Trends in Terminological Networks in Online Public Access Catalogs: A Bibliometric Study

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Abstract

The aim of this paper is to explore the knowledge input and the subject relationship with other disciplines for the domain of information science through a citation analysis, from the references of each article from , of four leading information science journals, The purpose of this study is to perform a keyword analysis to gain insights about Online Library Catalogue and its research trends and aspects. A Scientometrics analysis of publications in the Library Science domain from 1989 to 2022 indexed in the Web of Science database was performed. The period 1989-2022 was chosen as the start of the decade a major transition and adoption of technology in the Library Science. Network visualization techniques were applied using VOS Viewer software to find out the most popular author keywords and co-words.

Keywords - Online Catalogs, Online Searching, Online Searching in Libraries, Keyword Analysis; Co-word analysis; Bibliometrics; Information Visualization.

1. INTRODUCTION

Libraries give people access to information and help academic staff' by providing latest information regarding cutting-edge teaching and learning strategies in various institutions. Library professionals are essential knowledge landscape managers and play a key role in these institutes. Libraries are learning resource centres of any institution where people spend a lot of productive time learning and researching. Additionally, library professionals actively participate in activities that increase, preserve, organise, and share knowledge in order to further the goal of academic excellence. Historically, libraries have been crucial to students' educational experiences. In various library and information science research fields, bibliometric analysis is becoming more popular over the years. Pritchard (1969) first used the term "bibliometric investigations" which use mathematical and statistical techniques to produce thorough information on the subject. By creating accurate summaries of the existing literature, they specifically aid in the classification and analysis of bibliographic content (Donthu et al., 2020) by employing quantitative techniques and offering methodical comparisons across areas, nations, and institutions.

2. REVIEW OF LITERATURE

In order to examine bibliometrics data from the publications of IMS and SUM Hospital, Bhubaneswar, from 2009 to 2013, Mishra, Sahu and Brahma, Mahapatra (2015) did a bibliometrics study on the progress of research in an Indian medical college. The goal of the research was to determine the aggregate number of articles published by department, the aggregate number of citations to published articles by department, the estimated number of citations per article, institutional impact indices, institutional percentages of articles with no sources, the annual average number of faculty per department, and the average number of citations per faculty member. The findings revealed that over a five-year research, their institute published 207 articles. The research productivity of faculty members in the life sciences at the Savitribai Phule Pune University (SPPU), Maharashtra, India, was examined by Nagarkar, Veer, and Kumbhar (2015) using bibliometric analysis. They examined the research output between 1999 and 2013 as well as the patterns of authorship and citations. The bibliographic information and source data were taken from the Web of Science database. Results indicate that faculty members are producing more research, their articles are receiving quality citations, and as a result, their journals have a higher Impact Factor. The faculty members have expanded interdisciplinary research by working with well-known worldwide scholars. In order to analyse the publication features and growth of a science journal with 35 years of history, Journal of Membrane Science (JMS), Zhen Fu and Shan Ho (2015) conducted a bibliometric analysis of the journal for the years 1976 to 2010. Wolfgang Ketterle, the 2004 Nobel laureate, was the subject of a scientometric study conducted by Koganurmath et.al(2004). The authorship patterns of his 115 papers from 1982 to 2002, which included the fields of Bose-Einstein condensation (68), laser spectroscopy (30), and atomic physics (17), were examined. He worked with 68 other people. A study of the 190 papers by Nobel Laureate Harold W. Kroto that were published between 1985 and 2000 was carried out by Kademani,and Kumar(2002). His domain-specific publication and collaboration patterns were primarily examined in this study. According to the report, he worked with a total of 181 authors in this duration.

3. OBJECTIVES OF THE STUDY

1. To find out the emerging research areas in the field.
2. To find out the country wise and language wise distribution of publications in the field.
3. To find out the author keyword network in the field.
4. To find out the keywords and their occurrences in the field.

4. DATA SOURCES

The data was collected from the Web of Science bibliographic database developed by Clarivate Analytics. The depth of records ranges from indexing citations, authors, topics, title, subject keywords, abstracts, periodical title, author's address and publication year. The requisite data was extracted from the core collection of the Web of Science (WoS) bibliographical database. It provides access to multiple subscription-based databases.

Comprehensive citation data is provided across various academic disciplines such as science, social science, arts, and humanities and supports 256 disciplines.
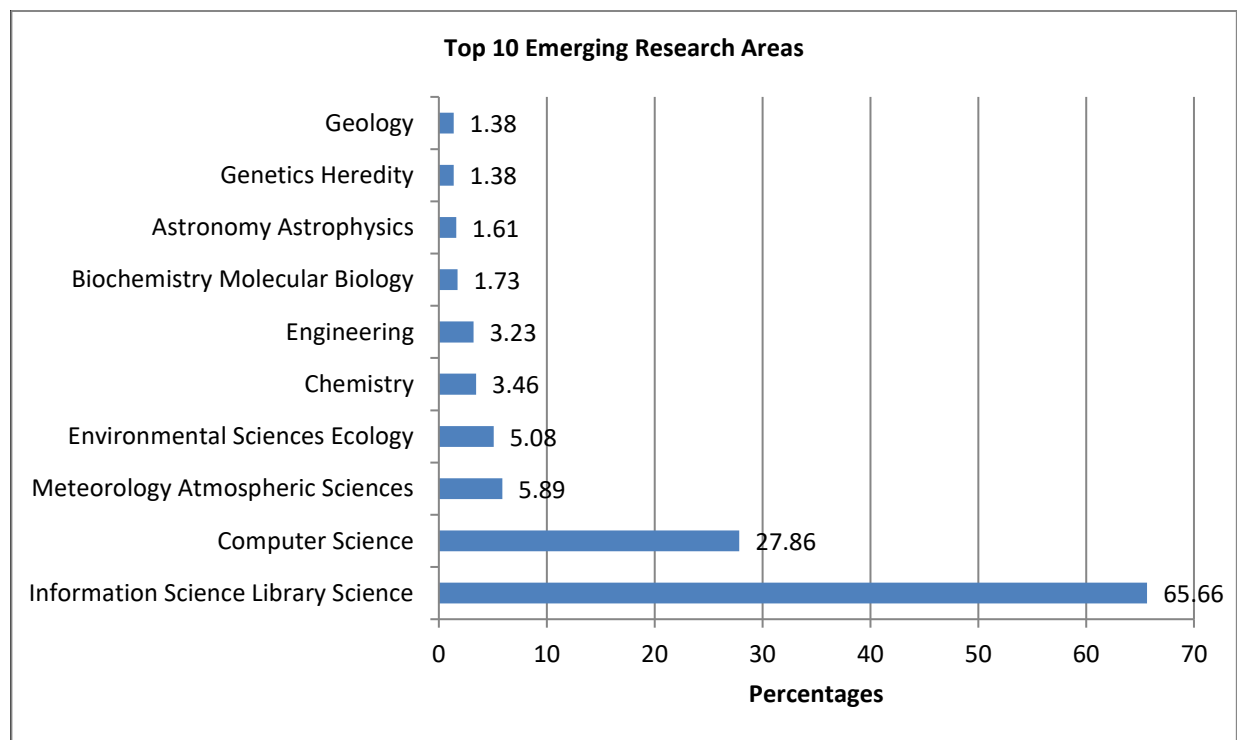
5. SAMPLE OF THE STUDY

The sample of the study comprises the data collected from the Web of Science database based on a search query for the Library Science domain. 865 publications of scholarly literature published from 1989 to 2022 in the Library Science domain served as a sample for this study. The keywords used to extract data in order to assess the publication productivity in the Library Science domain were derived based on the Library of Congress Subject Heading List.

Entry Terms:

- ➢ Online Catalogs
- ➢ Online Public Access Catalogs
- ➢ Online Searching
- ➢ Online Search
- ➢ OPAC
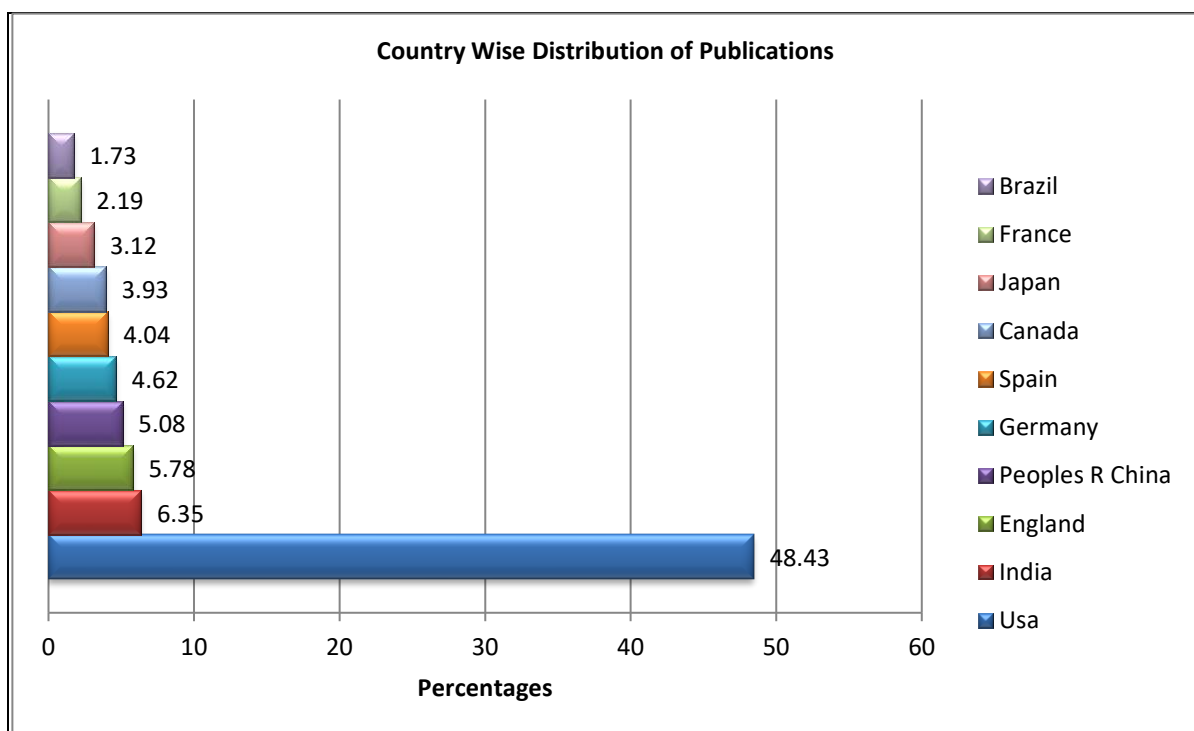- ➢ Online Searching in Libraries

6. DATA ANALYSIS

The data analysis was carried out on VOS Viewer software to derive the most popular keywords based on the number of occurrences and create networked visualizations.

Top 10 Emerging Research Areas

Research Area	Percentage
Geology	1.38
Genetics Heredity	1.38
Astronomy Astrophysics	1.61
Biochemistry Molecular Biology	1.73
Engineering	3.23
Chemistry	3.46
Environmental Sciences Ecology	5.08
Meteorology Atmospheric Sciences	5.89
Computer Science	27.86
Information Science Library Science	65.66

Percentages

Figure No. 1 - Top 10 Emerging Research Areas

Figure No.1 represents the top five emerging research areas from 1989 to 2022 based on the number of publications. Information Science Library Science with 65.66% (568) publication is the most popular and emerging research area. Computer Science had 27.86% (241) of publication is the second most popular field. Meteorology Atmospheric Sciences had 5.89% (51) publication. Environmental Sciences Ecology is the fourth most popular research area with 5.08% (44) of publications. Geology is the least popular emerging research area with 1.38% (12) publications. The emerging fields are interdisciplinary in nature and are subdomains of the Library and information science field.

A country-wise division of publication productivity was carried out and the leading countries are shown below along with the number of publications, percentage of publications out of 865 the total number of publications during the period of study and the rank at which the country lies are shown in the Figure No.2.

Country Wise Distribution of Publications

Country	Percentage
Brazil	1.73
France	2.19
Japan	3.12
Canada	3.93
Spain	4.04
Germany	4.62
Peoples R China	5.08
England	5.78
India	6.35
Usa	48.43

Figure No. 2 - Country Wise Distribution of Publications

Figure No. 2 shows the top ten most productive countries producing research output in health informatics discipline. Along with the ranking of each country. The United States of America lies at the first rank with 48.43% of publications from 1989 to 2022. India lies at the second rank with 6.35% of publications; however, the USA occupies the first rank with a stark difference when it is compared to other countries. Peoples R China lies at the fourth rank with 5.08% of publications followed by Germany at the 5th rank with 4.62%, Spain with 4.04%. The findings reveal that developed countries occupy the highest ranks as compared to developing countries. The research and development framework is stronger in developed nations in contrast with the developing nations.

Table No. 1 – Language wise Distribution of Publications in the field of Library Science from 1989-2022

Sr. No	Languages	Record Count	% of 865
1	English	819	94.68
2	German	14	1.61
3	Spanish	12	1.38
4	Japanese	8	0.92
5	Portuguese	6	0.69
6	Chinese	3	0.34
7	Dutch	1	0.11
8	French	1	0.11
9	Welsh	1	0.11

Table No. 1 depicts that the highest number of publications were in English language, 819 Record Count out of a total of 865 Publications. The findings suggest a bias towards the English language as 94.68% of publications had English as the primary language. 12 Record Count were in Spanish, 1 Record Count Dutch, French and Welsh Language respectively each during the period of study.

Table No. 2 - Author Keyword Network for Library Science domain from 1989 to 2022

| Sr. No	Keywords	Occurrences	Total Link Strength
1	Information Retrieval	7	11
2	Users Studies	4	8
3	India	2	7
4	Libraries	4	7
5	Discovery Tools	2	5
6	Ebooks	2	5
7	Online Catalogues	3	5
8	OPACs	2	5
9	University Library	2	5
10	Galaxy: halo	2	4
11	Galaxy :Stellar Content	2	4
12	Online Catalog	7	4
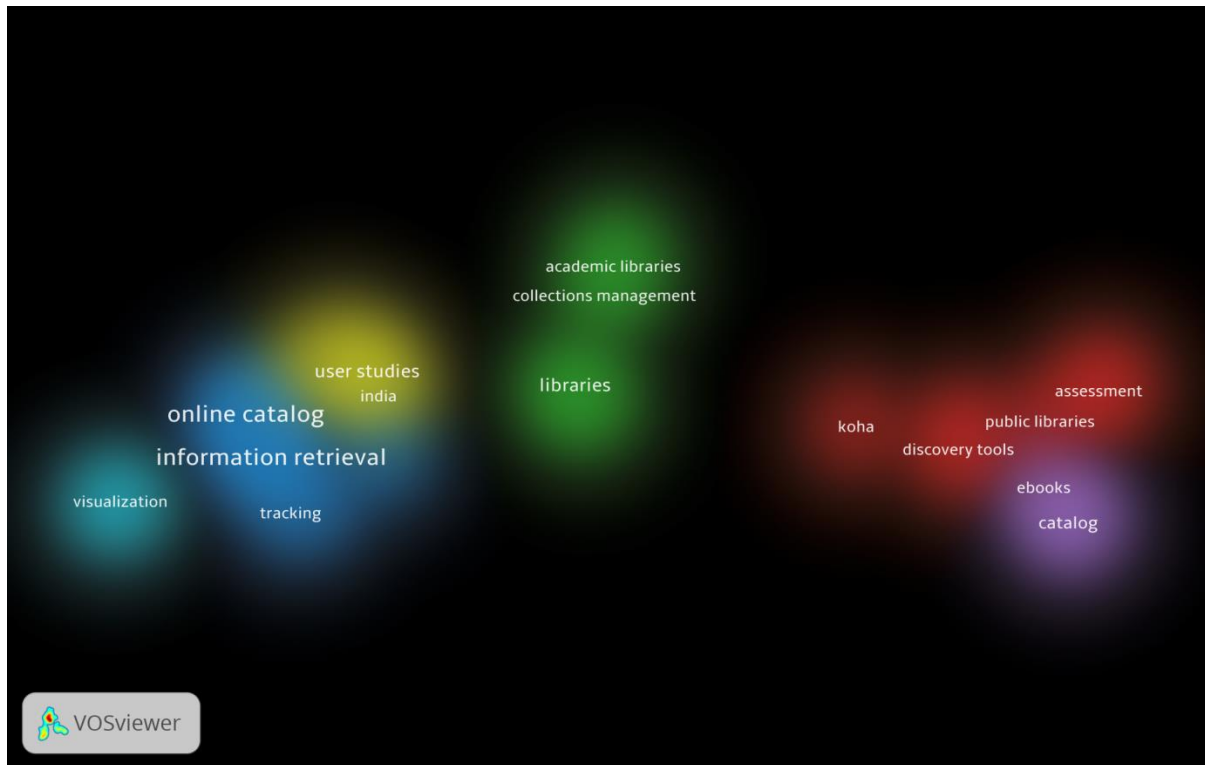
Figure No. 3 - Author Keyword Network

Figure 3 represents the cluster map of author keywords in Library Science domain from 1989 -2022. The visualization comprises networked lines and the weight of keywords grouped into colour coded clusters based on the co-occurrences of terminologies. Group 1 (Red) comprises various techniques applied to take it up such as Assessment, Discovery Tools, OPACs and Public Libraries. Group 2 (blue) consists of Library Science and its associated areas like Online Catalog, Information Retrieval, Tracking etc..Group 3 (Yellow) includes OPAC, user Studies and India. Group 4 (Green) includes Libraries, Academic Libraries..etc.Group 5 (Purple) includes ebooks and Catalogs.The visualization depicts that Information Retrieval has had the highest number of occurrences followed by the term User Studies, India, Libraries, Discovery Tools. The colour coded clusters depict the correlations between terminologies that have co-occurred. The network depicts that the term health informatics has co-occurred along with all the clusters.

Table No. 3 – Top 12 Keywords and their Occurrences in the field of Library Science from 1989 to 2022

Sr. No	Keywords	Occurrences	Total Link Strength
1	Online Catalog	61	64
2	Access	18	28
3	Users	11	28
4	Model	12	27
5	Retrieval	19	25
6	Design	10	22
7	OPAC	10	22
8	Subject Access	13	22

| 9	Library	18	21
10	Behavior	10	19
11	Information Retrieval	12	18
12	Web	11	18
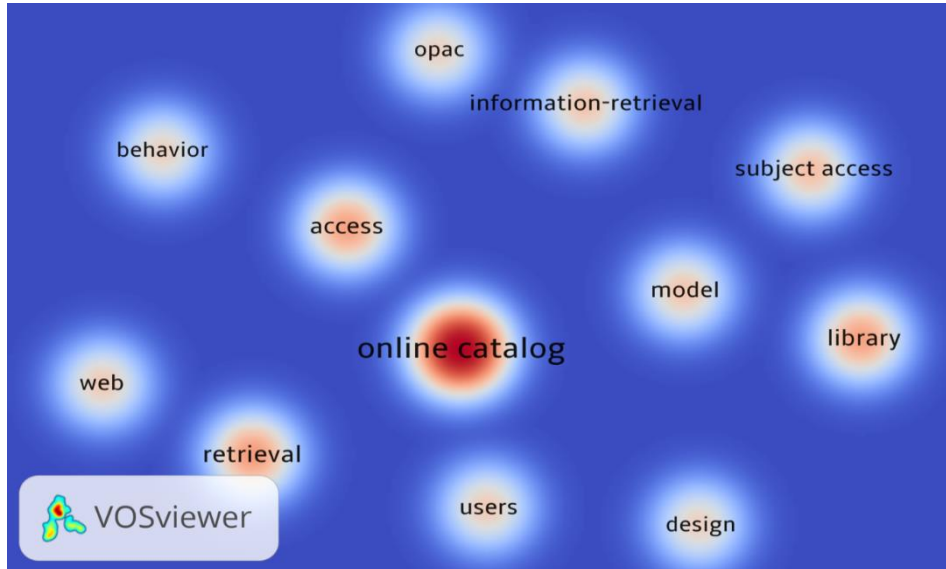
Figure No 4 - Top 12 Keywords and their Occurrences

Table No. 3 enlists the top twelve keywords along with the number of 61 occurrences out of the total dataset of 865 records. The term 'Online Catalog' has appeared the highest number of times followed by term 'Retrieval'; that has occurred 19 times. The term Access, Library, Subject Access and Information Retrieval have also been the most popularly used keywords by authors who produced scholarly publications in the field of Library Science. The networked visualizations for the core keywords used for this study based on the Library of Congress Subject Heading List.
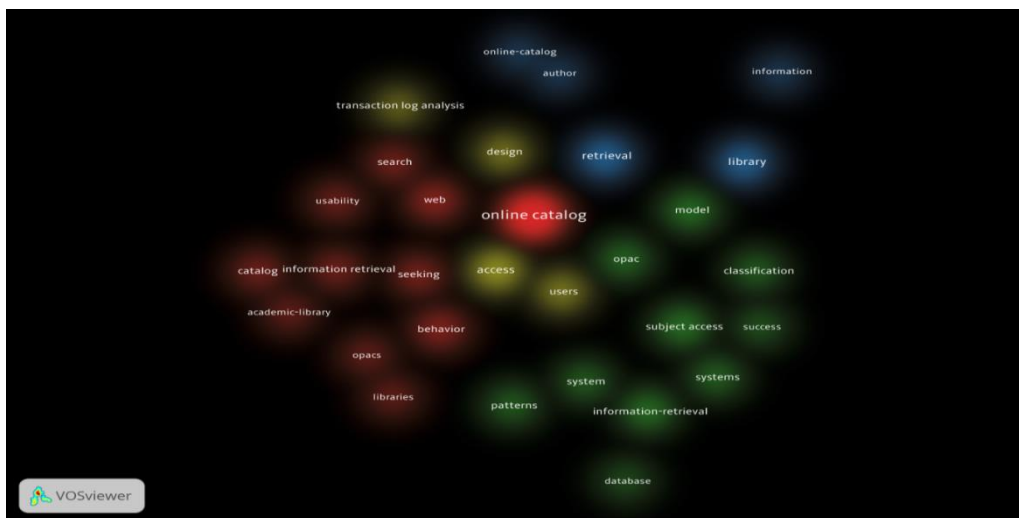
Figure No. 5 - Density Visualization of Keywords
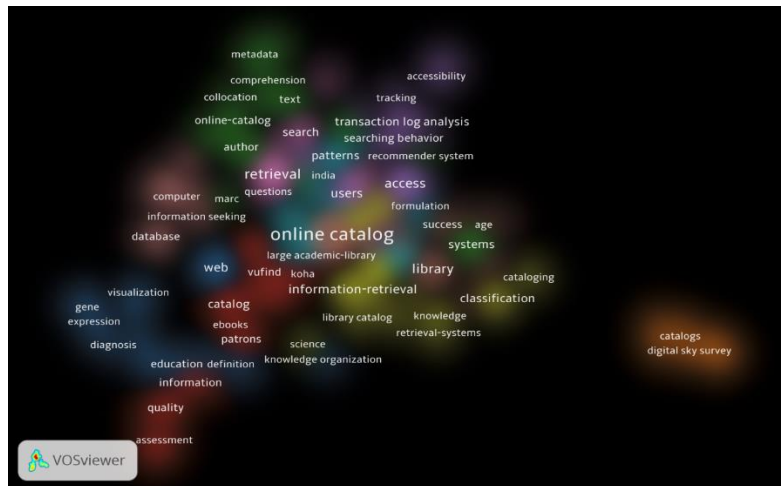
Figure No. 6 - Density Visualization of Keywords

Figure No. 5 and 6 represent the density visualization for popularly used keywords in Library Sciences domain from 1989-2022. Each point in the visualization represents a colour that indicates the density of the terms at that point. The larger the number of items in the neighbourhood of a term and the higher the weights of the neighbouring terms, the closer the colour of the point are to Light Grey. The smaller the number of items in the neighbourhood of a point and the lower the weights of the neighbouring items, the closer the colour of the point is to blue.

7. FINDINGS

1. Maximum number of articles was published in the year 1992 (5.32%).
2. Information Science Library Science Category Receives highest First Ranking, Record Count ie 568 and 65.67%.
3. Users have given Highest Preference to 'Articles' ie 753 Record Count, 3.23%. for their scholarly publication.
4. Information Science Library Science with 65.66% (568) publication is the most popular and emerging research area.
5. The United States of America lies at the first rank with 48.43% of publications, while Brazil is at the last rank with 1.73% of publication in the field.
6. The findings suggest a bias towards the English language as 94.68% of publications had English as the primary language, while publication in Welsh Language is least used by authors for publication.
7. The term 'Online Catalog' has appeared the highest number of times followed by term 'Retrieval' that has occurred 19 times.
8. The publications exhibited an upward trend with significant growth from 2017 to 2020.

8. CONCLUSION

The first bibliometric analysis of LIS research from the Online Catalogue is presented in this work. The study's conclusions are supported by an examination of data spanning seven decades (1951 to 2021).Keyword and co-word analysis was carried out based on the overlay visualizations and networked clusters based on the number of occurrences for each term.

Some scholars who did not contribute throughout the early phases of the study period demonstrated considerable contributions by 2022. More such studies may give impetus to innovations and new researches in the field. The new trends in research may help the library professionals in designing policies regarding collections in the libraries.

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