



Annals of Information: A Decade of Discovery in LIS Research

Dr. Sapna Sharma^a and Dr. Madhuri Shah^b

^aHead, Library, Assistant Professor, Management Department, IPS Academy IBMR, Indore Ujjain Road, 453551 India.
Email: sapanasharma@ipsacademy.org

^bAssistant Professor, Management Department, IPS Academy IBMR, Indore Ujjain Road, 453551 India.
Email: madhuri.shah@ipsacademy.org

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This study aims to represent a bibliometric analysis of the journal *Annals of Library and Information Studies* (ALIS) from 2015 to 2024. During this study period, a total of 324 articles, contributed by 617 authors, were published across 10 volumes and 40 issues. On average, 32 articles are published every year. The paper analyses authorship patterns and finds a high percentage of double-authored papers. We also calculated authorship measures regarding the Collaborative Index (CI) and Collaborative Coefficient (CC). This study also analyses inter-institution, inter-gender, RGR, and DT. The paper applies Lotka's law for author productivity.

Keywords: Bibliometric Analysis, ALIS, C.C. & C.I., RGR & D.T., Inter-Institution, Inter Gender.

Introduction:

Research plays a crucial role in society and has become significant in all knowledge-based fields (Naseer & Mahmood, 2009). The publications in a specific field aim to convey innovative thoughts or data, which further enhance that subject (Warraich & Ahmad, 2016). Libraries play a crucial role in our social and educational endeavors, supporting researchers in conducting systematic research. The expertise of librarians, particularly in providing guidance and services, is vital in creating a conducive learning environment (Hapke, 2005).

The ANNALS of Library and Information Studies is a leading quarterly journal in this domain, publishing original papers, survey reports, reviews, short communications, and letters related to library and information science and their applications. Launched in 1954 by the former INSDOC, under the editorship of Dr. S. R. Ranganathan, the journal's title was expanded in 1964 and later renamed in 2001 to its current title. As of its 59th volume in 2012, it stands as the oldest Indian journal in Library and Information Science. The first volume was initiated in 1954, and it continues to be published quarterly. It is now freely accessible online, with archives dating back to Volume 1, launched during the seminar on "Indian LIS Journals: Problems and Prospects" at CSIR-NISCAIR, New Delhi, on April 23, 2014 (ISSN online – 0975-24040, ISSN

print – 0972-5423). Dr. G. Mahesh is the current editor of the journal.

A bibliometric analysis is a scientific, quantitative method for evaluating publications. It uses factual and numerical techniques to assess publication patterns and all forms of written communication. This method is used globally, particularly in institutions, to evaluate research performance. It is considered a valuable tool for systematically investigating publications and their impact, especially in fields like social science. In essence, it provides a statistical way to measure the influence of publications on a community.

Objectives:

- To study the year-wise distribution of papers and their growth rate and doubling time,
- To find out the authorship pattern of the papers,
- To study the inter-institution collaboration distribution of the papers,
- To study inter-gender collaboration distribution of the papers,
- To find out the applicability of Lotka's law.

Literature reviews:

Literature reviews play a crucial role in academic research by providing a comprehensive overview of a specific field. They serve to assess the existing body of knowledge, highlighting key findings and relevant

theories. This process organizes information systematically, allowing researchers to understand the current state of their area of study. As noted by Snyder (2019), these reviews identify gaps in the literature that require further investigation, thus guiding future research directions. The elegance of a well-structured literature review can illuminate pathways for new inquiries, fostering deeper insights and addressing unresolved questions. By synthesizing various studies, literature reviews offer a clear picture of what has been explored and what remains unknown, contributing significantly to the advancement of knowledge.

Asubiaro's 2019 study showed a significant rise in African LIS publications from 1996 to 2015, driven by the expansion of LIS schools across the continent. This growth, despite LIS being a small fraction of overall research, indicates a strengthening foundation for LIS scholarship and professional development in Africa.

South Africa and Nigeria lead African LIS research due to strong academic programs. The study emphasized that collaboration, author roles, and publication location influence citation counts, highlighting the importance of understanding these dynamics for LIS scholars to effectively navigate the research landscape.

Owusu-Nimo and Boshoff's 2017 study on Ghanaian LIS research revealed low intra-African collaboration but a stronger trend in international partnerships. This highlights a need for increased local collaboration and networking among African LIS scholars to further boost the field's growth and impact within the continent.

Literature reviews are vital for academic research, offering a comprehensive overview of a field. They synthesize existing knowledge, identify key findings and gaps, and guide future research. By systematically organizing information, they illuminate pathways for new inquiries, significantly advancing knowledge.

With soaring research output, comprehensive literature reviews are crucial. Öztürk (2021) notes they prevent disorganization, while Kraus et al. (2022) stress their role in sifting millions of articles to ensure important findings aren't missed amidst the information overload.

Many literature reviews lack transparency regarding their source selection criteria, which Linne Luecke et al. (2020) note can confuse readers and question validity. Over-reliance on "high-quality"

journals can skew perspectives, making explicit criteria and diverse sources essential for balanced understanding.

Methodology:

The data for the study were collected from 2015 to 2024. A total of 40 issues of 10 volumes have been studied. It publishes 4 issues per year. The data has been loaded on an MS Excel worksheet for further analysis by manually accessing each article online.

Hypothesis:

For this study, five hypotheses have been formulated:

- Inter gender collaboration is higher in ALIS.
- Inter-institution collaboration is higher in ALIS.
- Relative growth rate is increasing.
- Doubling time is decreasing.
- Single authorship is higher than double authorship in ALIS.

Formula used: The following bibliometric formulae have been used in this study.

(a) Degree of Collaboration (DC) or Collaboration Coefficient (C.C.): - (Subramanyam, 1983)

$$C.C. = \frac{Nm}{Nm+Ns}$$

Where, Ns = Single-authored publications

Nm = Multiple-authored publications

(b) Collaboration Index: - Lawani

$$C.I. = \frac{\text{No. of authors of total joint publications}}{\text{Total joint publications}}$$

(c) Relative Growth Rate and Doubling Time:

$$(I) RGR1 - 2^R = \frac{\log_e 2w - \log_e 1w}{2^T - 1^T}$$

Were,

$1-2^R$ = Mean relative growth rate over the specific period of the interval

$\log_e 1w$ = log of initial number of articles.

$\log_e 2w$ = log of the final number of articles after a specific period of interval

$2^T - 1^T$ = the unit difference between the initial time and the final time

$$(ii) DT = \frac{0.693}{R}$$

(D) Lotka's law: $1/n^2$, where n = n=number of contributions

Data analysis: The data has been collected from ALIS from 2015 to 2024.

Year-wise distribution of articles:

The study is confined to 10 years from 2015 to 2024. A total of 324 articles has been published and analyzed. It ranges between 20 and 47, with an average of 32 articles per volume per year. It publishes 4 issues per volume. The number of articles ranges between 6 and 10 per issue, except for 2 issues with 5 and 15 articles. The table 7.1 also gives mean, median, and standard deviation values. These are shown in graph 7.1. The mean is 32 articles per volume, and the median is 33.5. The total number of articles varied year by year, hence no value of mode could be calculated.

Relative growth rate (RGR) and doubling time (DT):

Table 7.2 calculates the relative growth rate and doubling time. It shows that RGR has continuously decreased from 0.61 to 0.16, and consequently, DT has increased from 1.13 to 4.42.

The data reveal a clear trend of decreasing Relative Growth Rate (RGR) and increasing Doubling Time (DT) over the years. This pattern suggests a

slowdown in the growth rate of the studied parameter between 2015 and 2024. The fluctuations in RGR and DT values across different years indicate potential variations in factors influencing the growth dynamics during this period (Graph 7.2 and Graph 7.3).

Authorship pattern:

The Table 7.3 shows Double-authored papers dominate the authorship pattern, accounting for 47.22% of total contributions, while single authorship stands at 31%. Collaborative research is on the rise,

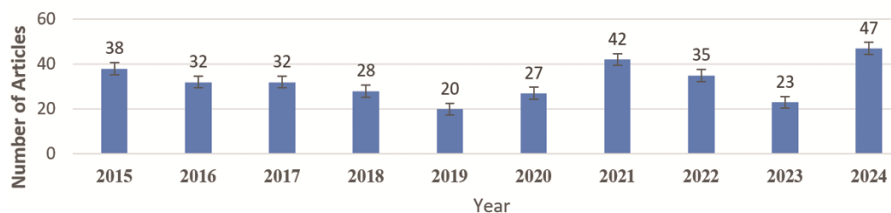
These findings suggest a predominance of single and double authorship in the field during the studied period. The trend towards collaborative research appears limited, with only a small percentage of articles having three or more authors. This authorship pattern may indicate the nature of research in the discipline, possibly reflecting individual scholarship or small-scale collaborations as the norm.

Degree of collaboration and collaboration index:

The data (Table 7.4) reveals fluctuations in both the Degree of Collaboration (D.C.) and Collaboration Index (C.I.) over the ten years from 2015 to 2024. The highest D.C. value of 0.83 was observed in 2023,

Table 7.1 — Year-wise distribution of articles

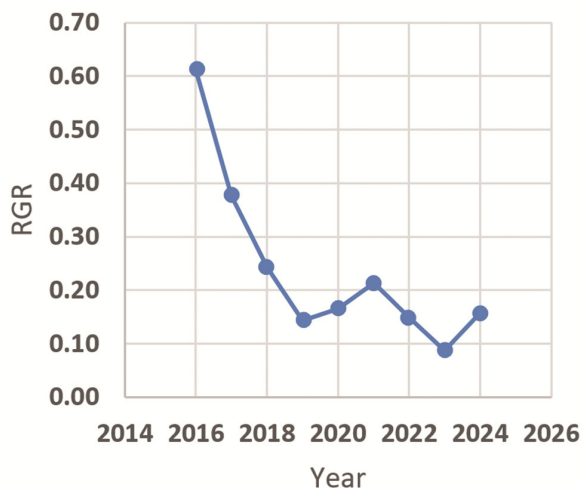
S.N.	Year	Vol. No.	Issue No.				Total	%
			1	2	3	4		
1	2015	62	6	7	9	16	38	11.73%
2	2016	63	10	8	8	6	32	9.88%
3	2017	64	10	6	6	10	32	9.88%
4	2018	65	8	7	7	6	28	8.64%
5	2019	66	6	4	5	5	20	6.17%
6	2020	67	6	5	8	8	27	8.33%
7	2021	68	8	12	12	10	42	12.96%
8	2022	69	8	10	7	10	35	10.80%
9	2023	70	5	6	6	6	23	7.10%
10	2024	71	12	9	13	13	47	14.51%
	Total		79	74	81	90	324	100.00%
	%		24.38%	22.84%	25.00%	27.78%	100.00%	
	Total		Mean		Median			SD.
	324		32.4		33.5			8.39



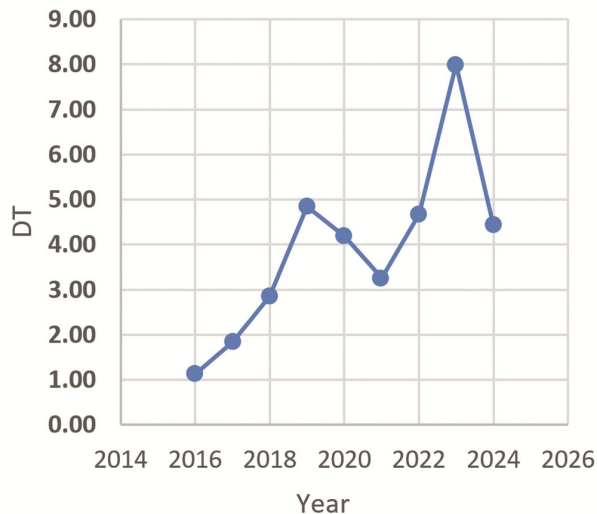
Graph 7.1 — Year Wise distribution of articles

Table 7.2 — Relative growth rate and doubling time

Year	Total	C. Total	w ²	w ¹	RGR	DT
2015	38	38	3.6376			
2016	32	70	4.2485	3.6376	0.61	1.13
2017	32	102	4.6250	4.2485	0.38	1.84
2018	28	130	4.8675	4.6250	0.24	2.86
2019	20	150	5.0106	4.8675	0.14	4.84
2020	27	177	5.1761	5.0106	0.17	4.19
2021	42	219	5.3891	5.1761	0.21	3.25
2022	35	254	5.5373	5.3891	0.15	4.67
2023	23	277	5.6240	5.5373	0.09	7.99
2024	47	324	5.7807	5.6240	0.16	4.42
Total	324					



Graph 7.2 — Relative growth rate



Graph 7.3 — Doubling time

indicating a peak in collaborative authorship that year. Conversely, the lowest D.C. value of 0.53 occurred in 2015, suggesting a higher proportion of single-authored papers at the beginning of the studied period.

The D.C. ranges between 0.53 and 0.66 with an average of 0.68. C.I. ranges between 1.76 and 2.34 with an average of 2.01.

Inter-institutional collaboration pattern:

There are 221 (68.52%) joint-author articles in the study. The table 7.5 shows high inter-institutional collaboration. There is 58.37 % inter-institutional collaboration, while intra-institutional collaboration is 41.63% of articles.

This trend of high inter-institutional collaboration suggests a strong network of researchers working together across different organizations. Such collaborations often lead to more diverse perspectives, increased access to resources, and potentially higher-quality research outcomes. The consistent pattern of inter-institutional collaboration over the years indicates a sustained effort to foster partnerships and knowledge exchange between institutions in this field of study.

Inter-gender collaboration pattern:

The data (Table 7.6) reveal a relatively balanced distribution of inter-gender and intra-gender collaborations over the 10 years. There is a noticeable increase in inter-gender collaborations in recent years, particularly in 2022 and 2024, where they account for over 60% of joint authorships. This trend suggests a growing tendency towards diverse research teams and potentially indicates a more inclusive academic environment in the field (Graph 7.7).

Lotka’s Law:

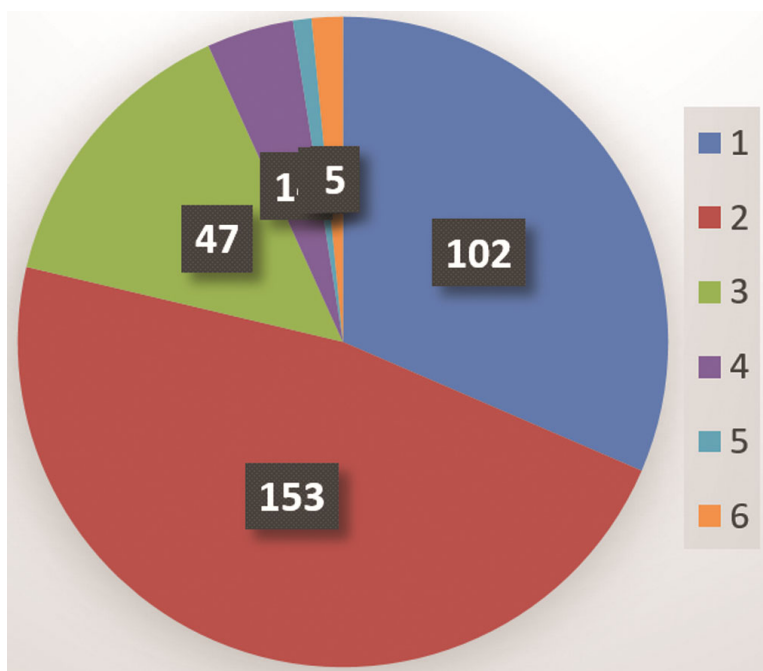
Lotka’s law of productivity of an author has been tested in Table 7.7. The table calculated the expected number of authors with the formula, which is $1/n^2$, where n is the number of contributions. Here, observed values are less than expected values; hence, Lotka’s law is not applicable.

Table 7.3 — Authorship pattern

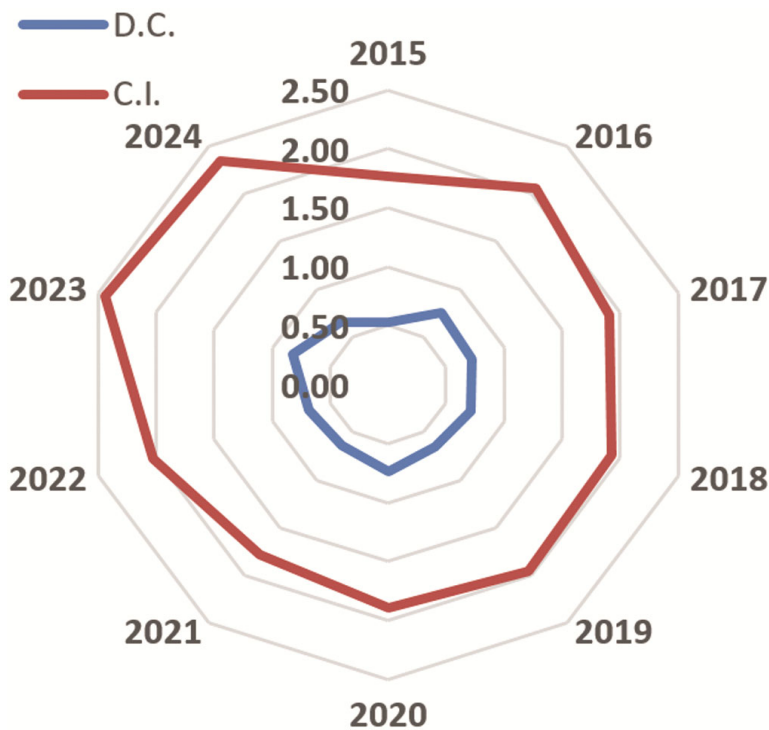
S.N.	Year	Number of authors						Total	%
		1	2	3	4	5	5+		
1	2015	18	14	4	1	1	38	11.73%	
2	2016	8	18	3	2	1	32	9.88%	
3	2017	9	17	6			32	9.88%	
4	2018	8	16	2	2		28	8.64%	
5	2019	7	8	4	1		20	6.17%	
6	2020	7	16	4			27	8.33%	
7	2021	15	21	6			42	12.96%	
8	2022	10	19	3	2		35	10.80%	
9	2023	4	10	6	2		23	7.10%	
10	2024	16	14	9	4	1	47	14.51%	
	Total	102	153	47	14	3	324	100.00%	
	%	31%	47.22%	14.51%	4.32%	0.93%	100.00%		

Table 7.4 — Degree of Collaboration and Collaboration Index

S. N.	Year	Single author	Joint authors	Total authors	Total papers	%	D.C.	C.I.
1	2015	18	20	67	38	7.14%	0.53	1.76
2	2016	8	24	66	32	8.07%	0.75	2.06
3	2017	9	23	61	32	8.70%	0.72	1.91
4	2018	8	20	54	28	10.87%	0.71	1.93
5	2019	7	13	39	20	10.56%	0.65	1.95
6	2020	7	20	51	27	13.35%	0.74	1.89
7	2021	15	27	75	42	11.18%	0.64	1.79
8	2022	11	24	71	35	8.39%	0.69	2.03
9	2023	4	19	56	23	11.49%	0.83	2.43
10	2024	16	31	110	47	10.25%	0.66	2.34
	Total	103	221	650	324	100.00%	0.68	2.01



Graph 7.4 — Authorship pattern



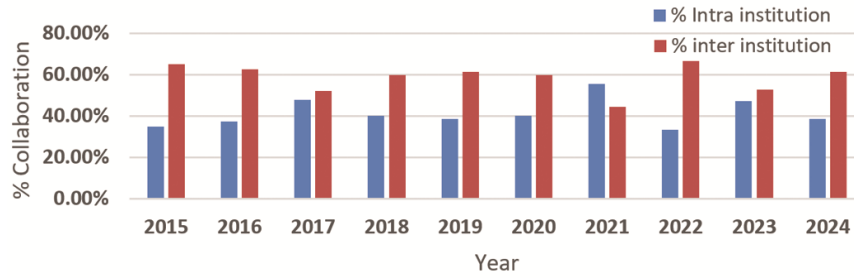
Graph 7.5 — Degree of Collaboration and collaboration Index (2015-2024)

Table 7.5 — Inter-institutional collaboration pattern

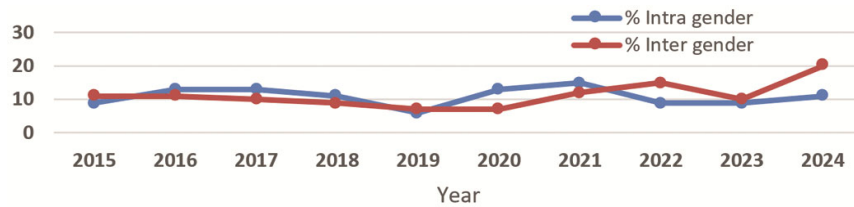
S.N.	Year	Joint authors	% Intra institution	% Inter-institution
1	2015	20	7(35%)	13(65%)
2	2016	24	9(37.50%)	15(62.50%)
3	2017	23	11(47.83%)	12(52.17%)
4	2018	20	8(40%)	12(60%)
5	2019	13	5(38.45%)	8(61.54%)
6	2020	20	8(40%)	12(60%)
7	2021	27	15(55.56%)	12(44.44%)
8	2022	24	8(33.33%)	16(66.67%)
9	2023	19	9(47.37)	10(52.63%)
10	2024	31	12(38.71%)	19(61.29%)
	Total	221	92(41.63%)	129(58.37%)

Table 7.6 — Inter-gender collaboration pattern

S.N.	Year	Joint authors	% Intra gender	% Inter gender
1	2015	20	9(45%)	11(55%)
2	2016	24	13(54.17%)	11(45.83%)
3	2017	23	13(56.52%)	10(43.48%)
4	2018	20	11(55%)	9(45%)
5	2019	13	6(46.15%)	7(53.85%)
6	2020	20	13(65%)	7(35%)
7	2021	27	15(55.56%)	12(44.44%)
8	2022	24	9(37.50%)	15(62.50%)
9	2023	19	9(47.37%)	10(52.63%)
10	2024	31	11(35.48%)	20(64.52%)
	Total	221	109(49.32%)	112(50.68%)



Graph 7.6 — Inter institutional collaboration pattern (2015-2024)



Graph 7.7 — Inter Gender Collaboration Pattern (2015-2024)

Table 7.7 — Lotka law –ALIS

S. N.	No. of contribution	Author observed	%	Author	Author Expected	%	(o-e)	Difference in %
1	Single	404	100.00%	404	404	100.00%	0	0.00%
2	Two	37	9.16%	74	101	25.00%	-64	-15.84%
3	Three	25	6.19%	75	45	11.14%	-20	-4.95%
4	four	9	2.23%	36	25	6.19%	-16	-3.96%
5	five	4	0.99%	20	16	3.96%	-12	-2.97%
6	six	3	0.74%	18	11	2.72%	-8	-1.98%
7	seven	1	0.25%	7	8	1.98%	-7	-1.73%
8	eight	2	0.50%	16	6	1.49%	-4	-0.99%
9	Nine	0	0.00%	0	0	0.00%	0	0.00%
10	Ten	0	0.00%	0	0	0.00%	0	0.00%
	More than 10	0	0.00%	0	0	0.00%	0	0.00%
		485		650	616			

Test of hypothesis:

Hypothesis 1: There is a low degree of inter-institutional collaboration in ALIS journals.

Ho: There is a high degree of inter-institutional collaboration in ALIS.

H1: There is a low degree of inter-institutional collaboration in ALIS.

Mathematically:

$H_0: C_{intra} > C_{enter}$

$H_1: C_{intra} \leq C_{enter}$

Chi-square test

S. N	Institutions	Observed	Expected	o-e	(o-e) ²	(o-e) ² /e
1	Intra	92	110.5	-18.5	342.25	3.097
2	Inter	129	110.5	18.5	342.25	3.097
	Total	221				6.194

Here

χ^2 (calculated value) = 6.194

χ^2 (tabulated value) = 3.84

The calculated Chi-square value (6.194) is more than in the standard Chi-square table (3.84) at a degree of freedom of 1, level of significance, $\alpha=0.05$. The difference in these values is highly significant; hence, the hypothesis is not supported by the data.

So, $6.194 > 3.84$

$\chi^2_{Cal} > \chi^2_{tab}$

So, the null hypothesis is rejected

Hypothesis 2: There is a high degree of inter-gender collaboration in ALIS journal

Ho: There is a high degree of inter-gender collaboration in the ALIS journal.

H1: There is a low degree of inter-gender collaboration in the ALIS journal

Mathematically,

$H_0: G_{intra} > G_{inter}$

$H_1: G_{intra} \leq G_{inter}$

Chi-square test						
S.N.	Gender	Observed	Expected	o-e	(o-e) ²	(o-e) ² /e
1	Intra	109	110.5	-1.5	2.25	0.02
2	Inter	112	110.5	1.5	2.25	0.02
	Total	221				0.04

Here

$$\chi^2 \text{ (calculated value)} = 0.040$$

$$\chi^2 \text{ (tabulated value)} = 3.84$$

The calculated Chi-square value (0.040) is less than in the standard Chi-square table (3.84) at a degree of freedom of 1, level of significance, $\alpha=0.05$. The difference in these values is highly significant; hence, the hypothesis is accepted by the data.

$$\text{So, } 0.040 \leq 3.84$$

$$\chi^2_{\text{cal}} \leq \chi^2_{\text{tab}}$$

So, the null hypothesis is accepted

Hypothesis 3: Relative growth rate is increasing.

H₀: Relative growth rate is increasing.

H₁: Relative growth rate is decreasing.

The table finds that the relative growth rate of ALIS decreased. So, the null hypothesis is rejected & alternative hypothesis is accepted.

Hypothesis 4: Doubling time is decreasing in ALIS.

H₀: Doubling time is decreasing in ALIS.

H₁: Doubling time is increasing in ALIS.

The table indicates the DT of ALIS. It could be observed that the DT ALIS journal has been increasing, so the null hypothesis is rejected.

Hypothesis 5: Single authorship is higher than double authorship in ALIS.

H₀: Single authorship is higher than double authorship in ALIS.

H₁: Single authorship is lower than double authorship in ALIS.

Mathematically,

$$H_0: A_S > A_D$$

$$H_1: A_S \leq A_D$$

Chi-square test						
S. N.	Number of authors	Observed	Expected	o-e	(o-e) ²	(o-e) ² /e
1	Single	103	162	-59	3481	21.48
2	double	221	162	59	3481	21.48
	Total	324				42.96

$$\chi^2 \text{ (calculated value)} = 42.96$$

$$\chi^2 \text{ (tabulated)} = 3.84$$

The calculated Chi-square value (42.96) is more than in the standard Chi-square table (3.84) at a degree of freedom of 1, level of significance, $\alpha=0.05$. The difference in these values is highly significant, hence Lotka's law does not apply to the data.

$$\text{So, } 42.96 > 3.84$$

$$\chi^2_{\text{cal}} > \chi^2_{\text{tab}}$$

So, the null hypothesis is not accepted

H₀: Lotka's law is applicable.

H₁: Lotka's law is not applicable

Mathematically:

$$H_0: X_c < X_t$$

$$H_1: X_c \geq X_t$$

To test this hypothesis, a chi-square test has been applied to these values.

Chi-square test						
S. N.	No. of contributions	Author Observed	Author Expected	o-e	(o-e) ²	(o-e) ² /e
1	Single	404	404	0	0	0.00
2	Two	37	101	-64	4096	40.55
3	Three	25	45	-20	400	8.89
4	four	9	25	-16	256	10.24
5	five	4	16	-12	144	9.00
6	six	3	11	-8	64	5.82
7	seven	1	8	-7	49	6.13
8	eight	2	6	-4	16	2.67
9	Nine	0	0	0	0	0.00
10	Ten	0	0	0	0	0.00
		485	616			83.29

$$\chi^2 \text{ (calculated value)} = 83.29$$

$$\chi^2 \text{ (tabulated)} = 16.91$$

The calculated Chi-square value (83.29) is more than the table Chi-square value (16.91, at a degree of freedom of 9, level of significance, $\alpha=0.05$). The difference in values is highly significant, and Lotka's law does not apply to the data.

$$\text{So, } > 16.91$$

$$X_{\text{cal}} > X_{\text{tab}}$$

So, the hypothesis is rejected.

Conclusion:

The bibliometric study of ALIS from 2015 to 2024 reveals several significant patterns and trends. The journal has maintained a consistent publication output, averaging 32 articles per year, with a noticeable peak in 2024. Double-authored papers dominate the authorship pattern, accounting for 47.22% of total contributions, while single authorship stands at 31%. Collaborative research is on the rise, as

reflected in the high Degree of Collaboration (average 0.68) and Collaboration Index (average 2.01). Inter-institutional collaborations (58.37%) are higher than intra-institutional ones, indicating broader scholarly networking and engagement. Gender-based collaboration analysis shows a balanced trend, with inter-gender collaborations slightly exceeding intra-gender ones. However, the Relative Growth Rate (RGR) has shown a consistent decline, while the Doubling Time (DT) has increased, suggesting a slowing growth pace of publication frequency. The application of Lotka's law indicates that author productivity in ALIS does not conform to its expected distribution. Overall, the study confirms that ALIS continues to play a crucial role in disseminating LIS research in India, fostering collaborative efforts, and sustaining academic interest. These findings may help journal editors, LIS researchers, and policy-makers in refining publication strategies, promoting equitable participation, and encouraging interdisciplinary and cross-institutional collaborations.

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