36	0.61	0.38
2015	14	22	5	4	0	45	60.71	58.11	0.39	0.69	0.39
2016	12	20	6	2	3	43	-4.44	-4.3	0.42	0.72	0.43
2017	12	14	9	1	2	38	-11.6	-11.3	0.4	0.68	0.41
2018	14	11	3	3	1	32	-15.8	-15.3	0.33	0.56	0.34
2019	12	9	8	2	3	34	6.25	6.055	0.4	0.65	0.42
2020	9	10	11	5	2	37	8.824	8.553	0.48	0.76	0.49
	421	359	113	42	27	962			0.32	0.56	0.32

Compound Annual Growth Rate of Publications

The Compound Annual Growth Rate (CAGR) is computed by calculating the n^{th} root of the overall percentage growth rate. Table 1 shows that the highest CAGR of 151.3 % was registered in 1994, second by 58.11 % in 2015. The CAGR was determined using the method.

$$\text{CAGR} = (\text{EV} / \text{BV})^{(1/\text{NY})} - 1$$

EV = Last Value

NY = Years

BV = Beginning Value

Measures of Authorship

The measure of authorship is significant to the author's contribution to a specific subject area. The Collaborative Index (CI), Degree of Collaboration (DC), Collaboration Coefficient (CC), Modified Collaboration Coefficient (MCC), and Relative Growth Rate (RGR), were determined based on the year-wise output of publications.

Degree of Collaboration

The Degree of Collaboration (DC) measures the correlation between multiple-authored articles and the total no. of publications produced in a certain period. DC is analyzed as a degree

because of the ranges of DC around 0 (zero) and 1(one). After all, DC makes no distinction between levels of multiple authorship.

The formula for calculating DC was proposed by Subramanyam (1983).

$$DC = 1 - \frac{f_1}{N}$$

f₁ = single-authored articles

N = Total publication in a year.

For example DC for 1987 is:

$$\begin{aligned} DC &= 1 - \frac{f_1}{N} \\ &= 1 - \frac{8}{14} \\ &= 1 - 0.57 = 0.43(\text{approx.}) \end{aligned}$$

With this formula, DC is calculated for all the study periods of 1987-2020. The study found that the highest average DC is 0.77 in 2005, and the lowest average DC is 0.25 in 1997. The average DC of the study period is 0.56. (Please refer Table 1)

Collaboration Coefficient

The Collaboration Coefficient (CC) was created to address the introductory CI and DC flaws and it is also a measure of author collaborations. The fraction of multi-authored articles and the average number of authors per manuscript are reflected in CC.

Ajiferuke et al. 1988 introduced this formula.

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

Where,

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

f_j = the number of j authored articles

N = the total number of articles published in a year

A = the total number of authors per articles

Using the above formula Collaboration Coefficient (CC) is prepared in Table 1:

For example CC for 1987 is:

$$\begin{aligned} CC &= 1 - \frac{\sum_{j=1}^A \left(\frac{1}{j}\right) f_j}{N} \\ &= 1 - \frac{\left(\frac{1}{1} \times 8\right) + \left(\frac{1}{2} \times 4\right) + \left(\frac{1}{3} \times 0\right) + \left(\frac{1}{4} \times 1\right) + \left(\frac{1}{5} \times 1\right)}{14} \\ &= 1 - \frac{(8+2+0+0.25+0.2)}{14} \\ &= 1 - \frac{10.45}{14} \\ &= 1 - 0.75 \\ &= 0.25 (\text{app.}) \end{aligned}$$

With this formula CC is calculated for all the study period of 1987-2020. Table 1 shows that from the study it is found in 2020 the highest CC (0.48) is found, followed by 2016 (0.42) and lowest CC (0.13) is found in 1997 and 1998.

Modified Collaboration Coefficient

Modified Collaboration Coefficient (MCC) is an interesting measure, given by Ajiferuke et al. Assume that each article conveys a single "credit" distributed among the authors. Thereby, when an article has such a one writer, the writer obtains one credit; if there are two authors, everyone obtains 1/2 credit; and, throughout general, if there are X authors, each gets 1/X credits. As a result, the average score of credit given to each writer of a randomized publication is E[1/X],

ranging from 0 to 1. Because we want 0 to represent single authorship. Table 1 shows the modified collaboration coefficients.

The formula for calculating the modified collaboration coefficient (MMC) suggested by Savanur and Srikanth (2010) is:

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

Using the above formula table 1 is prepared:

For example MCC for 1987 is:

$$= \left(\frac{14}{14-1} \right) \left\{ 1 - \frac{\left(\frac{1}{1} \times 8 \right) + \left(\frac{1}{2} \times 4 \right) + \left(\frac{1}{3} \times 0 \right) + \left(\frac{1}{4} \times 1 \right) + \left(\frac{1}{5} \times 1 \right)}{14} \right\}$$

$$= \left(\frac{14}{13} \right) \left\{ 1 - \frac{(8+2+0+0.25+0.2)}{14} \right\}$$

$$= \left(\frac{14}{13} \right) \left(1 - \frac{10.45}{14} \right)$$

$$= 1.08 \times (1 - 0.75)$$

$$= 1.08 \times 0.25$$

$$= 0.27 \text{ (app)}$$

With this formula, MMC is calculated for all the study periods of 1987-2020.

From the study it is found that the highest MCC is 0.49 is in the year 2020, followed by 2005 and 2019 with 0.42 and the lowest MCC is 0.13 in 1997 (Please refer Table 1).

Relative Growth Rate and Doubling Time

Table 2 shows the Relative Growth Rate (RGR) and Doubling Time (DT) of LISR from 1987 to 2020. Assume that the frequency of contributions made by a participant doubles over the study period. The logarithms of the number 2 must always be the difference between both the logarithms of the numbers just at the start and end of the reporting period. The value of this difference is 0.693, when calculated using the natural logarithm. The DT is correlated explicitly to RGR, which measures the increasing number of timely publications.

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

Where,

RGR = Rate of growth over the intervals of specific time period,

W1 = Natural log of the initial number of contributions

W2 = Natural log of the final number of contributions

T1 = Initial time

T2 = Final time

Table 2: Year Wise Relative Growth Rate (RGR) and Doubling Time (DT)

Year	No of Article	Cumulative No of Article	Log1e	Log2e	RGR	Mean RGR	DT	Mean DT
1987	14	14	0	2.64		0.26		4.65
1988	20	34	2.64	3.53	0.89		0.78	
1989	16	50	3.53	3.91	0.39		1.8	
1990	19	69	3.91	4.23	0.32		2.15	
1991	19	88	4.23	4.48	0.24		2.85	

1992	21	109	4.48	4.69	0.21		3.24	
1993	15	124	4.69	4.82	0.13		5.37	
1994	43	167	4.82	5.12	0.3		2.33	
1995	20	187	5.12	5.23	0.11		6.13	
1996	17	204	5.23	5.32	0.09		7.96	
1997	16	220	5.32	5.39	0.08		9.18	
1998	17	237	5.39	5.47	0.07		9.31	
1999	20	257	5.47	5.55	0.08		8.55	
2000	22	279	5.55	5.63	0.08		8.44	
2001	26	305	5.63	5.72	0.09		7.78	
2002	24	329	5.72	5.8	0.08		9.15	
2003	26	355	5.8	5.87	0.08		9.11	
2004	29	384	5.87	5.95	0.08		8.83	
2005	30	414	5.95	6.03	0.08	0.08	9.21	9.21
2006	33	447	6.03	6.1	0.08		9.04	
2007	32	479	6.1	6.17	0.07		10	
2008	34	513	6.17	6.24	0.07		10.1	
2009	33	546	6.24	6.3	0.06		11.1	
2010	35	581	6.3	6.36	0.06		11.2	
2011	43	624	6.36	6.44	0.07		9.71	
2012	40	664	6.44	6.5	0.06		11.2	
2013	41	705	6.5	6.56	0.06		11.6	
2014	28	733	6.56	6.6	0.04		17.8	
2015	45	778	6.6	6.66	0.06	0.05	11.6	14.2
2016	43	821	6.66	6.71	0.05		12.9	
2017	38	859	6.71	6.76	0.05		15.3	
2018	32	891	6.76	6.79	0.04		18.9	
2019	34	925	6.79	6.83	0.04		18.5	
2020	37	962	6.83	6.87	0.04		17.7	

From Table 2 shows that in 2018, the highest doubling time of 18.9 was observed, preceded by 18.5 DT in 2019. In the study, it has been also shown that RGR decreases 0.26 to 0.05. The Mean RGR (1987-1998) is 0.26, the second second block (1999-2009) is 0.08, third block

(2010-2020) has RGR is 0.05. So, Mean RGR is decreasing continuously.

Double Time of Publication in Library & Information Science Research

From the study period, it has been shown that Double Time increase from 0.78 to 17.7. The Mean Double Time (1987-1998) is 4.65, the second block (1999-2009) is 9.21, third block (2010-2020) has DT is 14.2. So, Mean DT is increasing continuously. (Please refer Table 2)

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

R= Growth rate

Co-Authorship Index

Garg & Padhi, in the year 1999, describe Co-Authorship Index (CAI) for calculating the publication proportionately by single, two, and multi-authored article. If the value of CAI is higher than 100, it indicates no. of publications is > average publication and CAI<100 reflects that the no. of publications is < average no of publication, and if the CAI value is 100 then the no. of publications is equal to the average.

Garg & Padhi year (1999) suggested the formula for calculation of Co-authorship Index (CAI) is

$$CAI = \left(\frac{N_{ij}}{\frac{N_{io}}{N_{oj}} \times N_{oo}} \right) \times 100$$

Where,

N_{ij} = no. of article having j authors in block i;

N_{io} = Total output of block i;

N_{oj} = Number of papers having j authors for all blocks;

N_{oo} = Total number of papers for all authors and all blocks; j = 1, 2, 3, 4,5

Using the above formula table 3 is prepared:

For example, CAI of single author publication of 1987 is:

$$CAI = \left(\frac{8}{\frac{14}{421} \times 962} \right) \times 100$$

$$= \frac{0.572}{0.437} \times 100 = 130.57 \text{ app.}$$

Table 3: Co-authorship Index (CAI) distribution

Year	Single Author Paper	CAI-1	Two Authored Paper	CAI-2	Three Authored Paper	CAI-3	Four Authored Paper	CAI-4	Five Authored Paper	CAI-5	Total
1987	8	130.57	4	76.56	0	0	1	163.61	1	254.5	14
1988	14	159.95	3	40.19	3	127.7	0	0	0	0	20
1989	9	128.53	5	83.74	2	106.4	0	0	0	0	16
1990	8	96.212	7	98.72	2	89.61	2	241.1	0	0	19
1991	12	144.32	4	56.41	2	89.61	1	120.55	0	0	19
1992	14	152.34	7	89.32	0	0	0	0	0	0	21
1993	10	152.34	3	53.59	1	56.76	1	152.7	0	0	15
1994	32	170.05	9	56.09	1	19.8	0	0	1	82.86	43
1995	12	137.1	6	80.39	2	85.13	0	0	0	0	20
1996	9	120.97	5	78.81	3	150.2	0	0	0	0	17
1997	12	171.38	4	66.99	0	0	0	0	0	0	16
1998	13	174.74	3	47.29	1	50.08	0	0	0	0	17
1999	13	148.53	4	53.59	1	42.57	1	114.52	1	178.15	20

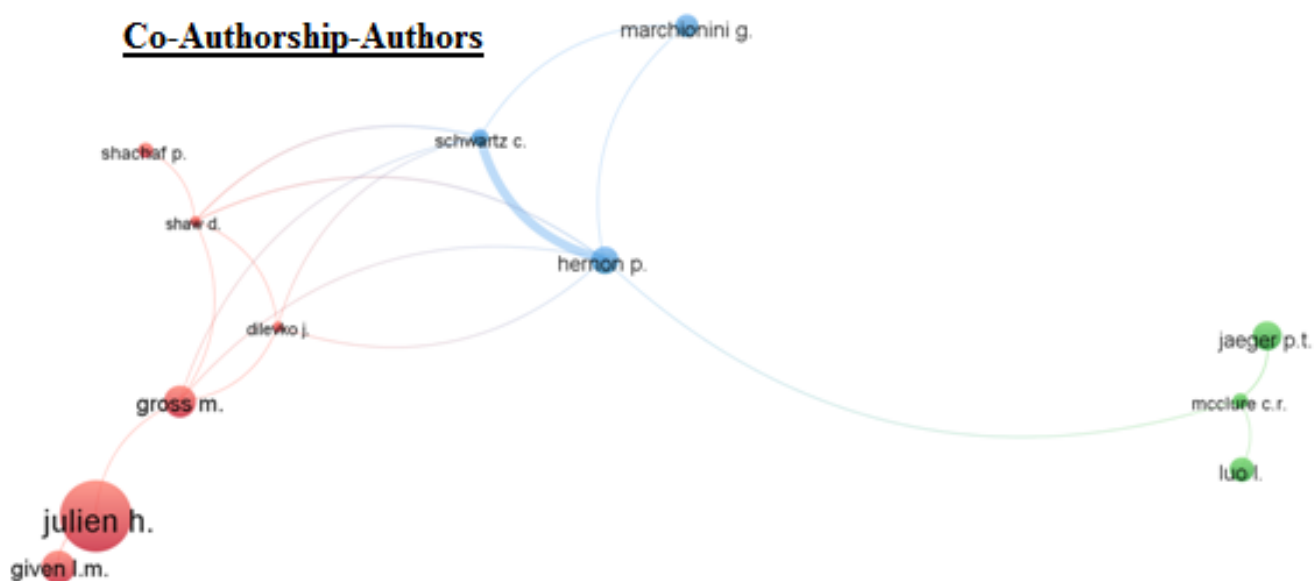
2000	8	83.092	13	158.3	1	38.7	0	0	0	0	22
2001	18	158.19	4	41.23	3	98.23	0	0	1	137.04	26
2002	14	133.29	6	66.99	3	106.4	1	95.437	0	0	24
2003	11	96.675	12	123.7	1	32.74	0	0	2	274.07	26
2004	7	55.156	19	175.6	3	88.07	0	0	0	0	29
2005	7	53.317	19	169.7	4	113.5	0	0	0	0	30
2006	11	76.168	16	129.9	2	51.6	2	138.82	2	215.94	33
2007	13	92.83	13	108.9	4	106.4	1	71.577	1	111.34	32
2008	12	80.648	18	141.9	3	75.12	1	67.367	0	0	34
2009	14	96.941	15	121.8	3	77.39	1	69.408	0	0	33
2010	13	84.873	17	130.2	3	72.97	2	130.88	0	0	35
2011	20	106.28	11	68.55	8	158.4	3	159.8	1	82.86	43
2012	10	57.126	16	107.2	8	170.3	3	171.79	3	267.22	40
2013	13	72.452	20	130.7	5	103.8	2	111.73	1	86.902	41
2014	11	89.769	10	95.7	2	60.81	3	245.41	2	254.5	28
2015	14	71.09	22	131	5	94.59	4	203.6	0	0	45
2016	12	63.768	20	124.6	6	118.8	2	106.53	3	248.58	43
2017	12	72.159	14	98.72	9	201.6	1	60.276	2	187.52	38
2018	14	99.97	11	92.11	3	79.81	3	214.73	1	111.34	32
2019	12	80.648	9	70.93	8	200.3	2	134.73	3	314.38	34
2020	9	55.582	10	72.42	11	253.1	5	309.52	2	192.59	37
	421	100	359	100	113	100	42	100	27	100	962

Co-Authorship-Authors

Figure 1 shows the authorship collaboration, the link of the author show in the different colors

line, and the radius of the author show the author engagement. In this figure, it is shown that Julien, H. published research papers through maximum number of collaborations with other authors.

Figure 1 : Co-Authorship Authors

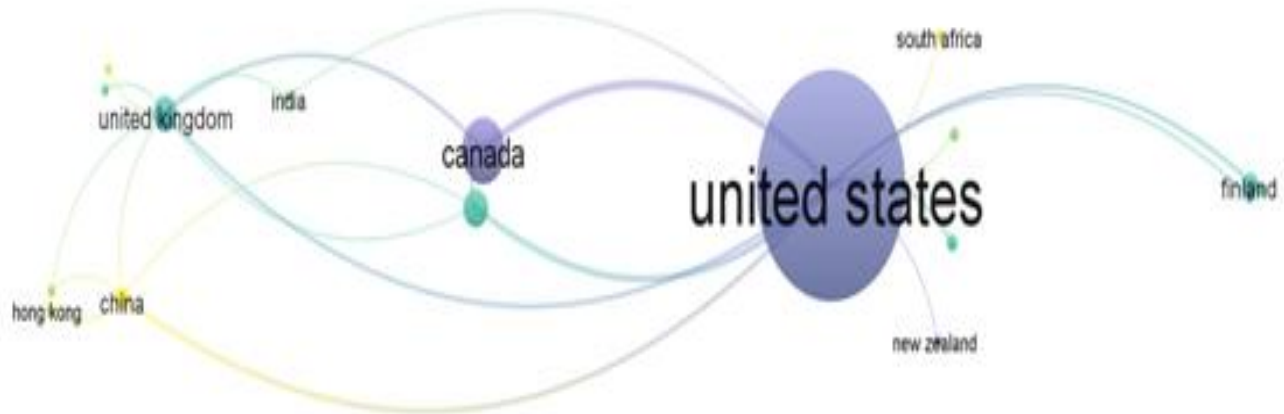


Co-Authorship-Countries

Figure 2 shows the authorship country collaboration, the link of the country show in the different colors line, and the radius of the country

show the author engagement. In this figure it will be show that highest number of author contribute from United States. United States and Canada co-authorship is highest then UK and China followed by Finland, India, South Africa and New Zealand.

Figure 2 : Co-Authorship-Countries



Keyword Analysis

The keyword is the most powerful to analysed the research trend of a specific field. A keyword usually consists of a word, phrase or term. The below three diagram researchers describe Co-occurrence Author Keyword, Title Keyword and Abstract Keywords. In this study it is found that

abstract keyword diagram highlighted the keyword such as library, study, analysis. In the article title keyword diagram highlighted the keyword such as Library, public, analysis, study,etc. Author keyword diagram highlighted the keyword such as Public Library, content analysis, information literacy, Library management



Abstract Keyword



Title keyword



Authors Keyword

Finally, researchers describe that the author keyword is the main to analyse the research trend in a specific field, Public Library, content analysis, information literacy, Library management field is the main research trend in LISR from 1987-2020.

Co-citation-cited sources

Figure 3 shows that journal of library and information science research, library quarterly, scientrometrics, journal of academic library, information system research, school library media quarterly is the highest co-citation cited sources in this study.



Figure 3 : Co-citation-cited Sources

Table 4: Top 20 Author Impact

S. N.	Author	h_index	g_index	m_index	TC	NP	PY_start
1	Hernon P	7	11	0.241	200	74	1993
2	Schwartz C	6	7	0.214	124	74	1994
3	Shaw D	4	7	0.143	51	22	1994
4	Julien H	13	14	0.5	655	14	1996
5	Dilevko J	6	8	0.24	78	11	1997
6	Gross M	8	10	0.348	278	10	1999
7	Savolainen R	10	10	0.37	905	10	1995
8	Stvilia B	8	10	0.571	239	10	2008
9	Given L M	7	8	0.35	274	8	2002
10	Williamson K	6	8	0.25	344	8	1998
11	Luo L	6	7	0.375	183	7	2006
12	Thelwall M	6	7	0.316	173	7	2003
13	Aharony N	5	6	0.313	129	6	2006
14	Large A	6	6	0.231	299	6	1996

15	Mcclure C R	5	6	0.172	102	6	1993
16	Adkins D	4	5	0.222	84	5	2004
17	Burnett G	5	5	0.263	141	5	2003
18	Chu S K W	4	5	0.364	119	5	2011
19	Jaeger P T	5	5	0.278	229	5	2004
20	Kazmer M M	5	5	0.313	52	5	2006

Table 4 shows top 20 authors and their h index, g index and m index, total citation and total number of publications. Hernon P and Schwartz C published the highest number of the article and

Julien H obtained the highest h_index and g_index and Savolainen R obtained highest number of citation in the study period.

Co-citation-cited Authors

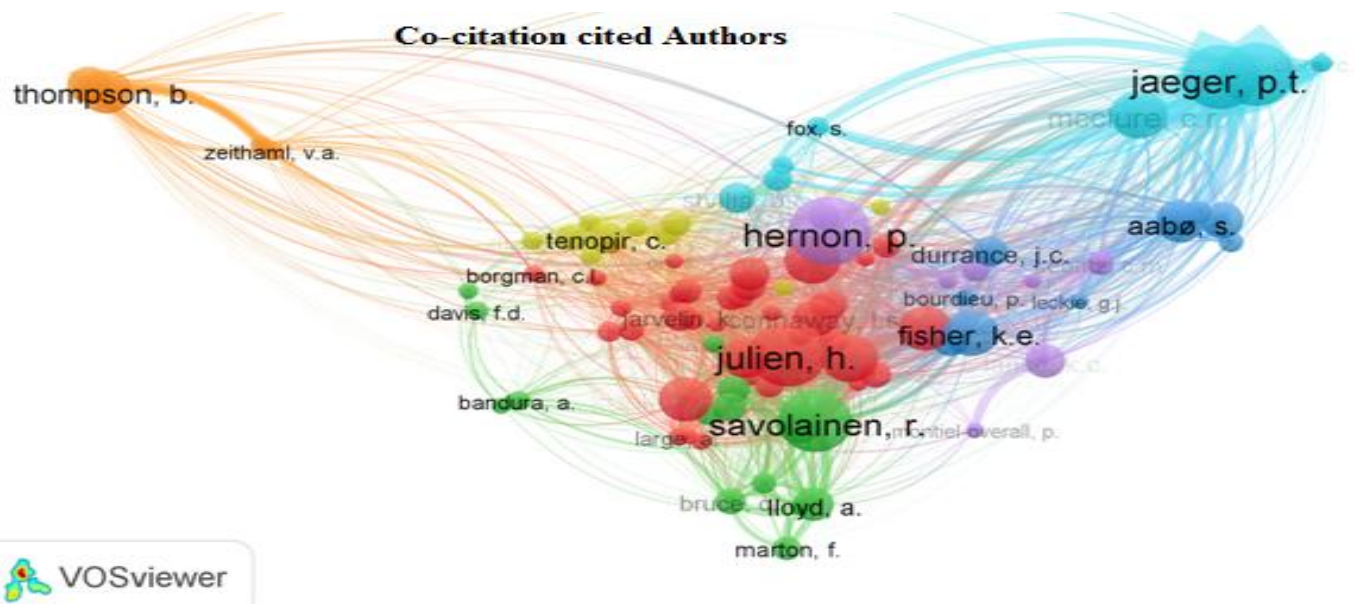


Figure 4 : Co-citation-cited Authors

In this figure 4, we show that co-citation cited author, Hernon P and Savolainen R and Jaeger PT is the highest co-citation cited author in this study period.

Bibliographic Coupling

Bibliographic coupling is a type of co-citation coupling in which two documents that cite the same publications are linked together. If papers A

and B cite papers C, D, and E in their reference lists, they are bibliographically connected. This coupling mechanism was examined using VOS viewer. This method can be used to create several types of networks. It is estimated the total length of bibliographic coupling links with some other texts. Total Link Strength determines the size of the label and the item's circle (TLS). The TLS property shows the entire strength of a

researcher's co-authorship ties with other researchers. For instance, Hernon, P, Schwartz, C has the highest TLS, then Shaw, D and Julian, H



CONCLUSION

From the analysis of collected data from 1987-2020 in Library and Information Science Research journal total 962 articles are studied. In the year-wise distribution, the maximum number of articles published in 2015 is 45 (8.80%). It is shown that most articles are written by a single author, a total of 421 out of 962 articles. The mean relative growth for the first year (1987-1998) showed 0.26, whereas the mean RGR of the last 11 years (2010-2020) was reduced to 0.05. Similarly, the DT for different years gradually increased 4.65 to 14.2 during the study period. The average DC of all years from 1987-2020 is 0.56, the average CC is 0.32, and from the keyword analysis, it is shown that maximum research is going on public library and content analysis, Library management in the field of LISR.

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