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ORIGINAL

Emerging Themes, Leaders, and Collaboration in Library and Information Science Research

Temas emergentes, líderes y colaboración en la investigación en bibliotecología y ciencias de la información

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ABSTRACT

Introduction: this study uses bibliometric methods to evaluate research articles within the library and information science (LIS) domain. The focus is to uncover trends and patterns in social network analysis related to LIS, particularly examining research collaborations and content within highly cited articles. By analyzing these aspects, the study seeks to identify influential authors, prominent research themes, and key contributors in the LIS field.
Method: a dataset of 14 517 articles published between 1954 and 2023 was extracted from the Scopus database for bibliometric analysis. The study concentrated on publications in the LIS domain, focusing on the journal Library Philosophy and Practice. Multiple Correspondence Analysis (MCA) was used to identify clusters within the research field, while content analysis was performed to determine prevalent topics and disciplinary influences within the articles.
Results: the analysis revealed that China is home to many of the most influential authors in the LIS domain, with the United States, China, and the United Kingdom identified as the top contributing countries to LIS research. Common research themes include information science, bibliometrics, academic libraries, information literacy, and LIS education. Two main clusters emerged from the MCA: one focused on information-related concepts and the other on bibliometrics and scholarly communication. Content analysis indicated a significant presence of topics from physics, computer science, and information technology within LIS research.
Conclusions: this study highlights key trends and patterns in LIS research, with academic libraries, information literacy, LIS education, and librarians' roles identified as critical areas for future exploration. Expanding databases and refining keyword searches are recommended to enhance knowledge dissemination and educational adaptability in the LIS field. The findings aim to support LIS researchers, facilitate research planning, and promote global interinstitutional cooperation.

Keywords: Text Mining; LIS; Library and Information Sciences; Research Collaboration; LIS Network Analysis.

RESUMEN

Introducción: este estudio utiliza métodos bibliométricos para evaluar artículos de investigación en el ámbito de la biblioteconomía y las ciencias de la información (LIS). El objetivo es descubrir tendencias y patrones en el análisis de redes sociales relacionadas con la biblioteconomía y documentación, examinando en particular las colaboraciones en investigación y el contenido de los artículos más citados. Mediante el análisis de estos aspectos, el estudio pretende identificar autores influyentes, temas de investigación destacados y colaboradores clave en el campo de la biblioteconomía y documentación.

Método: se extrajo de la base de datos Scopus un conjunto de datos de 14 517 artículos publicados entre 1954 y 2023 para su análisis bibliométrico. El estudio se concentró en las publicaciones del ámbito de la biblioteconomía y documentación, centrándose en la revista Library Philosophy and Practice. Se utilizó el Análisis de Correspondencias Múltiples (MCA) para identificar grupos dentro del campo de investigación, mientras que el análisis de contenido se realizó para determinar los temas prevalentes y las influencias disciplinarias dentro de los artículos.
Resultados: el análisis reveló que China alberga a muchos de los autores más influyentes en el ámbito de la información y la documentación, y que Estados Unidos, China y el Reino Unido son los países que más contribuyen a la investigación en este campo. Entre los temas de investigación comunes se encuentran la ciencia de la información, la bibliometría, las bibliotecas académicas, la alfabetización informacional y la educación en biblioteconomía y documentación. Del MCA surgieron dos grupos principales: uno centrado en conceptos relacionados con la información y otro en bibliometría y comunicación académica. El análisis de contenido indica una presencia significativa de temas de física, informática y tecnología de la información en la investigación en biblioteconomía y documentación.
Conclusiones: este estudio pone de relieve las tendencias y los patrones clave en la investigación en biblioteconomía y documentación, con las bibliotecas académicas, la alfabetización informacional, la educación en biblioteconomía y documentación y las funciones de los bibliotecarios identificadas como áreas críticas para la exploración futura. Se recomienda ampliar las bases de datos y refinar las búsquedas por palabras clave para mejorar la difusión del conocimiento y la adaptabilidad educativa en el campo de la biblioteconomía y documentación. Las conclusiones pretenden servir de apoyo a los investigadores en biblioteconomía y documentación, facilitar la planificación de la investigación y promover la cooperación interinstitucional a escala mundial.

Palabras clave: Minería de Textos; LIS; Biblioteconomía y Ciencias de la Información; Colaboración en la Investigación; Análisis de Redes de LIS.

INTRODUCTION

The universities around the world have been playing an important missions of teaching, research, and social service for sustainable development[1,2] and research is one of key in supporting the advancement of science, social science, technology, and innovation in university institutions[3,4] resulted in the university researchers and professors play an important role in creating research that meets the needs of society and students with the aims to promote and support learning and social development.[5,6] The research in the universities have a great impact in raising the educational's competitiveness rankings of universities across the country and was driving force for changes occurrences adaptation. In addition, research and the university research capabilities were also used as indicators of the university's success and reputation.[7,8] Nevertheless, as the research has assisted the researcher and the reader increases knowledge and understanding of the studied areas along withthe confidentially decision-making.[9]

The researchers, learners, and readers can follow the progress of research through academic publications such as books, journals, and conference articles, as evident of printed or online published materials by the university professors, researchers, and students. With the recognition of the critical background and importance, the article would shed the light of the university research and authors role in creating, disseminating knowledge, and innovation to the learner and society. This research would be the part the sciences and society development in the rapid technological and learning changes.

The Library and Information Science (LIS) education and research play a paramount prominence in university institutions around the world, since it has constructed in 1960s from various knowledge disciplines such as Computer science, Information systems, Knowledge management, Digital education, and Information management. Hence, this might be assumed that science had played an important role in supporting teaching, research, and social service.[10] In aspect of research, the research in this field had integrated a number of disciplines with different strategies and techniques in the study. Apart from that, the LIS might have to be challenged with technological transformations and the multiple of big data technology, and the trends analysis in the recent research.[11] One of the important areas of research in LIS is the bibliometrics techniques, which was to increase efficiency for job classification and analysis research.

The analysis would affect to the personal development and job development in educational institutions.[12] Furthermore, the biometric analysis would help to identify about the university expertise or cooperation as well as comprehend the current and past state of LIS studies for effective curriculum planning and research support.[13] Therefore, the LIS branch has been plays an important role in library operations in educational institutions, research support services provision, and the intellectual structure planning to prepare the LIS education to support other related operations in technology and communication (ICT) era.[14,15]

Additionally, based on the LIS literature reviews on bibliometrics studies, it was indicated that there were a few studies LIS research on bibliometrics studies integrated with social network analysis and content analysis, but was found in the methods, objectives, and different research areas. In this study, the researcher has divided the literature review into three main categories: 1) Bibliometric analysis: the analysis of databases of publications, researchers, publication sources, countries, institutions, the keywords and citation, such as citations rank from the author, type of publication , publication sources or h-index, g-index, i-10 index, FWCI values, etc., which are quality indicators of the articles, 2) Social network analysis: the analysis of three-filed plot analysis, co-occurring keyword analysis, co-citation, cooperation network, and revolution in different time periods to comprehend the trends and research topics for future research planning and decision-making, 3) Content analysis: the analysis of research articles, the author, title of the article, name of the journal published, publication year, purpose, study methods, data collection instruments, data or sampling, results and conclusion according to content analysis guidelines from.[16,17]

METHOD

This study using the bibliometric indicators utilized in the study included:

1. Publication Output: total journal articles published from 1954 to 2023.
2. Authorship: the number of authors, including single- and co-authored articles, and metrics on international co-authorships.
3. Citation Metrics: indicators include average citations per document, total citations, H-index, G-index, and M-index.
4. Keywords: this is an Analysis of the Author's Keywords (DE) and Keywords Plus (ID), used to track research themes.
5. Institutional and Geographic Indicators: data on countries and institutions contributing most to research output.
6. LIS Social Network Analysis: this technique evaluates collaboration patterns using co-authorship networks, cooperation networks, and co-citation analysis.
7. Content Analysis: in-depth analysis of the top ten most-cited articles to identify thematic areas and research impact.

These indicators helped outline trends, research impact, and collaboration dynamics within the LIS domain.

This study has employed a bibliometrics analysis with applying the bibliometrics and social network analysis of Lazar et al.[35] and Zhong et al.[36], based the research methodology diagram on figure 1 as were follows:

1. Stage I: determine the topic to study and research objectives.

The main research objectives in this study were the research in Library and Information science from university in the Scopus database.

2. Stage II: data collection and analyze data and create diagrams with software.

The data was retrieved from the Scopus on September 10, 2023 based on the literature review related to Library and Information science by Hjørland[37,38]. Therefore, the search terms for titles, abstracts, and keywords in the Scopus were determined as the scope of research from university. With the following search terms: TITLE-ABS-KEY ("library and information science*" OR "library science*" OR "information science*" OR "LIS") AND AFFIL (universit*).

The select the entire study period from 1954 to 2023, then use the Limit to command to filter the data by selecting the publication type of research article, publication source, type only for journals, language only English, and exclude keywords (excluded keywords) or general words that are not relevant in the analysis, such as article, human, male, female, adult, child, children, aged, nonhuman, etc. due to the bibliometrics analysis does not require permission from the Research Ethics Board (IRB) and there were no participation of human inquirers or interviewers in the study[39] then save it as a digital file with the extension .csv, check and clean the data. Therefore, there were 14 517 related research articles remaining to be imported into the next step of software analysis using the Bibliometrix R-Package program with the Biblioshiny add-on program[40] as shown in figure 1.

The obtained results to compute and analyze results in the biometric as shown in figure 1 for reporting the results analysis and social network analysis.

3. Stage III: The Results Analysis.
4. Stage IV: The Content Analysis.

Once the analysis results from step III were obtained, the top-ten research articles, which has shown the most citations were taken to analyze the content of the discovered research articles. This analysis was conducted by

the observation to in-depth evaluation the content in a systematic pattern,[41] thus to study and evaluate the top-ten most cited research articles.

5. Stage V: Conclusion and Discussion.

The study results have concluded and discussed for in-depth detail for inclusive and further studies suggestions.

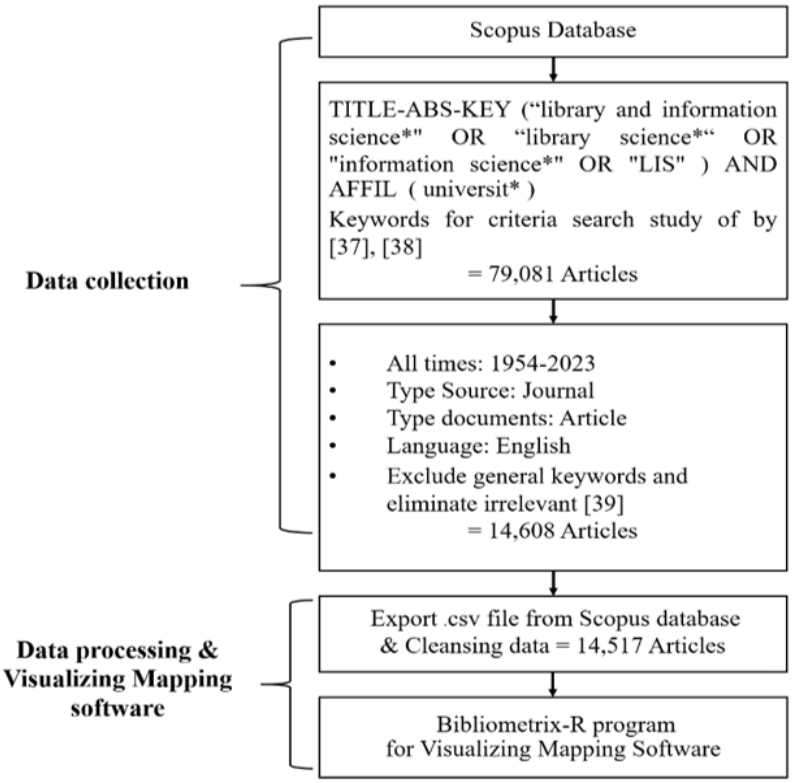

Figure 1. Data collection and Data processing & Visualizing mapping software

RESULTS

This study has divided the results into three main parts were as follows: 1) summary of library and information science (LIS) research documents 2) the LIS research articles by the bibliometrics methodology, 3) the LIS Network analysis, and 4) the Content analysis of the LIS top-ten most cited research articles. The scope of the study was research articles analysis, which published in English in LIS Academic journals from university in the Scopus.

Summary of library and information science (LIS) research documents

Table 1 shows a summary that provides an overview of research documents within the Library and Information Science (LIS) field, focusing on studies that employ bibliometric and social network analysis methods alongside content analysis techniques. The analysis highlights trends, patterns, and collaborations within LIS research by examining citation networks, author contributions, institutional affiliations, and research themes. The study identifies influential authors, countries, and journals contributing to LIS through bibliometric analysis, while social network analysis sheds light on research collaboration structures and knowledge dissemination pathways. Content analysis further explores thematic areas, highlighting key topics and concepts in LIS research, such as information science, bibliometrics, academic libraries, information literacy, and educational practices. This integrated approach provides a comprehensive view of the evolution and impact of LIS research, guiding future directions and identifying significant areas for continued scholarly investigation.

From table 1, the study revealed that the majority of research has conducted through the bibliometrics analysis or LIS research have different methods or formats, such as analyzing research articles, theses, books, or analyzing LIS journals only, or comparing LIS research in different periods, databases, techniques, studied areas are at the regional, continents or countries levels, etc. As study[21], the bibliometric analysis in LIS research in the Middle-East continents, 22 countries in Arab League member countries, from Scopus database found that a total of 863 articles by analyzing countries, institutions, journals, research collaborations and keywords frequently shew in LIS research. Similarly, the study of[22], which study the road map for library and

information science (LIS) research in South Africa under the search area of the database "Web of Science Category" WC= (Information Science & Library Science) with the Bibliometrix R studio tool. Besides, the study of[23], also examined the study of bibliometric studies to evaluate research in the field of library science and information science in Malaysia to assess the growth of publications and research patterns, during 2016-2021, with the term 'Library Science' from the Scopus database.

Table 1. Summary of Library and Information Science (LIS) Research: Bibliometric and Social Network Analysis

Topic	Authors15-1														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Bibliometric analysis															
1.1 Indexed Databased in *Scopus **Web of Science ***Others	*	*	*	*	**	*	***	**	*,**	*	**	**	***	*	***
1.2 Publication Papers	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
1.3 The most published authors				●	●	●	●	●	●		●				
1.4 The most published sources	●	●		●	●			●	●	●	●	●	●		
1.5 The most cited papers		●			●	●	●	●		●		●	●		
1.6 The most published countries	●			●			●	●	●	●		●	●	●	
1.7 The most published institutes				●	●	●	●		●						
1.8 The most frequent keywords	●			●	●				●		●				
2. Social network analysis															
2.1 Three-filed plot analysis					●										
2.2 Co-occurring keyword analysis	●	●		●	●			●	●						
2.3 Co-citation								●	●		●	●	●		●
2.4 Cooperation network	●	●		●	●			●	●	●		●			●
2.5 Research Revolution	●			●	●							●			●
3. Content analysis			●												

Note: * Scopus, ** Web of Science, *** Others, 1.[18], 2.[19], 3.[20], 4.[21], 5.[22], 6.[23], 7.[24], 8.[25], 9.[26], 10.[27], 11.[28], 12.[29], 13.[30], 14.[31], 15.[32]

addition, the study of[24], which employ bibliometric analysis in published articles from 1994 to 2020, the study indicated the 699 research articles published in the journal Library & Information Science Research and employed a Google Scholar to determine the data about publication, institutions, and authors and citation per publication (CPP) and i-10 values as indicator to assess the impact of countries, institutions, authors, and citation growth trends. Similar to study[25], which explore the LIS professional development from 2002 to 2021 in the Web of Science database though the Bibliometrix-R and VOSviewer for analytical studies as well as study[26], which conduct Bibliometrics in aspect of the academic output of LIS in Bangladesh since from 1971 to 2020, to analyze the LIS authors' expertise in Bangladesh, who has been published in LIS journals indexed in Web of Science (WoS) and Scopus databases, to explore expertise diagrams and networks for international cooperation. In addition,[27] has conduct a comparative study of ASEAN research in LIS with Bibliometrics, Social Network analysis (SNA) and measuring the reaction of publications in India or social media research (altmetric) from Altmetric.com with the keyword 'Library' OR 'Libraries' from the Scopus database.[28]

Thus, LIS research is undertaken to develop and improve information management systems in various organizations and institutions, which is an important part in supporting efficient operations. This research would help in the development of information technology and innovation as an important factor in promoting the growth and development of organizations and society, which employ the analysis and planning with the key for developing methodology. For example, the bibliometrics tools such as Bibliometrics, Librametrics, Scientometrics, Informetrics, Webometrics, Cytometrics, and cybermetrics. For the evaluation aspect, the Bibliometrics studies are an essential tool for LIS professionals in service planning, data collection development, decision making, resource allocation, and research quality assessment.

These studies would help to identify root causes or gaps in problems encountered in the LIS profession[33] and strengthen the standards of service, invent a new theory, to expanding the knowledge[34] to study through bibliometrics and social network methods. All the Bibliometrics has analyzed the data from the research output

conducted by the university through research articles, types, and patterns of social networks related to research and the top-ten highest research citations from the Scopus database to move forward to the ultimate goal. To comprehensively investigate university-level LIS research, this study aims to analyze research articles using bibliometric techniques, assess patterns in social networks analysis among authors and countries, and identify the most cited research in the field.

Bibliometric analysis

Main Information

Table 2 shows that there were published research articles in journal since 1954 to 2023, in 2713 sources, with a total of 14 517 articles from the 26 824 authors. The articles with a single author accounted for 28,94 % (4202 articles) and the co-authors per article was on average 2,82 people, while the number of co-authors from other countries accounted for 17,39 % from the entire study. Additionally, the average articles age was about 13,3 years and the average citations per document were 23,97 and the author used 28 150 keywords in the article, including 37 151 keywords plus. In addition, a total of 472 599 citations were found from all articles, as the main information of the articles at that time.

Table 2. Main information about academic documents, authors, and publications spanning from 1954 to 2023

Description	Results	Description	Results
Main Information About Data		Authors	
Timespan	1954:2023	Authors	26 824
Sources (Journals, Books, etc)	2713	Authors of single-authored docs	3155
Documents	14 517	AUTHORS COLLABORATION	
Annual Growth Rate %	9,56	Single-authored docs	4202
Document Average Age	13,3	Co-Authors per Doc	2,82
Average citations per doc	23,97	International co-authorships %	17,39
References	472 599	DOCUMENT TYPES	
Document Contents		Article	14 517
Keywords Plus (ID)	37 151		
Author's Keywords (DE)	28 150		

The top ten authors/researchers, sources, countries, and documents

The top ten authors/researchers

Table 3 shows that the author with the highest research production and impact was Wang, Y., with 91 published research articles, the H-index value was 26, followed by Thelwall., M., of 41 articles, the H-index value is 24. The author Zhang, Y. has many citations, but the M-index is low, which indicates that his article may not have a high impact. In addition, it was found that authors Li, J., Zhang, Y., and Liu, Y. had 57, 58, and 62 articles.

Table 3. The top ten authors/researchers who has the most published research

Rank	Authors	NP	TC	H-index	G-index	M-index	PY_start
1	Wang, Y.	91	2581	26	49	1,368	2005
2	Thelwall, M.	41	1834	24	41	1,043	2001
3	Li, J.	57	950	19	29	1,188	2008
4	Zhang, Y.	58	1313	19	35	0,500	1986
5	Liu, Y.	62	1222	18	33	0,720	1999
6	Cronin, B.	26	1037	17	26	0,447	1986
7	Leydesdorff, L.	24	1676	17	24	0,607	1996
8	Wang, X.	47	734	17	25	0,773	2002
9	Willett, P.	36	1156	17	33	0,378	1979
10	Zhang, L.	35	923	17	30	1,417	2012

Note: NP = Number of publications; TC = Total Citation; PY_Start = Publication Year Start

Meanwhile, authors or researchers number 6-10 were found to have an H-index value of 17 and There are a similar number of articles, between 24 and 58. The M-index and G-index values for rankings 1-3 were the most valuable, but the 10th author, Zhang, L., has a G-index value comparable to the first-third author, which demonstrates the effectiveness of authors who have produced research in this field.

As for the total number of citations, it was found that Wang, Y. ranked number 1 as the most influential, with 2581 citations, followed by Thelwall, M., with 1834 citations when considering the average of all 10 rankings, there are approximately 1343 times, between 700 - 2500 times. For the H-index value in the overall view of the author/researcher, it was found that the H-index value was between 17 and 26. In addition, the G-index and M-index values help would evaluate the results. The author's impact on research in the field is determined by the number of citations found in the article by the author/researcher.

The top prolific sources

Table 4 shows that the Library Philosophy and Practice journal has the highest number of research articles published in the LIS field, 468 articles. The journal's H-index is equal to 25, but there is no Quartile value to measure the quality of the journal. This is because this journal is not included in the SJR database quality measure and is covered by Scopus between 1998 - 2021 only, followed by the Journal of the American Society for Information Science, which has 365 articles, but has not been rated as a journal quality and has not found an H-index value because it was covered in the Scopus database in the 1970s. – 1999 only.

As for the journal IEICE Transactions on Information and Systems from Japan, there are 351 articles (H-index = 53) ranked as journals at the Q3 level, while numbers 4 -7 were classified as journals at the Q1 level, which are journals from the United States. and the United Kingdom. The study also indicated that the Information Sciences journal had the highest H-index value, equal to 210. The journals ranked 9-10 were Information and Management and Education for Information from the Netherlands and were classified as Q1 and Q2 journals, respectively, and have more than 200 articles, demonstrating the quality of the journals ranked in the top 10.

Table 4. Top 10 most prolific sources

Rank	Sources	Country	NP[1]	H-index[2]	Qualtile[2]
1	Library Philosophy and Practice[3]	USA	468	25	-
2	Journal of the American Society for Information Science[4]	USA	365	-	-
3	IEICE Transactions on Information and Systems	Japan	351	53	Q3
4	Information Sciences	USA	339	210	Q1
5	Journal of Information Science	UK	328	73	Q1
6	Journal of Documentation	UK	280	69	Q1
7	Information Processing and Management	UK	252	114	Q1
8	Journal of the American Society for Information Science and Technology[5]	USA	247	-	-
9	Information and Management	Netherlands	238	182	Q1
10	Education for Information	Netherlands	208	21	Q2

Note: [1]Number of publication; [2]Scientific Journal Rankings = SJR 2022; [3]Scopus coverage years: from 1998 to 2021; [4]Scopus coverage years: from 1970 to 1999; [5]Scopus coverage years: from 2000 to 2014

The top countries

Table 5 shows that the country with the most research output is the United States with 11 155 articles, followed by China with 6984 articles and the United Kingdom with 2484 articles. Meanwhile, Japan, Canada, India, Italy, Germany, and South Korea had between 1000-1600 articles, but less than 2000 articles, and Australia was found to be in 10th place with 929 articles. In addition, in the ranking of 1-3 countries with the highest number of research articles belongs to the Americas, Asia and Europe, showing that Asia's research productivity ranks top after the Americas.

For the citation total, the United States of America is a leader, followed by China United Kingdom, Canada and Australia. Finally, in terms of average article citation rates, the top-three countries are the United Kingdom, the United States, and Canada, respectively.

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Table 5. Top 10 most prolific countries

Rank	Country	NP	TC	AAC
1	USA	11 155	81 127	35,27
2	China	6984	24 335	15,54
3	United Kingdom	2484	21 099	37,68
4	Japan	1671	4350	16,11
5	Canada	1609	12 245	32,14
6	India	1337	1895	5,05
7	Italy	1150	3305	19,56
8	Germany	1146	4825	24,25
9	South Korea	1106	4501	14,66
10	Australia	929	5546	24,65

Note: NP = Number of Publication; TC = Total Citations; AAC = Average Article Citations

The top cited documents

Table 6 demonstrates that the dataset's top ten cited research articles were primarily published in Q1-level journals, indicating high-quality and influential publications. Exceptions to this are articles ranked 5 and 10, not assigned a quartile ranking by the journal's indexing system. This omission occurred because these articles were indexed in Scopus only during a specific period, thus lacking continuous quartile evaluation. This table underscores the notable impact of top-cited LIS research, predominantly represented in high-ranking journals, thereby highlighting the significant contributions of these works within their respective fields.

Table 6. Top 10 most cited papers

Rank	Titles	Authors	Sources	Year	TC	TC/Year	FWCI	Q
1	A vector space model for automatic indexing	Salton, G., Wong, A., & Yang, C.S.	[42]	1975	5319	108,55	-	Q1
2	Understanding information systems continuance: An expectation-confirmation model	Bhattacherjee, A.	[43]	2001	4999	217,35	7,03	Q1
3	A Partial Least Squares Latent Variable Modeling Approach for Measuring Interaction Effects: Results from a Monte Carlo Simulation Study and an Electronic-Mail Emotion/Adoption Study.	Chin, W.W., Marcolin, B.L., & Newsted, P.R.	[44]	2003	4332	206,29	12,1	Q1
4	Strategies for ensuring trustworthiness in qualitative research projects	Shenton, A.K.	[45]	2004	3872	193,60	0,59	Q2
5	CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature	Chen, C.	[46]	2006	3129	173,83	16,63	-
6	Data-intensive applications, challenges, techniques and technologies: A survey on Big Data	Philip Chen, C.L., & Zhang, C.-Y.	[47]	2014	2170	217,00	76,14	Q1
7	Entanglement in quantum critical phenomena	Vidal, G., Latorre, J.I., Rico, E., & Kitaev, A.	[48]	2003	1850	88,10	33,27	Q1
8	Colloquium: Area laws for the entanglement entropy	Eisert, J., Cramer, M., & Plenio, M.B.	[49]	2010	1813	129,50	33,33	Q1
9	Predicting e-services adoption: A perceived risk facets perspective	Featherman, M.S., & Pavlou, P.A.	[50]	2003	1791	85,29	8,08	Q1
10	Development and application of a metric on semantic nets	Rada, R., Mili, H., Bicknell, E., & Blettner, M.	[51]	1989	1444	41,26	-	-

Note: TC = Total Citation; FWCI = Field-Weighted Citation Impact; Q = Journal Quartile Score from Scientific Journal Ranking = SJR 2022; *Scopus coverage years: from 1971 to 1995; **Scopus coverage years: from 2000 to 2014

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Additionally, the table reveals that the most frequently cited topics fall within Computer Science, Physics, Information Sciences, and Information Management. The most-cited article,[42] with 5319 citations, dates back to a 1975 study on vector space models for automatic indexing, with an impressive average of 108,55 citations per year. Despite its high citation count, this article lacks a Field-Weighted Citation Impact (FWCI) value due to its age and indexing limitations. Articles ranked 2 through 5 have citations between 3000 and nearly 5000, while articles ranked 7 through 10 have fewer than 2000 citations. However, when considering the average annual citations and FWCI values, articles ranked in lower positions, particularly those in the top three, exhibit considerable citation impact, sometimes surpassing those with higher cumulative citations.

Trends analysis

Based on the author's chosen keywords, an analysis of current trends was conducted, employing specific parameters, including the timeframe of 1954 to 2023, a minimum word frequency threshold of 10, and an annual word count of 3. The most prevalent subjects encompassed information science, library and information science, bibliometrics, academic libraries, information literacy, education, and libraries. Between 2004 and 2023, information science emerged as the dominant topic, particularly peaking in popularity between 2010 and 2020, with a notable surge in mentions during 2017. Furthermore, library and information science (LIS) and bibliometrics began gaining significant attention from 2020 onwards. Intriguingly, the theme of COVID-19 started gaining prominence as early as 2014 and continued to attract attention from 2016 to the present day. These findings collectively underscore the evolving landscape of research interests in the field.

Thematic map

A comprehensive analysis of the thematic map through clustering based on the authors' keywords. The thematic map is partitioned into four distinct sections, labeled Q1 to Q4, each representing different thematic categories: motor themes, niche themes, emerging or declining themes, and basic themes. We measure the degree of development (density) on the horizontal axis, while the vertical axis represents the degree of relevance (centrality). These two metrics assess a theme's level of development and significance within the research context.

Centrality indicates a theme's importance within the network, with nodes possessing greater connections to other nodes in the thematic network exhibiting higher centrality and, consequently, greater significance. In this section, we focus on the data related to motor themes. Our analysis reveals that the top six topics in this category are academic libraries, libraries, information literacy, LIS education, education, and librarians. The horizontal axis from Q1 to Q4 signifies the development degree (density), implying that these themes will evolve further and maintain dominance in the research field. These topics form the foundational knowledge base for subjects such as information science, information retrieval, information LIS, information technology, and information systems, which are prominently represented in Q4.

Additionally, two other noteworthy topics, GIS (Geographic Information Science) and geographic information science, are positioned on the vertical axis, representing their relevance degree (centrality). This positioning suggests that these themes are poised for further development, potentially evolving into specialized topics within the library and information science research field, with interconnected content.

Factorial Analysis

Abstracts featuring bigrams characterize the results obtained through Multiple Correspondence Analysis (MCA), revealing the organization of a research field into two distinct clusters. As depicted in figure 2, MCA analysis of high-frequency abstracts places those near the center of the graph, garnering significant attention within this study. Conversely, words distributed closely within the same area indicate shared or linked conceptual themes.

The first cluster, denoted by the red cluster on the right side of the x-axis, encompasses words related to the concepts of information management, information systems, information technology, and information science. Additionally, other terms included in this study cluster encompass information retrieval, information services, library science, education, libraries, big data, data mining, research methodology, and knowledge management. On the opposite end, the second cluster, represented by the blue cluster on the left side of the x-axis, comprises nine distinct words: scientometrics, citation analysis, bibliometrics, bibliometric analysis, scholarly communication, library and information science, LIS, and open access.

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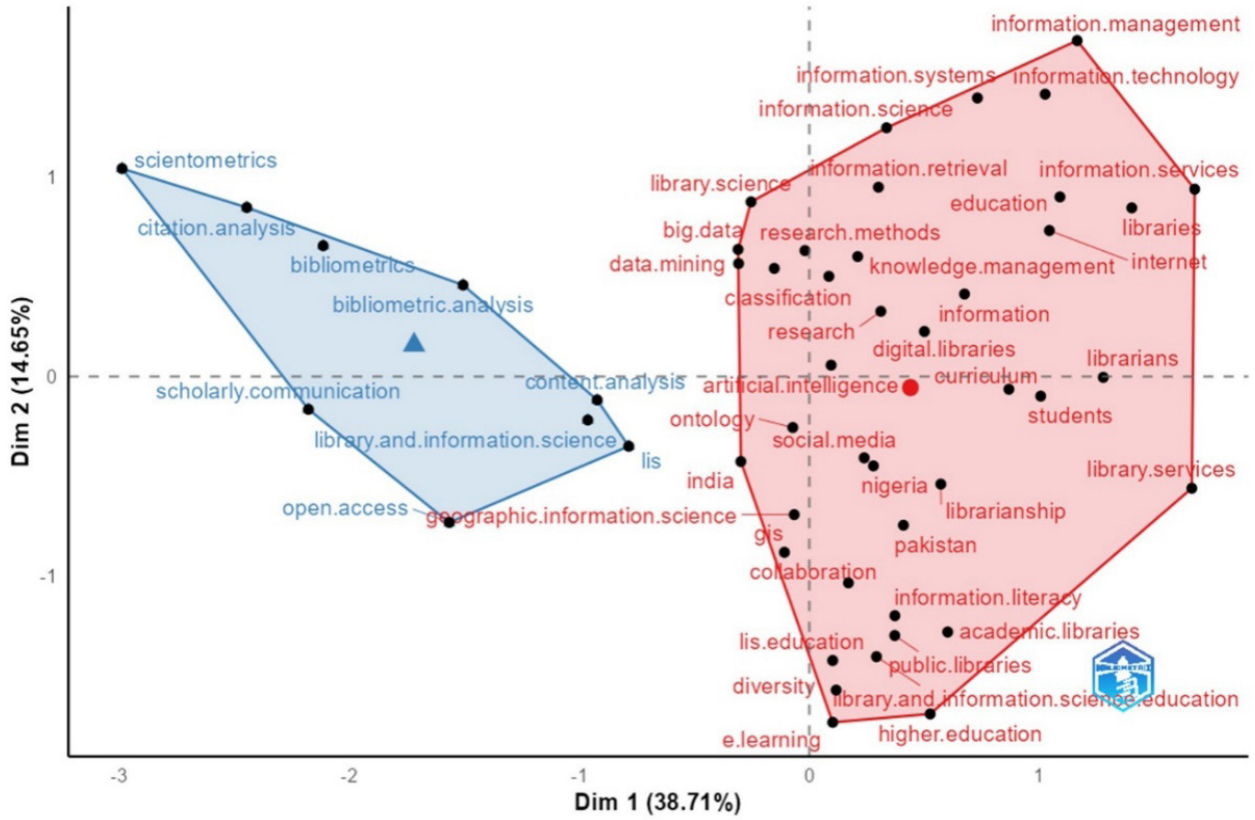


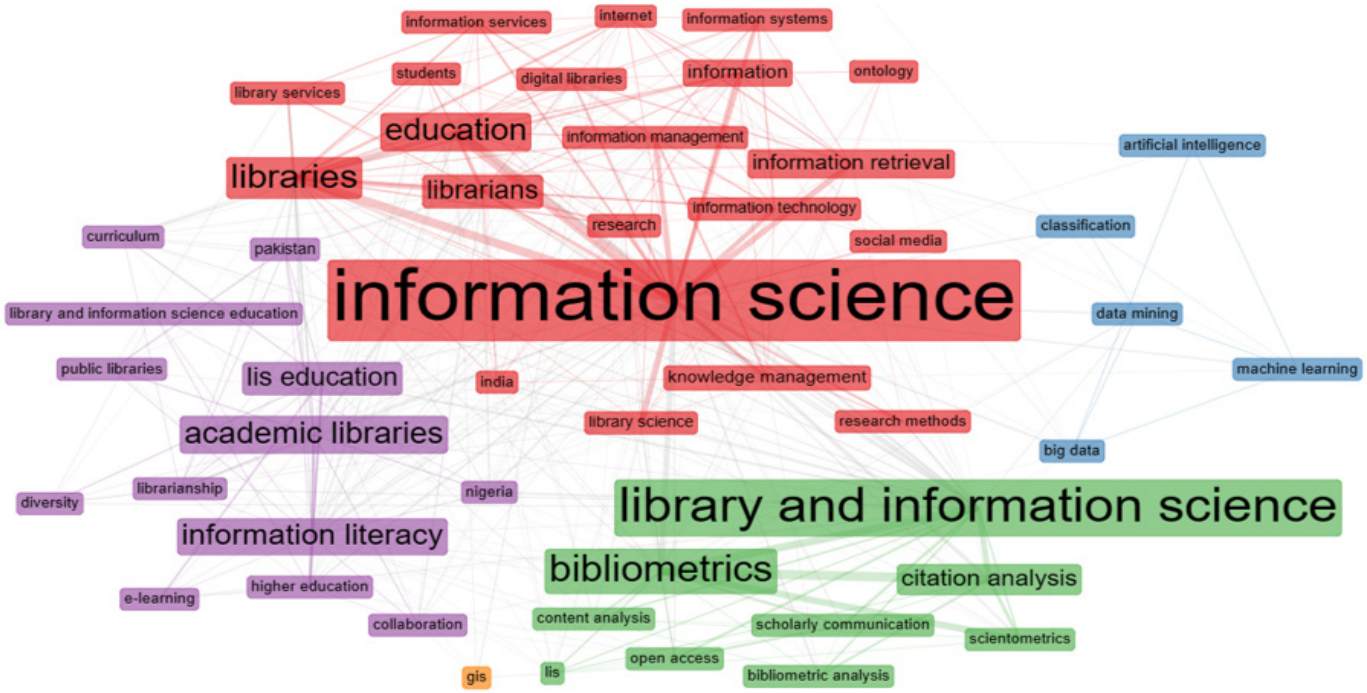
Figure 2. Multiple correspondence analysis of high-frequency abstract

LIS Network analysis

Co-occurance network

Figure 3A-B reveals that keywords by Keywords Plus and Author Keywords were different when clustered in each color group has demonstrated the group with the most shared keywords was divided into 2 groups. Keywords Plus, the first group, found the word “information science” with a higher frequency of co-occurance the most. For the second group, it can be seen that there were many common words related to science and physics, with the most emphasis on “quantum” and “photons” respectively. At the same time, when considering the results of joint keywords by Author Keywords found that the use of joint keywords was consistented with the research results, but it shews color grouping and clustering. The article specifies that the display should not exceed 50 nodes in order to see the relationship of the most commonly used conjunctions.

(A)



(B)

Figure 3. Co-occurance network of Keywords plus (A); Author keywords (B)

Collaboration analysis

Author Collaboration

Figure 4 shows that the collaboration of the author a relationship once a collaboration network was created, the authors who have related relationships were classified as the same or similar topics (figure 4), by calculating Betweenness centrality values for nodes in different groups to identify important papers by authors that share similar interests and share the same topic. There were two networks or large clusters from figure 4 in the important author collaboration paths such as red and blue clusters. The results show that the majority of author collaboration paths come from China. The most prominent authors include Wang, Y., Wang.

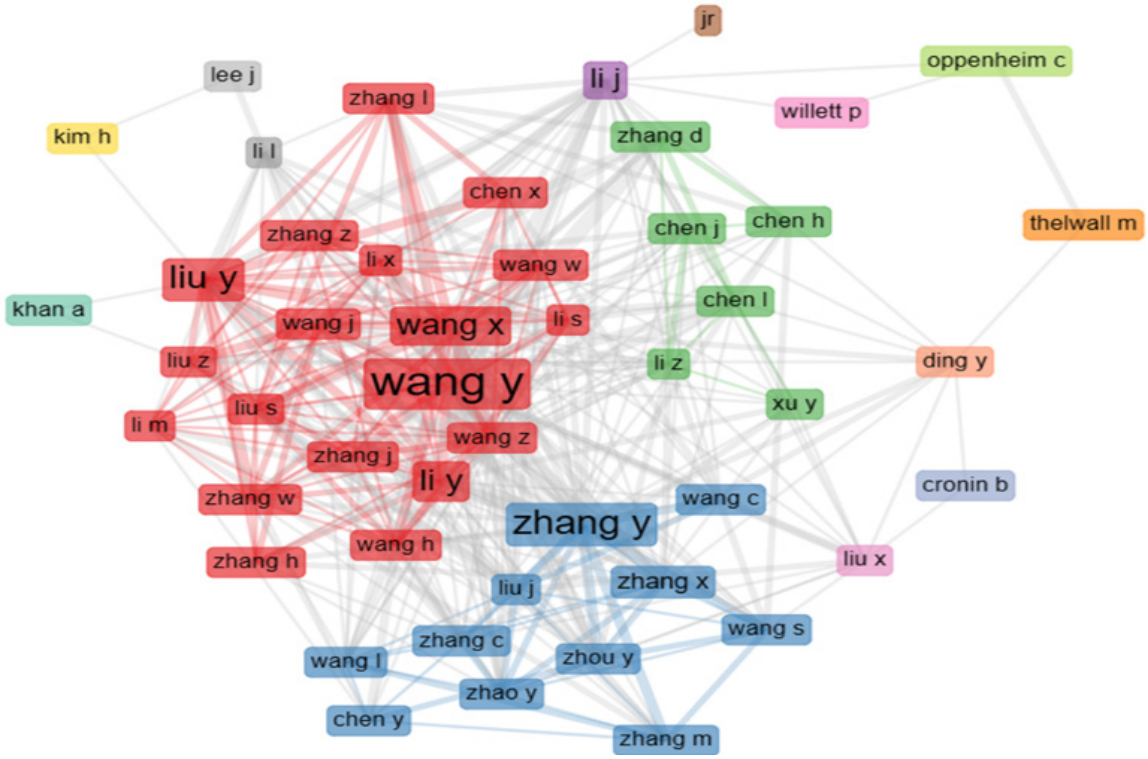


Figure 4. Mapping of authors in social networks by centrality measures (author collaboration)

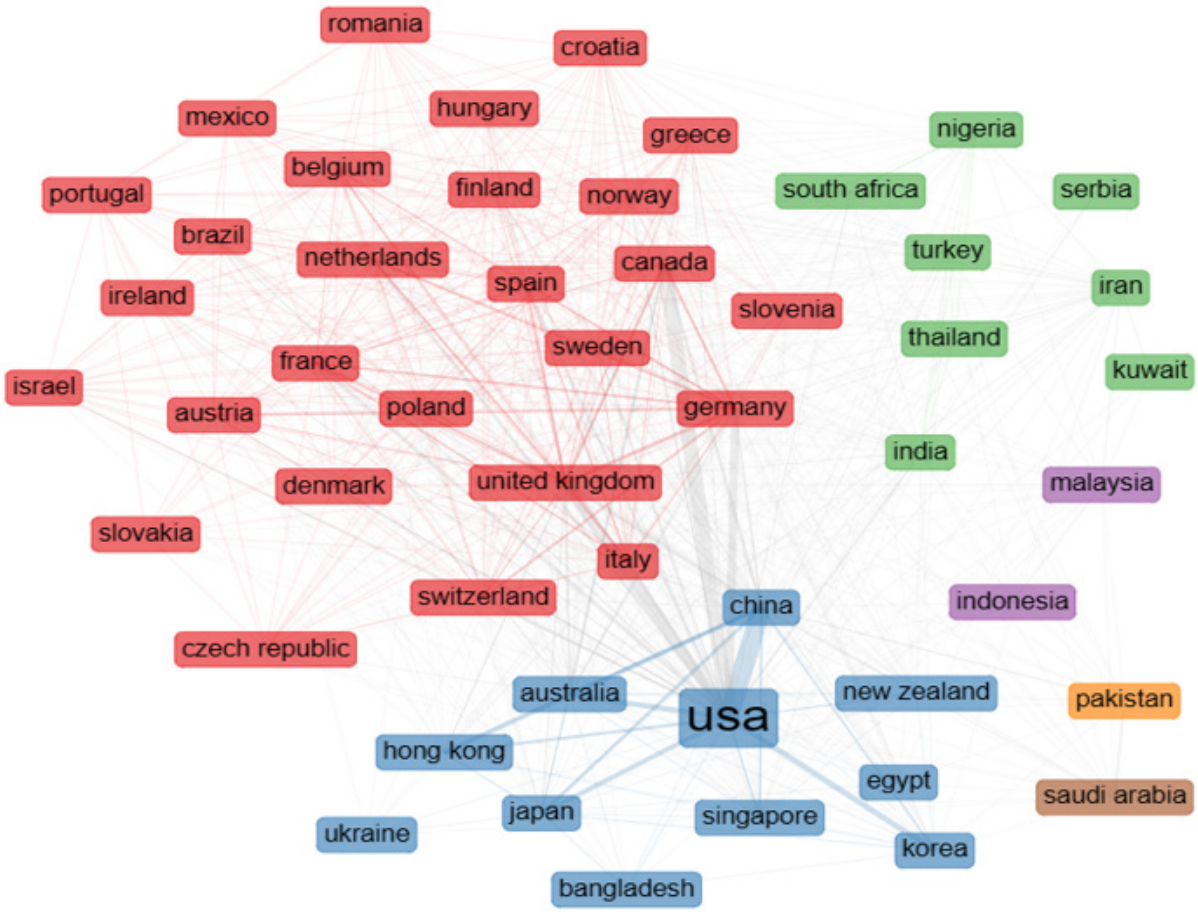
Table 7 reveals that the most important authors in joint research collaborations based on BC and CC social network measures, authors Li, J., Li, Y., Liu, Y., Wang, X., Wang, Y., and Zhang, Y. were relatively similar. A large difference between BC and CC values appears in the top-ten. The authors who shared BC and CC values found that there was only one BC and CC network measure not included in either of the two network measures: Ding, Y., Li, L., Liu, X., Liu, Z., Li, X., Liu, S., Wang, J., and Wang, Z.

Table 7. Top 10 most central of LIS author collaboration based on betweenness and closeness centralities

Rank	Author	BC	Author	CC
1	li j	154,9710	zhang y	0,0156
2	liu y	114,8473	wang y	0,0154
3	zhang y	79,4606	wang x	0,0149
4	ding y	57,9382	liu y	0,0145
5	wang y	55,4355	li j	0,0143
6	wang x	49,9908	li y	0,0143
7	li l	47,9477	wang z	0,0137
8	liu x	33,8196	liu s	0,0137
9	li y	31,1646	li x	0,0133
10	liu z	27,0380	wang j	0,0130

Note: BC = Betweenness centrality; CC = Closeness centrality

Country Collaboration



(A)

(B)

Figure 5. Country Collaboration (A); Collaboration World Map (B)

Figure 5A, the analysis of national cooperation, revealed that the two large and six small networks or groups in international LIS research collaboration. Most of the collaboration routes are between researchers from high-income countries (red group) such as USA, UK, Germany, Australia, etc. In addition, the USA has work partners, and research collaboration heavily with countries in Asia (blue group) including China, Japan, India, Singapore, Korea, Hong Kong, Bangladesh. For Europe, there were still many studies from the same European countries, which has been distributed among researchers in France, Germany, Brazil, Ireland, Spain, Norway, etc. The data in table 8 shows the measurement of social networks analysis, the BC and CC values of USA, China and United Kingdom also have the most in the top three.

On the one hand, the green group represents a moderate level of research cooperation, including Nigeria/ South Africa/ Iran from South Africa, Serbia/ Turkey from Europe, Thailand/ Kuwait/ and India from Asia, which have international cooperation comes from the integration of many continents together. For national research cooperation, there were not much cooperation, found in Pakistan, Saudi Arabia, Indonesia, Malaysia (figure 5A), which has less cooperation with other countries, which slightly conduct research cooperation, but still maintain with the minimum standard when comparing to a highly developed country like the USA as the first country that established the teaching of LIS in universities for a long time, and figure 5B shows a diagram of the connections between international cooperation networks that occur around the world.

Table 8. Top 10 most central of country collaboration based on betweenness and closeness centralities

Rank	Country	BC	Country	CC
1	USA	288,1481	USA	0,0204
2	China	49,9233	United Kingdom	0,0192
3	United Kingdom	48,7108	China	0,0185

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Table 8. Top 10 most central of country collaboration based on betweenness and closeness centralities

Rank	Country	BC	Country	CC
4	Germany	21,7371	Australia	0,0185
5	Australia	15,4420	Germany	0,0182
6	India	11,0683	India	0,0172
7	Italy	8,0599	Sweden	0,0172
8	Canada	7,7856	Italy	0,0169
9	France	7,4492	Canada	0,0169
10	Spain	7,3832	France	0,0169

Note: BC = Betweenness centrality; CC = Closeness centrality

Content analysis

Table 9, results of content analysis of the top-ten most cited research articles, represents LIS-related articles from university-level institutions around the world. It was found that there were related articles from the fields of computer science, physics, information science, Information management, as Article 1[42] found to be cited the most, 5319 times, is an article that creates a process for automatically searching and sorting information in an information acquisition system with vectors as a tool to display and calculate similarities between documents or data to be able to search and arrange data according to its relationship, these require accuracy and speed in finding relevant information. Next, Article 2[43] has been referenced 4999 times has studied the application of the theory of Expectation-confirmation model: ECM was used to understand the factors influencing users; intention to use information systems through an online survey of customers using online banking services.

Article 3[44] 4332 citations, as a simulation research article that uses computer simulations using Partial Least Squares (PLS) modeling to accurately estimate the effects of interactions on A Monte Carlo simulation study was conducted to study emotions and acceptance of electronic email. Article 4[45] has been cited 3872 times. Guba's constructs are a research paper that presents a robust evaluation framework. Related to quality research, this framework has 4 main elements, which are tools used to build trustworthiness in quality research were: 1) Credibility, 2) Transferability, 3) Dependability, and 4) Confirmability. Article 5[46] has 3129 citations, which describes recent developments in methods for detecting and visualizing emerging trends in the scientific literature and propose the creation of knowledge, theoretical method and academic methods for displaying information in knowledge areas to advance research.

The study employs the Freeman Relationship Metric to highlight potential key areas of new features in CiteSpace II that drive positive results by case study of 2 research fields: Mass extinction study (1981-2003) and the study of Terrorism (1990-2003). Article 6[47] Cited 2170 times this article highlights opportunities and challenges in managing big data and modern techniques such as granular computing, cloud computing, bio-inspired computing and quantum computing in solving big data management development problems. Article 7[48] has cited 1850 times.

This study focuses on the magnitude change of quantum entanglement in spin chain systems both near and at the quantum critical point which use microscopic calculations, Density Matrix Renormalization Group (DMRG) techniques and analysis of the scaling properties of the system. The results show similarities with the behavior in equation field theory and quantum concepts in condensed matter physics. Article 8[49] has cited 1813 times, the research focuses on changing the scale of quantum entanglement in spin-chain systems both near and at the quantum critical point.

The study employed microscopic calculations, Density Matrix Renormalization Group (DMRG) techniques, and analysis of the scaling properties of the system. The results show similarities with the behavior in equation field theory and quantum concepts in condensed matter physics. Article 9[50] has cited 1791 times, this research uses the Technology Acceptance Model (TAM) and assesses the risk in accepting electronic services through measuring risk perception and testing the model with Structural Equation Modeling (SEM), the result an impact on technology adoption, especially in the context of online payments, and the last article, Article 10[51] has cited 1444 times, this article is an article on developing and using the measurement unit "Distance" to evaluate ideas between sets of ideas in Semantic network using the "Distance" metric and testing the performance of the Indexer by comparing it with human indexing or keywords in the biomedical literature, which describes the research content in detail as shown in table 9.

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Table 9. Content analysis of top 10 articles in LIS

No.	Source/ Citation/ AAS	Objectives	Methods	Research tools	Data/Sampling	Results or Conclusion
1	[42]/ 5319 / 30	The paper proposes a vector space model for automatic indexing in document retrieval, based on space density computations.	Space density computations for choosing an optimum indexing vocabulary Clustering methods for generating a clustered collection	N/A	N/A	Optimum indexing vocabulary can be chosen based on space density computations. Retrieval performance may correlate inversely with space density. Results show the usefulness of the model. Improved recall-precision performance associated with decreased density.
2	[43]/ 4999 / 3	The paper applies expectation-confirmation theory to understand the factors influencing users' intention to continue using information systems.	Adaptation of expectation-confirmation theory from consumer behavior literature Integration of theoretical and empirical findings from prior IS usage research	N/A	The paper gathered data from 1000 randomly selected online customers of OBD, an online banking platform, using an online survey appended to their monthly statements.	The study collected data through an online survey of 1000 online banking customers. The results showed that perceived usefulness, satisfaction, and confirmation were significant determinants of IS continuance intention
3	[44]/ 4332 / 10	The paper demonstrates the effectiveness of the PLS approach in recovering true effects through a Monte Carlo simulation study with known true effects	The paper compares the Partial Least Squares (PLS) approach to other techniques such as regression and ANOVA, including single-indicator regression and summated regression	Latent variable modeling approach and Partial Least Squares (PLS) approach	N/A	A new latent variable modeling approach is proposed for analyzing interaction effects. The technique is supported by evidence from a simulated data set and an IT adoption data set. The paper proposes a new approach using partial least squares modeling to accurately estimate interaction effects in a Monte Carlo simulation study and an empirical study on electronic-mail adoption.

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4	[45] / 3872 / 14	Ensure trustworthiness in qualitative research projects Address credibility, transferability, dependability, and confirmability	Guba's constructs for ensuring trustworthiness in qualitative research Strategies for addressing credibility, transferability, dependability, and confirmability	Guba's constructs for ensuring trustworthiness Qualitative research methods and data analysis techniques	Number of organizations and their locations Restrictions on type of people contributing data	Strategies for ensuring trustworthiness in qualitative research Importance of addressing credibility, transferability, dependability, and confirmability
5	[46] / 3129 / 22	This article describes the latest development of a generic approach to detecting and visualizing emerging trends and transient patterns in scientific literature, and makes substantial theoretical and methodological contributions to progressive knowledge domain visualization.	Burst-detection algorithm for identifying emergent research-front concepts Freeman's betweenness centrality metric for highlighting potential pivotal points	New features in CiteSpace II produce promising results Challenges and opportunities for future work identified	case studies of two research fields: mass-extinction research (1981–2003) and terrorism research (1990–2003).	Visualizations of mass extinction and terrorism datasets Prominent article in mass extinction visualization: Alvarez-1980
6	[47] / 2170 / 13	This paper is aimed to demonstrate a close-up view about Big Data, including Big Data applications, Big Data opportunities and challenges, as well as the state-of-the-art techniques and technologies currently adopt to deal with the Big Data problems	Granular computing, cloud computing, bio-inspired computing, quantum computing	The paper discusses state-of-the-art techniques and technologies for handling Big Data problems. The paper mentions several underlying methodologies, such as granular computing, cloud computing, bio-inspired computing, and quantum computing.	N/A	This article discusses the challenges and opportunities in dealing with Big Data, including data capture, storage, analysis, and visualization. It is found that managing large-scale data remains a problem, but there are still significant potentials and opportunities in data management.
7	[48] / 1850 / N/A	To investigate the scaling properties of quantum entanglement in spin chain systems, both in the vicinity of the quantum critical point and at the quantum critical point.	Microscopic calculation Analysis of scaling properties	Microscopic calculations Density Matrix Renormalization Group (DMRG) techniques Numerical evaluations	N/A	The paper establishes a precise connection between concepts of quantum information, condensed matter physics, and quantum field theory by showing that the behavior of critical entanglement in spin systems is analogous to that of entropy in conformal field theories.

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8	[49]/ 1813/ 26	The paper reviews the current status of area laws for entanglement entropy in various fields, including black hole physics, quantum information science, and quantum many-body physics.	Rigorous results on lattice models in one and higher spatial dimensions Matrix-product states, higher-dimensional analogs, and variational sets from entanglement renormalization	Fisher-Hartwig theorem for studying asymptotic behavior of Toeplitz determinants Method of corner transfer matrices for obtaining area laws	N/A	In this paper, the current status of area laws in quantum many-body systems is reviewed and a significant proportion is devoted to the clear and quantitative connection between the entanglement content of states and the possibility of their efficient numerical simulation.
9	[50]/ /1791 / 3	To predict e-services adoption by incorporating perceived risk facets into the Technology Acceptance Model (TAM)	The research followed the methodology of Featherman (2001) and Pavlou (2001) by incorporating a measure of perceived risk into the Technology Acceptance Model (TAM) The research context for studying e-service evaluation and adoption was Internet-based bill payment services (EBPP) or e-billpay	Computer lab usability tests were conducted using a vendor's shopping trial demonstration software to evaluate the e-service adoption model Confirmatory Factor Analysis (CFA) Structural equation modeling (SEM)	Two usability tests were carried out with 214 participants initially and a subsequent sample of 181 undergraduate business students, using vendor-provided shopping trial software in a computer lab	The research confirmed the inclusion of a second-order perceived risk variable into TAM based on the theorized risk facets, with performance risk concerns influencing other risk factors such as time, privacy, psychological, and financial risks The study provided empirical evidence supporting the importance of considering perceived risk in the evaluation and adoption of e-services, particularly in the context of Internet-based bill payment services, this study found that e-services adoption is primarily affected by performance-based risk perceptions, and perceived ease of use of the e-service reduced these risk concerns
10	[51]/ 1444 / 9	The objective of the paper is to develop and apply a metric called Distance on semantic nets to assess the conceptual distance between sets of concepts. The authors aim to evaluate the value of a knowledge base in the retrieval of biomedical literature and ranking of documents in response to a query.	The design of Distance was guided by two observations: The behavior of conceptual distance is similar to that of a metric. The conceptual distance between two nodes is often proportional to the number of edges separating the two nodes in the hierarchy.	The authors also mention the use of an algorithm called Indexer for automatic indexing of document titles into a semantic net. Distance is used as a tool to measure the performance of Indexer and compare it against human indexers.	N/A	The authors propose a metric called Distance, which is based on spreading activation and conceptual distance, to assess the conceptual distance between sets of concepts in a semantic net of hierarchical relations. Distance is calculated as the average minimum path length over all pairwise combinations of nodes between two subsets of nodes.

Note: AAS = Altmetric Attention score from www.altmetric.com on 25-Jan-2024; N/A = Not available

DISCUSSION

The analysis through Bibliometrics methods, Social network, and Content analysis has manifested the LIS research pay some significant role in the international academic society from the Scopus. This study would shed the light of the important of LIS studies today and should be given continued since the information and communication technology has always changing in term of the voluminous data, directions, and inter-cooperation across the sciences. These resulted in the, in this study, the LIS research from 1954 to 2023 in the Scopus database, contained a total of 14 517 articles from 2713 published sources, which overall the published work over the past 70 years has been increasing continuously with an average about 9,56 % and the average of citations per year has gradually increased. Based this assumption, the LIS would be developed with increasing numbers of from the primitive LIS researchers.

In this study, the most prolific author is Wang, Y., with a high number of articles and a high H-index. The second author is Thelwall, M., with a high number of citations but a low M-index. Therefore, it may not have as high an impact as Wang, Y., followed by Li, J., Zhang, Y., and Liu, Y. also have important research works and a large number of articles. These findings highlight the importance of knowing authors who have made contributions and impact in this research field and specifying the H-index, M-index, and G-index values as a way to measure and evaluate the impact of authors on various aspects of research in this field, including citations as an important indicator for evaluating the quality of research and authors that are important in this field.

Nonetheless, when considering the sources of journal publications, it might have to be noted that the current status of journals in numbers 1-2, Library Philosophy and Practice and Journal of the American Society for Information Science, has ceased operations and is a journal that is not covered in the Scopus. Those interested in submitting articles for publication in the mentioned journal, might need to consider appropriateness to select publication sources in other journals that are relevant and appropriate to your own research content. In term reputation, the journal still received great recognition for its academic quality during its first century and it is still useful for researchers or readers to use as a reference.

In addition, LIS researchers should focus on developing, exploring, and evaluating the potential of research output in the field of bibliometric, social network or content analysis to be a guideline based on the principles of bibliometrics, which are useful to researchers and institutions to develop and improve LIS research to be more strengthened and stable and sustainable quality of education and research for teachers, academics, researchers, or LIS professionals in university. This is consistent with[52] study, which states that bibliometrics as the one tools used in LIS research continuously,[52] the bibliometrics was considered a useful tool for analyzing curricula[53] and for evaluating the quality of research outputs.[54]

Furthermore, an important finding indicated Wuhan University has an influence to create the most research results, which can be assumed that the university's potential in LIS research from Asia. In terms of the academic competition performance, the China's University could be compared with that of big countries like the United States of Americas or Europe such as the United Kingdom. This would make the possibility to recognize the importance and ability of universities in supporting LIS research and development in Asia, and to compare the potential and success of China's University in this area and the research cooperation in LIS with many countries in Asia and beyond. However, the importance of research is one of the indicators in which universities are evaluated in terms of research and considering the number of significant citations in the development of university research systems around the world.[55,56]

From the analysis of Keywords Plus such as quantum optics, software engineering, information retrieval shows that the research topics focus in many directions from a variety of fields of knowledge as indicated from the literature review. Hence, the LIS research is integrated or related to other disciplines. significantly from people who are experts in other fields and apply tools or techniques from expertise field to help solve problems in LIS research.[57,58] Additionally, Keywords Plus are words or phrases that frequently appear in the author's title that were created by an automatic computer algorithm.[59,60]

These findings may help researchers determine keywords in new research articles and perform keyword analysis and understand the dynamic of knowledge changing.[61] From the results, it was found that the most of the keywords found are related to information technology and science, which were of interest in LIS research from the past to the present, which consisted with the study of LIS research on many issues related to the analysis of the most common research keywords, such as the research of[62] study which achieve the bidimensional analysis to assess important main research trends in the field of LIS research and[63] has employed the study method about keyword analysis to track changes in research topics in the field of LIS, etc., which would influence LIS development of this field of research in the future.

Meanwhile, when considering the review of literature related to LIS bibliometrics research, bibliometrics and social network analysis has been conducted but has not yet been studied at the university. The results revealed that it is consistent with the LIS issues of LIS, but different in the methodology, such as defining different LIS search terms, year, area, country, or region used in the study which when determine the search terms on the context, topic, and objectives that the researcher needs to study. This[64], a study of LIS Bibliometric in India and another studies in Bangladesh,[30,26] Arab cities,[21] and other countries in BRICS[65,61] and author collaboration

in European LIS journals[66] and[31] studies bibliometrics in the South Asian Association for Regional Cooperation (SAARC) countries, but found that there is still a lack of bibliometrics studies that combine LIS bibliometrics with social network analysis (SNA) and content analysis along with important research articles directly in the area. Education from university around the world.

Furthermore, there has been a notable prevalence of subjects in the field of research, including information science, library and information science, bibliometrics, academic libraries, information literacy, and education. Particularly striking is the emergence of the COVID-19 theme, which began to gain prominence in 2014 and continued to shape research discussions in subsequent years. Among these subjects, academic libraries, libraries, information literacy, LIS education, education, and the role of librarians have emerged as key topics poised for further development and significance within the research field.

These trends were illuminated through the application of Multiple Correspondence Analysis (MCA), a statistical technique that unveiled two distinct clusters within the research field. One cluster is characterized by its focus on various information-related concepts, while the other cluster encompasses terms associated with bibliometrics and scholarly communication, shedding light on the evolving landscape of research interests and priorities.

In terms of author cooperation, the results manifested that there was an emphasis on analyzing cooperation and collaborative social networks in research in the LIS field through centrality measures to identify the importance of authors, institutions, and countries that are intermediaries in the network. Each group was demonstrated in the form of groups or clusters that highlight closely related authors, institutions and countries. Therefore, the study would help to identify authors who play an important role in promoting collaboration in research and knowledge development. However, the results of the analysis of relationships in this network in terms of the author's role, the authors would influence in international collaboration between universities is important in supporting future development.

However, the results of the analysis of the evolution of research topics in the LIS field in different periods analysis with the Keywords Plus and Author Keywords illustrate a noteworthy shift in topics gaining traction over time. The Keywords Plus performs just as well as author keywords and has been used to identify job trends in various fields of science.[67,68] This study was consisted with the research study guidelines of[65] and[61], which employed the keyword analysis of LIS authors in the BRICS economic zone (comprising Brazil, Russia, India, China and South Africa). Therefore, the results of keyword analysis from this study, such as "information science" and "information retrieval" were found to have a consistent frequency of using keywords in Keywords Plus. As for Author Keywords, the most frequently used keywords were "bibliometrics" and "LIS education". There was interest in the topic of Studying LIS research in university during periods 2-3 increased.

Finally, a content analysis section of the top-ten LIS research articles revealed that the diversity of the most cited research topics related to the fields of computer science, physics, and information science and information management. The content analysis would help to understand which articles are most cited related to the interests and priorities of the academic community in this field. The most citations might have had an impact and created theoretical frameworks or tools for research in this field, such as[42], which created a process for finding and organizing data and[43] used Expectation-confirmation model (ECM) to study the behavior of users of online information systems.

Therefore, the citations should be an indication of the popularity and importance of these studies in the academic community and their use in citing work in this or related fields. Apart from these, there were also information on how to measure popularity in the online media society also known as Altmetric analysis, which was found to be at a low level. The Altmetric is another important service used to measure and analyze the popularity and social impact of scientific research and other academic research using Data from various social media allows researchers and research institutions to more easily and quickly monitor and measure the success of their research from a social perspective.[69] Currently, in the era of information sharing through internet and social media are important in scientific research and other industries today.

CONCLUSIONS

This study on Library and Information Science (LIS) research documents reveals evolving themes and collaboration trends within the field. Key focus areas identified include academic libraries, information literacy, and LIS education, with prominent contributions from authors and institutions across the United States, China, and the United Kingdom. The study highlights a sustained growth in publications and influence, particularly through bibliometric and content analyses of top-cited articles, indicating core research topics and interdisciplinary influences from computer science and information technology. Recommendations for future LIS research include expanding keyword searches and enhancing global cooperation to foster knowledge dissemination and adapt to educational needs in the digital age.

BIBLIOGRAPHIC REFERENCES

1. Buzzigoli L, Giusti A, Viviani A. The evaluation of university departments. A case study for Firenze. Int Adv Econ Res. 2010;16:24–38. doi: 10.1007/s11294-009-9243-6.

2. Makki AA, Alqahtani AY, Abdulaal RMS, Madbouly AI. A novel strategic approach to evaluating higher education quality standards in university colleges using multi-criteria decision-making. Educ Sci. 2023;13(6):577. doi: 10.3390/educsci13060577.

3. Elbawab R. University rankings and goals: A cluster analysis. Economies. 2022;10(9):209. doi: 10.3390/economies10090209.

4. Rust VD, Kim S. The global competition in higher education. World Stud Educ. 2012;13(1):5–20. doi: 10.7459/wse/13.1.02.

5. Raju J. Future LIS education and evolving global competency requirements for the digital information environment: an epistemological overview. J Educ Libr Inf Sci. 2020;61(3):342–56. doi: 10.3138/jelis.61.3.2019-0088.

6. Wickert C, Post C, Doh JP, Prescott JE, Prencipe A. Management research that makes a difference: Broadening the meaning of impact. J Manag Stud. 2020;58(2):297–647. doi: 10.1111/joms.12666.

7. Nash JA, Wright DA. Profile of the chief research officer at major research universities in the United States and examination of the current pathways to the position. J Res Adm. 2013;44(2):74–93. Available from: https://files.eric.ed.gov/fulltext/EJ1156072.pdf.

8. National Research Council. Research universities and the future of America: Ten breakthrough actions vital to our nation's prosperity and security. Washington, DC: The National Academies Press; 2012. Available from: http://commission.fiu.edu/helpful-documents/trade-articles/national-academies-universities-report.pdf.

9. Creswell JW. Research design: qualitative, quantitative and mixed methods approaches. 4th ed. Thousand Oaks, CA: Sage; 2014. Available from: https://www.ucg.ac.me/skladiste/blog_609332/objava_105202/fajlovi/Creswell.pdf.

10. Abubakar BM. Library and information science (LIS) education in Nigeria: emerging trends, challenges, and expectations in the digital age. J Balkan Libr Union. 2021;8(1):57–67. Available from: https://dergipark.org.tr/en/download/article-file/1748804.

11. Järvelin K, Vakkari P. LIS research across 50 years: content analysis of journal articles. J Doc. 2022;78(7):65–88. doi: 10.1108/JD-03-2021-0062.

12. Kennan M, Corrall S, Afzal W. Making space in practice and education: Research support services in academic libraries. Libr Manag. 2014;35(8/9):666–83. doi: 10.1108/LM-03-2014-0037.

13. Hou L, Luo J, Pan X. Research topic specialization of universities in information science and library science and its impact on inter-university collaboration. Sustainability (Switzerland). 2022;14(15):9000. doi: 10.3390/su14159000.

14. Jabeen M, Yun L, Rafiq M, Jabeen M. Research productivity of library scholars bibliometric analysis of growth and trends of LIS publications. New Libr World. 2015;116(7-8):433–54. doi: 10.1108/NLW-11-2014-0132.

15. Jabeen M, Yun L, Rafiq M, Jabeen M, Tahir MA. Scientometric analysis of library and information science journals 2003–2012 using web of science. Int Inf Libr Rev. 2015;47(3-4):71–82. doi: 10.1080/10572317.2015.1113602.

16. Piwowar-Sulej K, Krzywonos M, Kwil I. Environmental entrepreneurship – Bibliometric and content analysis of the subject literature based on H-Core. J Clean Prod. 2021;295:126277. doi: 10.1016/j.jclepro.2021.126277.

17. Wahyuningrum IFS, Humaira NG, Budihardjo MA, Arumdani IS, Annisa AN, Puspita AS, Sari AM, Djajadikerta HG. Environmental sustainability disclosure in Asian countries: Bibliometric and content analysis. J Clean Prod. 2023;411:137195. doi: 10.1016/j.jclepro.2023.137195.

18. Chanlun J. Bibliometric analysis of published research on coronavirus disease 2019 (COVID-19) in library and information science of Asian countries. TLA Res J. 2023;16(1):37–56. Available from: https://so06.tci-thaijo.org/index.php/tla_research/article/view/263942.

19. Maporn P, Puseerit J, Rungwisai P. Bibliometric analysis of Thai journals indexed in Scopus. TLA Bull. 2023;67(1):177–98. Available from: https://so06.tci-thaijo.org/index.php/tla_bulletin/article/view/260267.

20. Wittayawuttikul R, Wipawin N. Social network analysis (SNA) for information science research. JLISSWU. 2012;5(2):126–40. Available from: https://ejournals.swu.ac.th/index.php/jlis/article/download/3029/3049/9778.

21. Siddique N, Ur Rehman S, Ahmad S, Abbas A, Khan MA. Library and information Science research in the Arab World: a bibliometric analysis 1951–2021. Glob Knowl Mem Commun. 2023;72(1-2):138-59. doi: 10.1108/GKMC-06-2021-0103.

22. Wani JA, Ganaie SA, Rehman IU. Mapping research output on library and information science research domain in South Africa: a bibliometric visualization. Inf Discov Deliv. 2023;51(2):194-212. doi: 10.1108/IDD-10-2021-0115.

23. Abdullah Sani MKJ, Sahid NZ, Saifudin N, Baba J. A bibliometric study to assess research fads in library and information science in Malaysia during 2016–2021. In: ICIS2022Penang, 5th International Conference on Information Science: 19-21 September 2022. Penang, Malaysia: Royale Chulan; 2022. p. 75-80.

24. Garg KC, Singh RK. A bibliometric study of papers published in library and information science research during 1994-2020. DESIDOC J Libr Inf Technol. 2022;42(1):57-63. doi: 10.14429/djlit.42.1.17480.

25. Rehman IU, Wani JA, Ganaie SA. Continuous professional development research in the Library and Information Science: A bibliometric analysis and knowledge mapping. DESIDOC J Libr Inf Technol. 2022;42(6):377-86. doi: 10.14429/djlit.42.6.18332.

26. Islam MA, Roy PK. Bibliometric study of scholarly productivity of library and information science research in Bangladesh from 1971-2020. DESIDOC J Libr Inf Technol. 2021;41(3):213-25. doi: 10.14429/djlit.41.03.16854.

27. Ibrahim C, Hardiyati R, Ayunda WA, Fadhli R. Comparative study of Asean countries research productivity in library science. Webology. 2021;18(1):371-88. doi: 10.1177/21582440221145157.

28. Sahu RR, Parabhoi L. Bibliometric study of library and information science journal articles during 2014-2018: LIS research trends in India. DESIDOC J Libr Inf Technol. 2020;40(6):390-5. doi: 10.14429/djlit.40.06.15631.

29. Li P, Yang G, Wang C. Visual topical analysis of library and information science. Scientometrics. 2019;121(3):1753-91. doi: 10.1007/s11192-019-03239-0.

30. Islam MS, Islam MN, Mondal M. Research trends in library and information science in Bangladesh: An analytical study. JISTaP. 2018;6(2):36-45. doi: 10.1633/JISTaP.2018.6.2.3.

31. Shukla A, Maurya SK. Research performance of South Asian Association for Regional Cooperation (SAARC) countries in library and information science: A scientometric analysis. Collnet J Scientometrics Inf Manage. 2018;12(1):73-81. doi: 10.1080/09737766.2017.1354478.

32. Chang Y-W, Huang M-H. A study of the evolution of interdisciplinarity in library and information science: Using three bibliometric methods. J Assoc Inf Sci Technol. 2012;63(1):22-33. doi: 10.1002/asi.21649.

33. Naseer MM, Mahmood K. Use of bibliometrics in LIS research. Libres. 2009;19(2):1-11. doi: 10.32655/LIBRES.2009.2.4.

34. Naseer MM, Mahmood K. LIS research in Pakistan: an analysis of Pakistan Library and Information Science Journal 1998-2007. Pakistan Library & Information Science Journal. 2009;40(3):10-20. Available from: https://digitalcommons.unl.edu/libphilprac/275.

35. Lazar N, Chithra K. Comprehensive bibliometric mapping of publication trends in the development of Building Sustainability Assessment Systems. Environ Dev Sustain. 2021;23(4):4899-923. doi: 10.1007/s10668-020-00796-w.

36. Zhong M, Lin M. Bibliometric analysis for economy in COVID-19 pandemic. Heliyon. 2022;8:e10757. doi: 10.1016/j.heliyon.2022.e10757.

37. Hjørland B. Library and Information Science (LIS), Part 1. Knowl Organ. 2018;45(3):232-54. doi: 10.5771/0943-7444-2018-3-232.

38. Hjørland B. Library and Information Science (LIS), Part 2. Knowl Organ. 2018;45(4):319-38. doi: 10.5771/0943-7444-2018-4-319.

39. Putri SSM, Fuad A, Maula AW. A bibliometric analysis of PubMed literature on coronavirus: All time period. BIO Web Conf. 2020;28:01001. doi: 10.1051/bioconf/20202801001.

40. Aria M, Cuccurullo C. Bibliometrix: An R-tool for comprehensive science mapping analysis. J Informetr. 2017;11(4):959-75. doi: 10.1016/j.joi.2017.08.007.

41. Camprubí R, Coromina L. Content analysis in tourism research. Tour Manag Perspect. 2016;18:134-40. doi: 10.1016/j.tmp.2016.03.002.

42. Salton G, Wong A, Yang CS. A vector space model for automatic indexing. Commun ACM. 1975;18(11):613-20. doi: 10.1145/361219.361220.

43. Bhattacherjee A. Understanding Information Systems Continuance: An Expectation-Confirmation Model. MIS Q. 2001;25(3):351-70. doi: 10.2307/3250921.

44. Chin WW, Marcolin BL, Newsted PR. A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo Simulation Study and an electronic-mail emotion/adoption study. Inf Syst Res. 2003;14(2):189-217. doi: 10.1287/isre.14.2.189.16018.

45. Shenton AK. Strategies for ensuring trustworthiness in qualitative research projects. Educ Inf. 2004;22(2):63-75. doi: 10.3233/EFI-2004-22201.

46. Chen C. CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. J Assoc Inf Sci Technol. 2006;57(3):359-77. doi: 10.1002/asi.20317.

47. Philip Chen CL, Zhang C-Y. Data-intensive applications, challenges, techniques and technologies: A survey on Big Data. Inf Sci. 2014;275:314-47. doi: 10.1016/j.ins.2014.01.015.

48. Vidal G, Latorre JI, Rico E, Kitaev A. Entanglement in Quantum Critical Phenomena. Phys Rev Lett. 2003;90(22):2279021-4. doi: 10.1103/PhysRevLett.90.227902.

49. Eisert J, Cramer M, Plenio MB. Colloquium: Area laws for the entanglement entropy. Rev Mod Phys. 2010;82(1):277-306. doi: 10.1103/RevModPhys.82.277.

50. Featherman MS, Pavlou PA. Predicting e-services adoption: a perceived risk facets perspective. Int J Hum Comput. 2003;59(4):451-74. doi: 10.1016/S1071-5819(03)00111-3.

51. Rada R, Mili H, Bicknell E, Blettner M. Development and application of a metric on semantic nets. IEEE Trans Syst Man Cybern Syst. 1989;19(1):17-30. doi: 10.1109/21.24528.

52. Khan I. A scientometric analysis of DESIDOC Journal of Library & Information Technology (2010-2014). Libr Hi Tech News. 2016;33(7):8-12. doi: 10.1108/LHTN-03-2016-0014.

53. Juznic P, Urbanija J. Developing research skills in library and information science studies. Libr Manag. 2003;24(6/7):324-31. doi: 10.1108/01435120310486048.

54. Middleton A. An attempt to quantify the quality of student bibliographies. IJLIS. 2005;6(1):7-18. doi: 10.1108/14678040510588553.

55. Daraio C, Bonaccorsi A, Simar L. Rankings and university performance: A conditional multidimensional approach. Eur J Oper Res. 2015;244:918-30. doi: 10.1016/j.ejor.2015.02.005.

56. Lin W-C, Chen C. Novel world university rankings combining academic, environmental, and resource indicators. Sustainability. 2021;13(24):13873. doi: 10.3390/su132413873.

57. Saracevic T. Information science: Origin, evolution and relations. In: Vakkari P, Cronin B, editors. Conceptions of Library and Information Science. New York: Taylor Graham; 1992. p. 5-27.

58. Wilson P. Bibliographical R&D. In: Machlup F, Mansfield U, editors. The Study of Information: Interdisciplinary Messages. New York: Wiley; 1983. p. 389-97.

59. Garfield E, Sher IH. KeyWords Plus™—algorithmic derivative indexing. J Assoc Inf Sci Technol. 1993;44(5):298-9. doi: 10.1002/(SICI)1097-4571(199306)44:5<298::AID-ASI5>3.0.CO;2-A.

60. Tan J, Fu HZ, Ho YS. A bibliometric analysis of research on proteomics in Science Citation Index Expanded. Scientometrics. 2014;98(2):1473-90. doi: 10.1007/s11192-013-1125-2.

61. Tripathi M, Jeevan VKJ, Babbar P, Mahemei LK. Library and information science research in BRICS countries. Inf Learn Sci. 2018;119(3-4):183-202. doi: 10.1108/ILS-10-2017-0101.

62. Hodonu-Wusu JO, Lazarus GN. Major trends in lis research: A bibliometric analysis. Libr Philos Pract. 2018:1873. Available from: https://digitalcommons.unl.edu/libphilprac/1873.

63. Chang Y-W, Huang M-H, Lin C-W. Evolution of research subjects in library and information science based on keyword, bibliographical coupling, and co-citation analyses. Scientometrics. 2015;105(3):2071-87. doi: 10.1007/s11192-015-1762-8.

64. Sa MK, Dora M. Research productivity and research trends in the library and information science subject: A study with reference to SCOPUS. Libr Philos Pract. 2019:2661. Available from: https://core.ac.uk/download/pdf/228203399.pdf.

65. Gupta N, Chakravarty R. Deciphering the status of library and information science research in BRICS nations: A research visualization approach. J Libr Adm. 2022;62(3):404-18. doi: 10.1080/01930826.2022.2043695.

66. Jokić M. Productivity, visibility, authorship, and collaboration in library and information science journals: Central and Eastern European authors. Scientometrics. 2020;122(2):1189-219. doi: 10.1007/s11192-019-03308-4.

67. Huang Y, Ao XL, Ho YS. Use of citation per publication as an indicator to evaluate pentachlorophenol research. Scientometrics. 2008;75(1):67-80. doi: 10.1007/s11192-007-1849-y.

68. Zhang J, Yu Q, Zheng F, Long C, Lu Z, Duan Z. Comparing keywords plus of WOS and author keywords: A case study of patient adherence research. J Assoc Inf Sci Technol. 2016;67(4):967-72. doi: 10.1002/asi.23437.

69. Sedighi M. Altmetrics analysis of selected articles in the field of social sciences. Glob Knowl Mem Commun. 2023;72(4-5):452-63. doi: 10.1108/GKMC-07-2021-0124.

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