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Visualization of Authorship Patterns and Research Trends of Annals of Library and Information Studies

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ABSTRACT

The study was designed to know the year-wise research growth rate, author collaboration pattern and productivity, sub-domain research in library science, research keyword network, thematic and cluster analysis of journal Annals of Library and Information Science. The data search and download has been done under (Scopus database) sources by selecting the subject area Social Science/Library and Information Science and the journal Annals of Library and Information Science. A total of 388 articles from the study period 2011 to 2022 have been downloaded with all bibliographic information from the Scopus database. VOSviewer (version, 1.6.9) and R (Biblioshiny) software have been used for data visualization and keyword analysis. Total 388 articles were published in which 2014 noted as the most productive year (11.60%) and 2019 as least productive (4.64%) year. Citation analysis indicates that highest 315 citation (18.39%) for year 2011 and lowest 32 (1.87%) in 2022, noted so for averaging 4.41 per article annually. multi-authored articles were found prominent (48.20%), followed by single authors (33.76%). The Collaborative Index ranged from 1.81 to 2.03 (average 1.88), and the Degree of Collaboration found between 0.88 to 0.73 (average 0.82). The Collaboration Coefficient, reflecting averaged collaboration 0.365, with values from 0.29 to 0.41. B K Sen, B Dutta, and K C Garg, noted as highest contributor for this journal where with article "Internet of Things and Libraries" published by Pujar S M & Satyanarayana K V in year 2015 has highest number of citations for any article. Keyword analysis indicate that term "Scientometrics," "Bibliometrics," and "India," occurred most time where Library Services, H-index, and Covid-19 noted as latest occurred term for year 2021. The thematic analysis of subject shows that koha, vufind, ethics, open source, ontology, academic integrity, citation impact, altmetrics, lexicon etc. found as emerging subject areas for research. As expected, India emerged as the primary contributor in publications (76.80%) and citations (75.55%), followed by Nigeria (6.44% publications, 5.78% citations) which shows the journal must make its presence on international level. The institute analysis indicates that research institutes are sharing more publication comparing to the central university where the library science department exist.

Keywords: Citation Analysis; Authorship Pattern; Biblioshiny; cluster Analysis; Scientometrics; R-Software.

1. Introduction

Annals of Library and Information Studies is a prestigious English language, quarterly journals in the field of Library and Information Science in India which is published by CSIR-NISCAIR, New Delhi. It has been started their publication from 1954 under the name Annals of Library studies. Dr. S R Ranganathan was the first editor of the journals. In year 1964, new name Annals of Library Science and Documentation, was adopted and again change in 2001 as Annals of Library and information Studies. Total 70 volume of this journal has been published. It is listed in various citation databases like Scopus, LISA, ILSA, DOAJ, ESCI. In modern era, researchers are engaged to publish new knowledge and idea through scholarly communication. They published their reports through scientific communications like conferences, journals, reports etc. based on previous knowledge. Citation analysis measures the productivity of authors or institutions, in technical and scholarly writing. Citations can be counted while using research references, bibliography, foot notes, sources etc. (Mondal & Raychoudhury, 2018). Alan Pritchard coined the term 'Bibliometrics' in the years 1960s (De Bellis, 2009), and Eugene Garfield known as the father of 'Scientometrics' research. In 1961, The Institute of Science Information (ISI) founded by them, a fundamental research organization which created Science Citation Index (SCI) presently known as Clarivate (Roemer & Borchardt, 2015) and later used to measures the journal impact factor. Bibliometrics, pertains to the quantitative assessment of scientific literature and other published materials. This includes not only the content of published research but also the author, journals in which they are published, and the frequency with which they are subsequently referenced by other researchers (Jones, AW 2005).

2. Review of literature

Authors Singh, Ranjit and et al investigates the co-citation, co-word and collaboration techniques and conceptual and social structure of the "Journal of Ecotourism" during 2002 to 2020. A significant growth of articles and citations found for the journal. It is found that 70% of the article published in the journal are from collaborative nature. Singh, Manendra (2017) inspect the authorship pattern and collaboration of authorship in Biotechnology in India during 2001-2016 and reveals that the average number of authors per article for India has been counted as 4.92, the collaboration coefficient for 16 years (2001-2016) was found 0.63. The multi authorship articles was dominating on single authorship and the average activity index of India for sixteen years was counted as 91.78. Khan, I examine the DESIDOC Journal of Library &

Information Technology (2010-2014)” and reveals that 307 articles published during the period. The year 2012 found as most influential year with 70 articles. The maximum number of contributions during the period of study are from joint authors, with a total of 188 (61.24 per cent). Majority of the authors preferred journals publications which received highest number of citations totaling 2,447 (51.89 per cent) followed by websites with 1,015 (21.52 per cent) citations and books with 613 (13 per cent) citations. The highest citations 1,109 (23.52 per cent) out of 4,716 were received in the year 2013, and lowest 700 (14.84 per cent) were recorded in the year 2010. Velmurugan, C. investigate the 203 ALIS articles during 2007 to 2012 and found that the highest number of contributions i.e., 43 (21.19 %) for year 2010. It is observed that collaborative authorship dominating on single authorship. The degree of collaboration ranges from 0.57 to 0.82 and 0.64. as average degree of collaboration. The average number author per paper is 1.87 and the average productivity of the author is 0.53. Hussain, A inspect the bibliometric analysis of ‘Electronic Journal’. The author reveals that 578 articles published in between 2001-2010. The single author publication dominates on multi author publication. Author, Stephen M. Mutula, Howard Falk, and Shien- Chiang Yu are found as most productive authors. Thanuskodi, S. found that the ‘Library Herald Journal’ from 2006 to 2010. They investigate number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc. Study reveals that most of the contributions are from India with 89.85% and others are 10.15% from foreign sources.

3. Objectives of the Study

This study has based on several set of objectives, which may give as below...

1. To examine the year-wise growth and citations pattern of journal Annals of Library and Information Studies during 2011-2022.
2. To understand the Collaboration and Degree of Collaboration
3. To find the Annual Growth rate and Relative Citation Index
4. To evaluate the most productive author and authorship pattern
5. To know the institution-wise and country-wise quantum of publications
6. To analyze the keyword and research trends in Library and Information Science.

4. Methodology

Bibliometric method has been used for present study for the period of 2011-2022. The data search and download has been done under (Scopus database) sources by selecting the subject

area Social Science/Library and Information Science and the journal Annals of Library and Information Science. The search key use for retrieving the details “SRCTITLE (annals AND of AND library AND information AND studies) AND PUBYEAR > 2010 AND PUBYEAR < 2023. A total of 388 articles from the study period 2011 to 2022 have been downloaded with all bibliographic information from the Scopus database.

4.1 Data Analysis

To achieve the objectives year wise distribution of publication with citations, Annual Growth Rate of publication (AGR), Annual Citation Count, Relative Citation Impact (RCI), Collaborative Coefficient, Degree of Collaboration, Collaborative Index, Keywords co-occurrence, citation analysis, Trends Topics, Cluster analysis, most profit author, most collaborative institute, top funding agency etc. analyzed with the Excel and for visualization VOS viewer (1.6.18) and R (Biblioshiny, 4.3.1) were used. The main information about the data analyses by R Biblioshiny software depicted in table 1, where AGR (1.07), Document average is 6.6, average citation per document (4.35), Co-authorship per document (1.9), International co-authorship (2.57), and references (8504).

Table 1. Main information about data

Sources (Journals, Books, etc.)	1	Single-authored docs	130
Documents	388	Co-Authors per Doc	1.9
Annual Growth Rate %	-1.07	International co-authorships %	2.577
Average citations per doc	4.358	Article	371
References	8504	Conference Paper	1
Keywords Plus (ID)	0	Letter	2
Author's Keywords (DE)	1129	Note	8

5. Result and discussion

5.1 Distribution of articles

Table 2 demonstrate the volume-wise publication growth of ALIS from 2011-2022, presenting a total number of 388 articles published in 12 Volumes, each volumes have 4 issue remaining only year 2013. It is found that the publication trend in ALIS has increasing and decreasing trends. The highest number of articles 45 (Vol. 61, 2014) followed by 43 (Vol. 68, 2021) and 38 article in (Vol. 62, 2015) where the lowest 18 article in (Vol. 66, 2019). it is found that highest number of cumulative articles published in fourth volume (101) where lowest for second volume (94) for all years.

Table 2. volume wise article distribution

Year	Volume	Issue	Issues wise Article				Total	Cumulative Publications	%
			1	2	3	4			
2011	58	4	10	10	9	7	36	36	9.28
2012	59	4	6	6	9	8	29	65	7.47
2013	60	3	9	9	9	0	27	92	6.96
2014	61	4	9	8	11	17	45	137	11.60
2015	62	4	6	7	9	16	38	175	9.79
2016	63	4	10	8	8	6	32	207	8.25
2017	64	4	10	6	6	10	32	239	8.25
2018	65	4	9	7	7	6	29	268	7.47
2019	66	4	3	5	5	5	18	286	4.64
2020	67	4	6	5	8	8	27	313	6.96
2021	68	4	8	13	12	10	43	356	11.08
2022	69	4	8	9	7	8	32	388	8.25
Total	12	47	94	93	100	101	388		100

5.2 Year Wise distribution of publication and citation with ACP & RCI

Table 3 demonstrate the highest AGR of publication 66.66 % found in year 2014, and lowest (-37.93%) noted for year 2019. The higher number of citations 315 (18.39%) receive in the year 2011, followed by 301 (17.57%) in 2014 and 179 (10.45%) in 2012, and lower 32 (1.87%) for year 2022. The average citation per publication 4.41% noted annually. The highest citation per publication 8.75 for year 2011, followed by 6.69 for 2014 and 6.17 for 2012. The average RCI 1 noted annually and highest RCI 1.98 (2011) and minimum 0.21 (2021).

Table 3. Year Wise distribution of publication and citation with ACP & RCI

Year	Total Articles	Annual Growth Rate	% of Total Articles	Total Citations	% Total Citations	Relative Citation Index	Average Citation Per Articles
2011	36	0	9.28	315	18.39	1.982	8.75
2012	29	-19.4	7.47	179	10.45	1.398	6.17
2013	27	-6.9	6.96	149	8.70	1.250	5.52
2014	45	66.7	11.60	301	17.57	1.515	6.69
2015	38	-15.6	9.79	144	8.41	0.858	3.79
2016	32	-15.8	8.25	139	8.11	0.984	4.34
2017	32	0.0	8.25	136	7.94	0.963	4.25
2018	29	-9.4	7.47	101	5.90	0.789	3.48
2019	18	-37.9	4.64	80	4.67	1.007	4.44
2020	27	50.0	6.96	96	5.60	0.805	3.56
2021	43	59.3	11.08	41	2.39	0.216	0.95
2022	32	-25.6	8.25	32	1.87	0.227	1.00
Total	388		100	1713	100	1	4.415

5.3 Authorship Pattern

It is found that the highest number of publications 188 (48.20%) published by two authors, followed by single author 130 (33.76%) and 70 (18.04%) three and more than three authors (Singh, M. K., 2018). The Collaborative index of authors ranges between 1.81 to 2.03, and the average collaborative index noted 1.88. The Degree of Collaboration between authors 0.88 found for year 2016, and 2022, where lowest 0.73 for 2015. The average Collaborative Coefficient noted 0.365 and the highest and lowest found between 0.29 to 0.41. The Co-Authorship Index measured by proportional output of one, two, three, four, authors. The highest co-authorship index for single author noted 122.55 found for year 2012 and lowest 65.81 for year 2020. highest co-authorship for two authorships calculated 138.32 for year 2020 and lowest 71.54 for year 2012, for tree author 153.96 in the year 2019 and lowest 71.67 2018, for more than three author the highest co-authorship index value is 259.82 in the year 2016 and 2022, and lowest index value 76.98 for year 2011. Total 497 authors published their paper during the period. The highest 20 paper published by author B K Sen followed by B Dutta, 13 publications, and K C Garg with 12 publications.

5.4 Most Cited Articles

Table 4 demonstrate the article, Internet of things and libraries (2015) published by Pujar S M and Satyanarayana K V received highest 32 (3.56) citation and 8.44 Normalized Total citations followed by Comparative analysis of scientific output of BRIC countries (2011) by Kumar N & Asheulova N with 32 (2.46) citations, Co-authorship and co-occurrences analysis using Bibliometrix r-package: A case study of India and Bangladesh (2019) by Jalal S K 29(5.80) citations and A study of ICT skills among library professionals in the Kerala University Library System (2014) by Seena S T & Sudhier Pillaiw K G by 25 (2.50) citations.

Table 4. Top 10 most cited articles

S No	Author	Year	Name of Article	TC	Year wise citation	Normalized TC
1	Pujar S M & Satyanarayana K V	2015	Internet of things and libraries	32	3.56	8.44
2	Kumar N & Asheulova N	2011	Comparative analysis of scientific output of BRIC countries	32	2.46	3.66
3	Jalal S K	2019	Co-authorship and co-occurrences analysis using Bibliometrix r-package: A case study of India and Bangladesh	29	5.80	6.52
4	Seena S T & Sudhier Pillaiw K G	2014	A study of ICT skills among library professionals in the Kerala University Library System	25	2.50	3.74

5	Sun J & Yuan B-Z	2020	Mapping of the word rice research: a bibliometric analysis of top paper during 2008-2018	24	6.00	6.75
6	Nwagwu W E & Ajama M	2011	Women's health information needs and information sources: A study of a rural oil palm business community in South-Western Nigeria	24	1.85	2.74
7	Jayshankar R, Ranesh Babu B & Rajendra P	2011	Research output of CSIR-central electro chemical research institute (CECRI): A study	22	1.69	2.51
8	Sun J & Yuan B-Z	2020	mapping of top Paper in the subject category of water resources based on essential science indicators	21	5.25	5.91
9	Fumani M R F Q, Goltaji M & Parto P	2015	The impact of title length and punctuation marks on article citations	21	2.33	5.54
10	Mittal R	2011	Library and information science research trends in India	21	1.62	2.40

5.5 Keyword and author cluster analysis

The keyword Scientometrics found as most occurred keywords with 32 occurrence (2.83%) followed by Bibliometrics 29 (2.57%), India 27 (2.39%), Citation Analysis 13 (1.15%), and 11 each for Academic Libraries, E-Resources, and Open Access. The analysis of keyword indicates that authors focused on review types of research like metric study rather than core subject of library science. Bibliographic Coupling occurs when two works reference a common third work in their references (Jarneving, B. 2007). Figure 1 depicted the result of author cluster analysis. The analysis reveals that total 15 clusters identified, cluster 11 found as highest with 6.33 impacts and 1.54 centrality and author Yuan B-Z has highest 22.5 normalized local citation score. The key words of the group noted are bibliometric analysis. Cluster 8 has lowest impact, but the centrality of cluster found 1.33 and author of group is Nishy P with 3.4 citation score and India, research trends and Scientometrics noted as keyword.

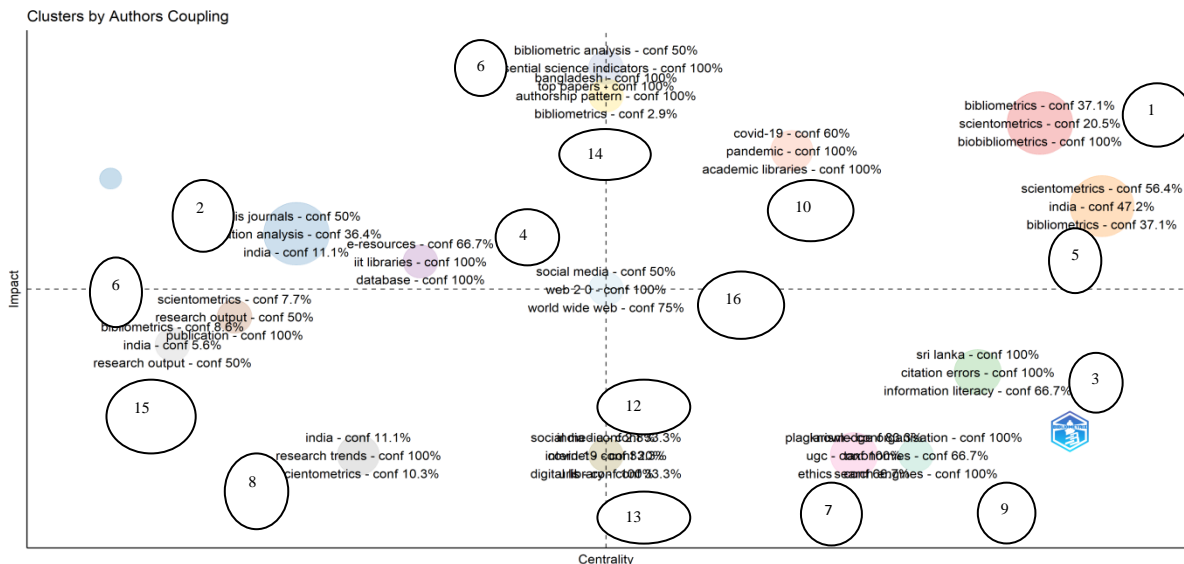


Figure 1. Author cluster analysis

5.6 Thematic Map of Subject Classifications

The parameter for analysis as minimum number of words 250, min cluster frequency (per thousand doc) 3, number of labels 3 and label Size 0.3. Total 191 keywords noted and distributed in 25 clusters; each cluster represents the group of keywords related to similar characteristics. The Niche themes, Motor themes, Basic themes, and emerging or declining themes have been shown in figure 2 and rank centrality, rank density, and keyword frequency shown in table 5. Based on occurrence of keywords, cluster 8 indicates that theme Scientometrics (basic theme) noted as most relevant with 239 cluster frequencies, Rank Centrality 26, and 7 rank density. The Academic Library found second most important (cluster 1) with 115 cluster frequency, 3 rank density, 25 rank centrality. The highest rank density 26 found for keyword Bibliometric Analysis (cluster 14) followed by dissertation 25 (cluster 2), and Open Access 21 (cluster 4). The keyword koha, vufind, ethics, open source, ontology, academic integrity, citation impact, altmetrics, lexicon etc. found as emerging subject areas for research. The basic theme of subject mix with library classification, colon classification, quantitative analysis, metric study, consortia, electronic resources metadata, academic library etc. under motor theme various emerging keywords like nirf, social media, science indicators etc. depicted. The niche themes of subject analysis show the information use, social tagging, library thing citation index etc.

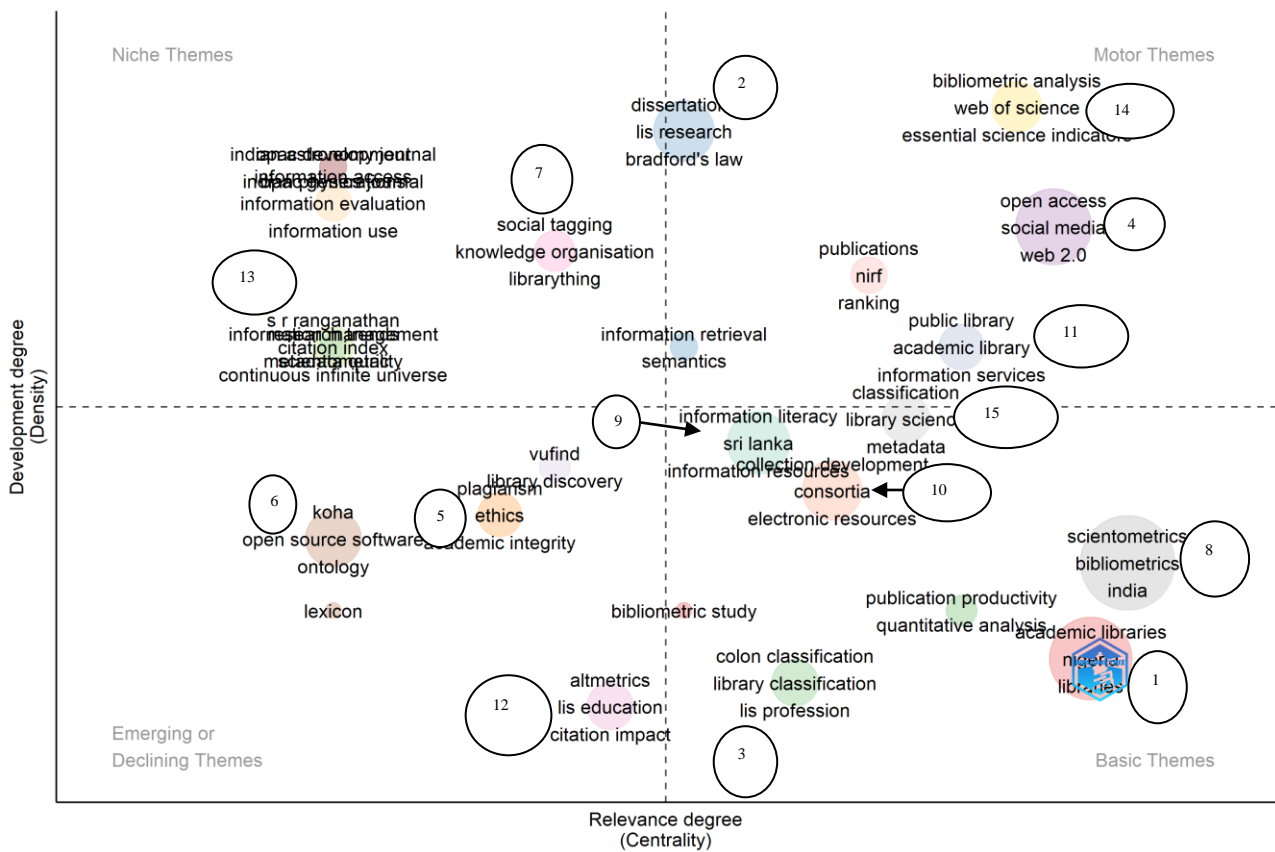


Figure 2. Thematic Analysis of Keywords

Table 5. Thematic Analysis of Keywords

Cluster no.	Cluster name	Rank Centrality	Rank Density	Cluster frequency
1	Academic Libraries	25	3	115
2	Dissertations	14	25	30
3	Colon classification	17	2	13
4	Open Access	24	21	77
5	Plagiarism	9	9	11
6	Koha	4.5	8	23
7	Social Tagging	10.5	20	9
8	Scientometrics	26	7	239
9	Information Literacy	16	12	34
10	Collection	18	10	29
11	Public Library	21.5	16	12
12	Altmetrics	12	1	13
13	S R Ranganathan	4.5	16	9
14	Bibliometric Analysis	23	26	16
15	Classification	20	13	14

5.7 Most collaborative Country and productive institute

Analysis shows that India is leading country with 298 (76.80%) of publications and 1295 Citations. The Nigeria found as second most publishing country with 25 (6.44%) publications and 99 (5.78%) of Citations, followed by Sri Lanka 17 (4.38%) and 69(4.03%) of citations, Bangladesh 9 (2.32%) of publications and 53 (3.09%) of citations. The country collaboration indicates that ALIS journal known as national level journal which needs to change in future by enhancing number of foreign publications or collaborative papers. Analysis of total 590 institutions indicate that Council of Scientific and Industrial Research India contributing the highest 33 (16.18%) publications followed by National Institute of Science Technology and Development Studies India with 24 (11.76) publications. Indian National Science Academy 20 (9.80%) of publications. The Jawaharlal Nehru University with 15 (7.35%) publications and Banaras Hindu University with 14 (6.86%) at 4th and 5th most contributing institute. The institute analysis indicates that research institutes are sharing more publication comparing to the central university where the library science department exist. These all publications in multidisciplinary in nature and particularly from metric study which are itself a review papers.

Findings and conclusion of study

After Analysis of Annals of Library and information studies during the period 2011-2022 finding are given Bellows

- During the study Period total 388 article published during 2011-2022, The year 2014 most productive year with 45(11.60%) articles and 2019 is less productive year with 18(4.64%) articles.
- The maximum number of publications 45(11.60%) and Annual growth rate (AGR) of publication 66.66 % found in year 2014, minimum number of publications 18(4.64%) and minimum annual growth rate of publication (-37.93%) found in 2019.
- The maximum number of citations is 315 (18.39%) receive in the year 2011, while the minimum of citation receives in the year 2022 that is 32 (1.87%). The average citation per publication is 4.41% annually. The average RCI is 1 annually and Maximum RCI is 1.98(2011) and minimum 0.21(2021).
- In Authorship Pattern, maximum number of publications published by two authors that is 188 (48.20%), followed by single author appears 130(33.76%).
- The Collaborative index of authors is in-between 1.81 (2021) to 2.03(2016 and 2022), and the average collaborative index is 1.88.

- The Degree of Collaboration between authors maximum is 0.88 found in 2016, 2022 and 2022 and minimum is 0.73 in 2015, average degree of collaboration is 0.82 during the study.
- The average Collaborative Coefficient is 0.365 and the highest and lowest values varies in between 0.29(2015) to 0.41(2016,2020 and 2022)
- The average Collaborative Coefficient is 0.365 and the highest and lowest values varies in between 0.29 to 0.41 and two authorship is 138.32 in the year 2020 and lowest 71.54(2012), three authorship is 153.96 in the year 2019 and lowest 71.67 (2018).
- B K Sen is most productive author with 20 publications followed by B Dutta with 13 publications, K C Garg with 20 publications.
- Internet of things and libraries (2015) by Pujar S M & Satyanarayana K V is most cited articles with 32 (3.56) citations and 8.44 normalized total citation followed by Comparative analysis of scientific output of BRIC countries (2011) by Kumar N & Asheulova N with 32 (2.46) citations and 3.66 normalized total citation.
- The word Scientometrics most occurred keywords with 32(2.83%) occurrences followed by Bibliometrics by 29(2.57%) occurrence, India 27(2.39%) occurrence, Citation Analysis 13(1.15%) occurrence found during the study.
- In bibliographical coupling 15 clusters are identified in which, based on Impact and Centrality Cluster 11 is most impact cluster with 6.33 impacts and 1.54 centrality, the author of the group is Yuan B-Z with 22.5 normalized local citation score is top positions.
- Thematic analysis, cluster 8 indicates that theme Scientometrics (basic theme) noted as most relevant with 239 cluster frequencies, Rank Centrality 26, and 7 rank densities.
- India is leading publishing county with 298(76.80%) of publications and 1295(75.55%) of Citations followed by Nigeria 25(6.44%) publications and 99(5.78%) of Citations.
- Council of Scientific and Industrial Research India contributing the highest number of publications is 33(16.18%), followed by National Institute of Science Technology and Development Studies India with 24(11.76) publications.
- Indian Council of Medical Research is top funded organizations with 3 publications, followed by Bangladesh Council of Scientific and Industrial Research.

Conclusion

The study analyzed 388 research articles published in ALIS, a prestigious journal within the library and information science in India, from 2011 to 2022, along with their citation patterns. The research revealed that 2014 marked the highest publishing with 45 articles, while 2019 witnessed the lowest with only 18 articles. Citations exhibited a wide range, peaking at 315 in 2011 and hitting a low of 32 in 2022, with an average of 4.41 citations per publication. Authorship trends leaned heavily towards dual authors (48.20%) and single authors (33.76%), indicative of prevalent collaboration practices, with notable involvement from institutions like the Council of Scientific and Industrial Research India and the National Institute of Science Technology and Development Studies India. In sum, this study underscores India's significant influence in Scientometrics and bibliometrics research, offering valuable insights into the field's evolving dynamics during the study period.

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