

# A comparative study on the development of academic librarianship research published in China and international journals from 2016 to 2020

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## ABSTRACT

This study investigates the top authors, the most frequent keywords in selected top Chinese and international journals in academic librarianship, and emergent themes by conducting network and cluster analysis. The results suggest that LIS researchers in mainland China were less active in publishing articles in international journals during the period examined. Chinese researchers focused more on reading promotion and new technology implementation in libraries, while international researchers discuss communications among diverse disciplines more. Drawing international subject librarians' practices could be an approach to transform Chinese academic libraries to cope with the library crisis by playing a role as a bridge among scholars from various disciplines.

## KEYWORDS

Academic librarianship in China; Academic librarianship international; Co-word analysis; Cluster analysis

## Introduction

The findings of social science research studies carry substantive academic, social, and economic value for society (Qiu & Wang, 2010). As the leading carrier of research achievements, academic journals play a critical role in creating, evaluating quality, and preserving research (American Library Association, 2006). Analyzing academic articles published in academic journals in a field with bibliometrics provides approaches to reveal emerging trends in research articles and explore a field knowledge structure in existing literature (Donthu et al., 2021).

Library and Information Science (LIS) is typically considered to be a social science discipline (Dick, 1995). As a subfield of LIS, academic librarianship is deeply influenced by its social context. The social environment between 2016 and 2020 was complex. On the one hand, with the rapid development of information technology, human society entered the era of industry 4.0 that applications represented by artificial intelligence and machine learning technology have penetrated everyone's life rapidly (PwC, 2017), creating a flexible way of read-

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ing. On the other hand, the COVID-19 pandemic has severely challenged the academic library service capacity around the world (Connell et al., 2021; Zareef & Ahmad, 2021). However, the scholarly communication on academic library practices between Chinese and international is not sufficient facing the complex social environment. The SSCI journals published 3,275,881 journal articles between 2011 and 2020, with the number of authors from the United States, United Kingdom, Australia, Canada, and China accounting for the top five among all countries. Chinese authors published 191,167 articles, accounting for 5.8% of SSCI articles. Among them, only 4,678 articles are LIS relevant, accounting for 2.4% of the articles with Chinese scholars, ranking 18th among all published disciplines. Factors such as language and research background lead to the barrier of scholarly communication between China and the international. Therefore, the purpose of this study is to a) analyze and identify the top scholars and appeared themes in Chinese and international academic library relating journals, and b) compare academic libraries' issues and practices in China and the world to promote mutual reference. This study will answer the following questions:

1. Who are the major producer authors of publications in selected Chinese and international journals from 2016 to 2020?
2. What are the highest frequency keywords appeared in selected Chinese and international journals from 2016 to 2020?
3. What topics appeared in selected Chinese and international journals from 2016 to 2020?

## Literature Review

An abundance of studies have examined the published academic literature relating to LIS using various approaches, such as using bibliometrics to investigate the authorships (Patil, 2010; Sethi & Panda, 2012; Singh & Chander, 2014), citations (Jena et al., 2012), topics evolution (Buřlar, 1991; Schrader, 1985), types of publication, keywords frequency (Ali et al., 2015), research methods (Oyewusi, 2012), pagination pattern (Singh & Chander, 2014), geographic networks of research collaboration (Hu & Hu, 2018), and funds (Jiang, 2018). Koufogiannakis et al. (2004) conducted a content analysis of LIS literature published in 2001 to determine the specialized fields and themes that appeared in the literature. Wen (2020) and Wu et al. (2019) conducted a content analysis of LIS literature published in 20 library science journals from 1978 to 2018 to investigate the development trend of contemporary library science and to identify the top library related theories appeared in the past decade. Wang et al. (2021) studied the topics trend of LIS doctoral dissertation in China from 2011 to 2020 with cluster analysis and network analysis.

Additionally, many researchers also have conducted bibliometric studies on academic library-related journals. Ali et al. (2015) studied the types, publication numbers, citations, authorship, and keywords frequency of articles published in JAL (Journal of Academic Librarianship) from 1999 to 2014. Similarly, Khanna et al. (2018) discussed the distribution years, length, authorship, and citation pattern of articles published in JAL from 2007 to 2016. Luo and McKinney (2015) conducted a content analysis of peer-reviewed articles published in JAL between 2004 and 2013 with the five critical variables, including authorship, article type, topic, research methods/design, and research theories/models. In the 1980s, Metz (1989) examined the statistics of the articles published by C&RL (College and Research Libraries) that, compared with previous decades, research articles published by C&RL used more frequently quantitative methods, especially in the information display. Further, Brattin (1991) examined six journals, including C&RL, that published research articles with quantitative methods in

1990 and revealed that half of the articles published by C&RL were research articles. Terry (1996) examined gender, institutional relationships, and degree of coauthorship in articles appearing in C&RL from 1989 to 1994. Recently, Mamdapur et al. (2013) investigated scholarly communication in C&RL from 1997 to 2011 to reveal coauthorship and citation.

In 1984, Sellen investigated the citation status of research articles published in 1981 in C&RL and JAL. Zemon and Bahr (1998) studied the identity and motivation of authors of articles published in C&RL and JAL between 1986 and 1996 and found that tenure was considered the least important motivating factor by more than half of participants. Crawford (1999) collected and investigated articles published in C&RL and JAL between 1996 and 1997 and evaluated the journals according to the type of articles published, article structure, statistical type, and data collection methods. Hakanson (2005) analyzed the gender of authors and cited authors of articles published in C&RL, JAL, and Library Quarterly from 1980 to 2000 and revealed the differences between the citation practices of female and male authors.

CJAL (China Journal of Academic Libraries) is the core journal in the Chinese academic library field. Xu et al. (2019) examined the hot topics of the peer-reviewed articles published in CJAL between 2015 and 2018 by performing word frequency statistics and co-word analysis with the keywords. Zhou (2016) did citation analysis (including the cited authors, journals, funds, institutions, subjects, etc.) and examined impact factor, H index, and a relative H index of articles published in CJAL from 2011 to 2015. Qin (2014) calculated keywords frequencies of the articles in CJAL published in the periods of 1989-2003 (15 years) and of 2004-2013 (10 years), comparing the research hotspots before and after the 21st century. Kong and Ding (2013) made a statistical analysis on the relationship between the authors and the article numbers based on 4,103 articles published in CJAL from 1983 to 2012, verified Lotka's Law, and revealed the distribution regularities of the paper authors of CJAL. Zhang and Zhuang (2011) discussed the publication numbers, authorship, and citation pattern of articles published in the Journal of Academic Library and Information Science from 2008 to 2010. Qi (2014) studied the time, the region, and affiliation distribution of coauthors, the number and research character of the core authors, and the coauthor-ship published in Library Work in Colleges and Universities from 2008 to 2012.

Co-word analysis is an essential method to explore conceptual networks and explain an academic field dynamic (Callon et al., 1991) by analyzing the documents, keywords, authors, and journals' networks (Sedighi, 2016), applied in various fields, such as neural network research (Noyons & van Raan, 1998), software engineering (Coulter et al., 1998), and biological safety (Cambrosio et al., 1993). Several LIS researchers investigated the field development through literature keywords co-words analysis. For instance, Sedighi (2016) conducted a co-word analysis for literature from the Web of Science database in the informatics field to reveal the frequently used topics between 1991 and 2012. Onyancha (2018) examined the characteristic of keyword networks in LIS studies and assessing and mapping pattern changes by extracting literature from the Thomson Reuters Science Citation Index, Social Science Citation Index, and Arts and Humanities Citation index that published between 1971 and 2015.

Hu et al. (2013) revealed the LIS intellectual structure in China with co-word analysis by extracting the keywords of literature collected in the Chinese Journal Full-Text Database. Yao et al. (2020) collected academic articles from 2014 to 2018 from the Chinese Social Science Citation Index to learn main research topics with statistical analysis and keywords analysis. Xu and Ma (2021) studied the articles published between 2013 and 2018 in LIS from China Aca-

demographic Journal Network Publishing Database with cluster analysis, multidimensional scaling, and social network analysis. Their study revealed that topics about electronic government, reading promotion, and social media had high relevancy.

In terms of investigating academic library-related journals, Cheng et al. (2018) identified the knowledge structure of the journal *Library Hi Tech* by collecting and analyzing the published articles' keywords with co-word analysis. Wang (2011) conducted a co-word analysis and cluster analysis on high-frequency keywords extracted from eight LIS core journals in China. The study described each research topic's development status according to the number of links in each topic cluster. Fan and Xie (2019) selected 19 core LIS journals in China published between 1990 to March 2019 as data sources to study the research topics and evolution characteristics. However, few studies compare the topics in academic library-related core journals in China and the United States analysis. Zhang (2012) compared the topics of the research articles published in *CJAL* and *C&RL* from 2000 to 2010 with content analysis and revealed that *CJAL* pays more attention to library theory and librarianship research while *CRL* focuses on the research of librarian and user behavior. In the current study, a more comprehensive range of journals related to academic librarians was selected to conduct a comparative study on the research topics in the recent five years to fill the gap in the literature.

## Methods

The researchers selected three top international journal periodicals, *C&RL*, the *JAL*, and the *New Review of Academic Librarianship*, and three top journal periodicals published in China, *CJAL*, *Library Work in Colleges and Universities*, and *Journal of Academic Library and Information Science*, to compare the topics appeared in the field of academic librarianship. All journal articles with author names and article keywords published by international top journals and China top journals relating to academic librarianship from 2016 to 2020 were selected.

From 2016 to 2020, the selected Chinese journals published 2,109 articles, while the selected international journals published 1,233 articles. Excluding book reviews, editorials, and articles without keywords, a total of 1,899 and 732 articles were gathered correspondingly as samples.

The collected data were transferred to Microsoft Excel for analysis. The collected keywords were synonymized for co-word analysis and cluster analysis. For instance, the keyword "universities libraries" was synonymized as "academic libraries." The Count-if functions calculated the frequencies of article authors' names and keywords frequency. VosViewer was used to map the social network keywords and to perform hierarchical clustering analysis.

## Results

From 2016 to 2020, eight authors have published 10 or more articles in selected Chinese journals (Table 1). Wu Hanhua, of Shanxi University of Finance and Economics, published the most articles, with a total of 17 articles. Among all the authors, Wu Hanhua, Wen Tingxiao, and Xiao Peng are universities' faculties, while the others are librarians. Nine authors published more than four articles in selected international journals (Table 2). Dickson K. W. Chiu, of the Hong Kong University, published the most articles, with a total of nine. Four of the 13 authors are Chinese from Hong Kong. The analysis points out that Chinese LIS researchers

play an essential role in international academic research in LIS field. Comparing the two groups of authors, all the authors who published over ten articles in selected Chinese journals had not published in the selected international journals. The Chinese authors who had published in the selected international journals are all from Hong Kong.

**Table 1** Major Producer Authors of Publications in Selected Chinese Journals from 2016 to 2020.

|              |    |
|--------------|----|
| Wu Hanhua    | 17 |
| Wen Tingxiao | 13 |
| Gu Yeqing    | 13 |
| Xiao Long    | 12 |
| Xiao Peng    | 11 |
| Wang Bo      | 11 |
| Yang Xinya   | 11 |
| Nie Hua      | 10 |

**Table 2** Major Producer Authors of Publications in Selected International Journals from 2016 to 2020.

|                           |   |
|---------------------------|---|
| Dickson K. W. Chiu        | 9 |
| Quinn Galbraith           | 8 |
| Patrick Lo                | 7 |
| Wendi Arant Kaspar        | 7 |
| Jaime A.Teixeira da Silva | 6 |
| M. Sara Lowe              | 5 |
| Jessica Bates             | 5 |
| William H.Walters         | 4 |
| Scott Walter              | 4 |
| Kevin K. W. Ho            | 4 |
| Ernest Tak Hei Lam        | 4 |
| Sarah LeMire              | 4 |
| Sarah Rose Fitzgerald     | 4 |

### Keywords Frequency

A total of 4,225 keywords from 1899 academic articles were collected as data samples for co-word analysis and cluster analysis from the three journals published in China. After synonymizing, the occurrence of 30 keywords appeared equal to or greater than ten times (Table 3), and the total occurrence frequency of 30 keywords was 1581 times, accounting for 37.42% of the total keywords' occurrence frequency.

Since the selected journals are from the academic librarianship field, it is not surprising that academic library (560), reading promotion (183), library services (99), information literacy (63), and collection development (56) have the most frequency. The keywords artificial intelligence, big data, smart library indicate that the library profession in China emphasizes the new technology in the recent five years. They also reveal the library status quo to seek trans-

formation and development in response to external technology challenges. Also, the library professionals focus on applying digital technology in humanities and hope to improve the service quality and create additional value for patrons through being familiar with digital humanities theory and related technologies.

**Table 3** Comparison between highest frequency keywords appeared in selected journals.

| Chinese Journals                | Frequency | International Journals          | Frequency |
|---------------------------------|-----------|---------------------------------|-----------|
| Academic library                | 560       | Academic library                | 254       |
| Reading promotion               | 183       | Information literacy            | 167       |
| Library services                | 99        | Students                        | 125       |
| Information literacy            | 63        | Academic librarians             | 59        |
| Collection development          | 56        | Research                        | 40        |
| New media                       | 54        | Library services                | 40        |
| Library and information science | 41        | Library and information science | 37        |
| Subject librarian service       | 40        | Open access                     | 37        |
| MOOC                            | 38        | Associations                    | 26        |
| Big data                        | 37        | Collaboration                   | 26        |
| Smart library                   | 34        | Student engagement              | 26        |
| Space reconstruction            | 34        | Higher education                | 24        |
| Librarians                      | 31        | Survey                          | 24        |
| Digital humanities              | 28        | Assessment                      | 24        |
| Information service             | 26        | Social medium                   | 23        |
| Digital library                 | 25        | Scholarly communication         | 23        |
| Open access                     | 24        | Psychology                      | 20        |
| Bibliometrics                   | 23        | Electronic books                | 19        |
| Oral history                    | 22        | Leadership                      | 18        |
| Reading service                 | 22        | Library resources               | 17        |
| Nationwide reading              | 21        | Collection development          | 16        |
| Library history                 | 17        | Library users                   | 15        |
| Library administration          | 16        | Universities & colleges         | 14        |
| Knowledge service               | 16        | Researchers                     | 14        |
| Digital reading                 | 15        | periodical publishing           | 14        |
| Bibliography                    | 13        | Institutional repository        | 12        |
| College students                | 12        | Library administration          | 12        |
| CALIS                           | 11        | Citation analysis               | 12        |
| COVID-19                        | 10        | Digital library                 | 12        |
| Artificial intelligence         | 10        |                                 |           |

Comparably, researchers collected 3,394 keywords from 732 academic articles as data samples for co-word analysis and cluster analysis from the three international journals. After synonymizing, 28 keywords' occurrence frequencies were equal to or greater than ten times (Table 3), and the total occurrence frequency of 29 keywords was 1,150 times, accounting for 33.88% of the total keywords' occurrence frequency.

Similar to the top frequent keywords appeared in selected Chinese journals, academic library (254), information literacy (167), students (125), academic librarians (59), and research (40), and library service (40) have the most frequency in selected LIS international journals. Keywords such as open access, psychology, social media, and citation analysis also appear more frequently, illustrating that the library profession emphasizes the humanities and data analysis and serves as a bridge between the hard sciences and humanism.

In comparing appeared keywords with high frequencies in selected journals, the terms with the greatest frequencies appeared in both Chinese and international LIS journals to be related to the topics such as the improvement of service quality and promoting communication among scholars from various fields by exploring new technologies in the recent five years.

### Cluster Analysis

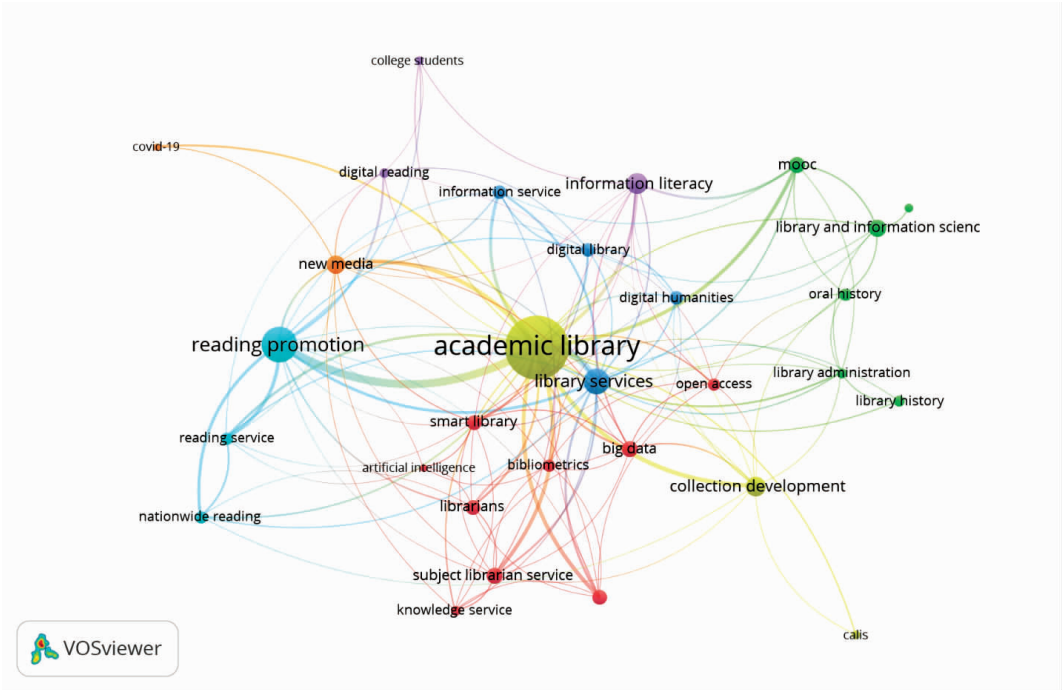
The top frequent 30 keywords that appeared in selected Chinese journals were divided into seven clusters with hierarchical clustering analysis (Table 5). The cluster red, focusing on library new technology, has the most keywords and the most significant number of links with other clusters (over nine times for each keyword) in selected journals published in China (Figure 1). The keywords involve applying various new technologies in the library field, such as smart libraries, applying artificial intelligence robots in space reconstruction, and using big data analysis technology in providing subject librarian services and knowledge services. Even though the cluster green, relating to the library and information science development history, contains more keywords than most clusters, but it has little connection with others and, therefore, is relatively independent. As the core term, the blue cluster with library services has extensive relationships with other clusters, indicating that providing various services to users is one of the primary responsibilities for academic libraries in China. It was revealed by keywords frequency and connection numbers of reading promotion and information literacy, most studies about library services related to reading and information literacy.

Also, the orange cluster with new media as the core keyword attracts the researchers' attention, which may suggest that academic libraries make efforts to maintain the libraries' regular operation by adapting various new digital media during the pandemic. Even though the sample in this study only involves 2020, the first year since the outbreak of COVID-19, the keyword COVID-19 still ranks in the top 30 keywords of the five years, indicating the severe challenges caused by the pandemic to libraries and the efforts made by academic librarians in China to maintain the library services. The keyword CALIS (shorts for China Academic Library & Information System) in cluster yellow is a literature-sharing consortium. Academic libraries in China generally face difficulties in collection development by budget cuts and database vendor price increments in recent years. The construction of CALIS reflects the measures to alleviate the dilemma.

**Table 4** Clusters of 30 keywords appeared in selected Chinese journals

| No. | Number of Keywords | Cluster Themes                  | Cluster Color | Member of Cluster  |
|-----|--------------------|---------------------------------|---------------|--|
| 1   | 9                  | Library new technology          | Red           | Artificial intelligence, bibliometrics, big data, knowledge service, librarians, open access, smart library, space reconstruction, subject librarian service |
| 2   | 6                  | Library and Information Science | Green         | Bibliography, library administration, library and information science, library history, MOOC, oral history   |
| 3   | 4                  | Digital services                | Dark Blue     | Digital humanities, digital library, information service, library services   |
| 4   | 3                  | Collection development          | Yellow        | Academic library, CALIS, collection development  |
| 5   | 3                  | Information literacy            | Purple        | College students, digital reading, information literacy  |
| 6   | 3                  | Reading service                 | Light Blue    | Nationwide reading, reading promotion, reading service   |
| 7   | 2                  | New media                       | Orange        | COVID-19, new media  |





**Figure 1** Keywords co-occurrence link strength appearing in selected Chinese journals, 2016-2020.

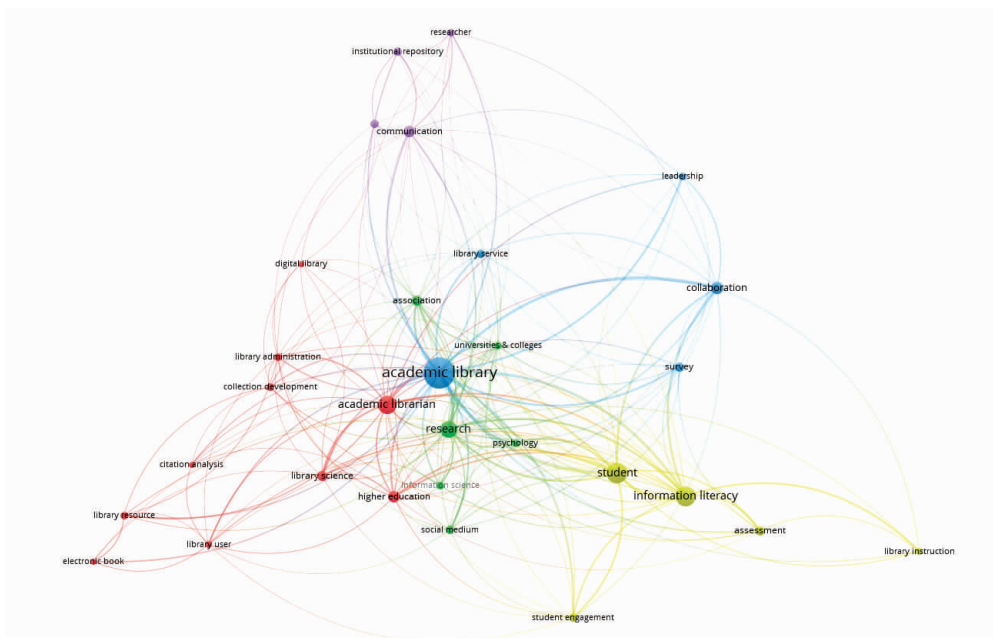
A hierarchical clustering analysis of keywords in the international journals was also performed. The 29 keywords were divided into 5 clusters, indicating that the research fields of the three international journals in recent five years were relatively concentrated (Table 6). The blue cluster appears to include terms related to academic library services, with fewer keywords, but is the largest cluster and is intertwined tightly with the other four clusters (Figure 2). It indicates that academic libraries are the centers of scholarly and professional communication and library instruction with various resources. It is worth noting that the cluster containing the keyword of the academic library in the international journals was more closely related to research. However, the keyword in Chinese journals was more closely related to collection development in its cluster. The reasons for such phenomenon may include a) the later development of higher education in China compared with western developed countries caused the less sufficient collection in academic libraries; b) the high exchange rate of U.S. dollars and EUR USD against RMB increases the database purchase cost for Chinese academic libraries, then aggravating the difficulty in developing the collection.

The red cluster, focusing on library resources, has the most diversified keywords, such as collection development, digital library, and electronic books, which illustrates the diversity of academic library resources. Due to the nature of academic libraries, the red cluster has a denser relationship with the largest cluster (blue cluster) compared with the other three clusters. The purple cluster, pertaining to scholarly communication, stood out from the other clusters.



**Table 5** Clusters of 29 keywords appeared in selected international journals.

| No. | Number of Keywords | Cluster Themes            | Cluster color | Member of Cluster   |
|-----|--------------------|---------------------------|---------------|---|
| 1   | 10                 | Library resources         | Red           | Academic librarian; citation analysis, collection development, digital library, electronic book, higher education, library administration, library sources, library and information science, library user |
| 2   | 5                  | Professional associations | Green         | Associations, psychology, research, social medium, university & colleges  |
| 3   | 5                  | Library services          | Blue          | Academic library, collaboration, leadership, library service, survey,   |
| 4   | 4                  | Library instruction       | Yellow        | Assessment, information literacy, library instruction, student, student engagement  |
| 5   | 3                  | Scholarly communication   | Purple        | Scholarly communication, institutional repository, open access, researcher  |


**Figure 2** Keywords co-occurrence link strength appearing in selected international journals, 2016–2020.

Compared to the clusters that appeared in selected Chinese journals and international journals, academic services are the center of research in both types of journals. However, Chinese journals appear to pay more attention to coping with new situations (e.g., pandemic) and applying new technologies in library services to maintain the current services and improve service qualities. Similarly, international journals appear to pay more attention to providing various library services but focus on collaboration between librarians and faculties and among scholars. New technologies, such as artificial intelligence and big data, are widely used in various fields in China, and their applications in academic libraries are parts of the broader trend. Then, it is no surprise that the relating keywords have higher

frequencies. A proposal to strengthen interdisciplinary training in higher education in the meeting of the National Committee of the Chinese People's Political Consultative Conference 2020 may suggest the deficiency of interdisciplinary in Chinese higher education from the side. Therefore, the cluster about communication among interdisciplinary scholars that appeared in international journals did not appear in selected Chinese journals. With the government's proposal, interdisciplinary research may also be a theme in the academic field in China in the coming years.

## Discussion

English-speaking countries account for 5-9% of the world's population, but over 80% of the world's scientific articles are published in English academic journals (Montgomery, 2004). For scientists who do not speak English as a native language, language barriers prevent them from communicating their research importance and relevance and cause of lacking communication competence and knowledge about written and unwritten rules for publishing (Gosden, 1992). This study found that the authors who published the most articles in selected Chinese LIS journals were not in the author list of international LIS journals. In contrast, nearly half of the authors who published the most articles in international journals came from Hong Kong, China. In fact, universities and research institutions in mainland China strongly encourage their researchers to publish in international journals (Zhang & Sivertsen, 2020).

The findings may suggest the difficulties for mainland Chinese researchers to publish in international journals. In contrast, Hong Kong had been a British colony for over 150 years. The Hong Kong researchers may be more familiar with international research background and international journal rules and have higher English proficiency than researchers in China mainland. To solve the problem, Lund et al. (2021) suggest forming a broad multinational collation by professional researchers, publishers, and advocacy groups to counter Western hegemony during publishing and providing free language editing services for promising articles by publishers. The approaches may increase the likelihood of non-native English speakers publishing in international journals and adding diverse research perspectives in relating fields.

Although there are different political and economic environments among Chinese and international academic libraries, the continuous technology development, and the frequent black swan events, such as the COVID-19 pandemic, make the libraries worldwide homogeneous. The current study applied cluster and network analysis with scholarly journal article keywords to reveal the similar and different approaches among Chinese and international academic libraries to cope with the situations. The similarities lie in that both Chinese and international academic libraries attach critical importance to collection development and information literacy instruction, expecting to expand academic library influence, convey LIS professional value, and assist patrons in acquiring in-need information conveniently and accurately. The differences lie those international academic libraries pay more attention to interdisciplinary communication services-keywords including association, collaboration, scholarly communication point to this topic. Comparably, Chinese academic libraries focused on reading promotion and library space transformation. Several scholars have noted the interdisciplinary emerging in higher education in the recent decade (Adkins, 2009; Corbacho et al., 2021; Thune et al., 2012). As for interdisciplinary in higher education, Jacob (2015) explained two trends: interdisciplinary research and interdisciplinary teaching.

Montaigne (1991) pointed out that the role of academic libraries is to accommodate interdisciplinary subjects and re-examine the academic boundaries imposed by modern higher education institutions by developing collections, services, and spaces. Therefore, part of the core mission of academic libraries is to serve interdisciplinary research practices and diverse collaborative modes (Kasten-Mutkus & Saragossi, 2021). Some western librarians are actively exploring the liaison between librarians and faculties. For instance, Eddy and Solomon (2017) conducted a case study to investigate possible approaches for subject librarians and faculty editors to develop advisory roles corporately to support faculty research and open access publication. The results indicate a unique opportunity to play a critical advisory role in advancing open-access academic publishing as a central part of future academic communication.

Interdisciplinary teaching can be achieved by cooperating among faculties from different fields (Lyll et al., 2015) and working with academic librarians who provide helpful external perspectives (Wishkoski et al., 2018). However, faculties pay little or no attention to their relationship with academic librarians, while the latter spend much time researching faculties' teaching needs (Christiansen et al., 2004; Wang et al., 2021). Therefore, international researchers also explore the involvement of subject librarians in interdisciplinary teaching. For instance, Gosselin and Goodsett (2019) discussed the collaboration between subject librarians and faculties in public sphere pedagogy assignments, a pedagogical strategy that aims to enhance students' sense of civic agency and social responsibilities by connecting their coursework to practical.

Compared with the keywords in selected international journals, Chinese journals appeared to focus on reading services but lacked scholarly and professional communication services that appeared in the international ones. Such focusing originated from the joint initiation of a reading campaign in 2006 by the Publicity Department of China and 11 other ministries in China (Library Society of China, 2006). Studies relating to reading promotion in China began to flourish since then as the number of research articles regarding reading promotion increased from 60 in 2006 to 2,364 in 2014 (Sun & Xie, 2016). With the information digitalization trend and individual reading habit changing, reading during fragment time (e.g., reading with a cellphone while waiting for a bus), utilitarian reading (e.g., reading for certificate exams), practical reading (e.g., reading for gaining practical skills for future job application), and leisure reading turn to the main characteristics of current college students, resulting in decreased library patrons and library book circulation (Gao, 2017). The purpose of the reading campaign is to promote reading services relating to research and practice to improve the collection utilization rate and stimulate patrons reading interests. Also, Chinese academic libraries focus on applying new technologies, such as artificial intelligence, big data, and 5G, to improve library adaptability by promoting collection digitalization and personalized services (Chu & Chen, 2019). In the current study, keywords that appeared in selected Chinese journals indicated Chinese academic library scholars' attention to subject librarianship but were relatively minor. For instance, Zhang (2016) provided a general introduction to the evolution and job responsibilities of subject librarian positions in China. He (2018) reviewed the role of subject librarians in medical universities on information research, fix topic information service, literature retrieval, novelty evaluation, high-quality literature research services, the connection between the library and academic research groups, and satisfying information needs of faculties for teaching and research. However, relevant research lacks systematic exploration and practice on subject librarian roles, including qualification, job responsibilities,

and management, indicating subject librarians have not played a significant role in providing interdisciplinary services in academic libraries (Li, 2017). Giving full play to the role of subject librarians may be one of the effective ways to confront the library crisis brought by the rapid development of technology and realize the transformation of current Chinese academic libraries.

The interdisciplinary personnel training plan proposed in the National Committee of the Chinese People's Political Consultative Conference held at the end of 2020 may significantly promote scholarly and professional exchange services provided by academic libraries research in the LIS field of China. However, drawing on the international journal literature, it could be seen that giving full play to subject librarians may encounter significant challenges. It could be the experiences and public perception that faculty often view academic librarians as incapable of teaching (Given & Julien, 2005). LIS educators lack the experience to demonstrate the value of academic libraries to faculties in other fields (Wang et al., 2021). To solve the problem, LIS educators in China can market the functions of modern academic librarians by, for instance, academic conferences and communication among associations, changing faculties' stereotypical impression of academic librarians, promoting communication between faculties and subject librarians, and discovering and developing feasible cooperative teaching methods to achieve interdisciplinary education effectively.

It is also worth noting the difference in attention between Chinese and international journals on the impact of pandemics on academic libraries reflected by keyword frequency statistics. COVID-19 affected academic library service format worldwide profoundly. Hinchiffe and Eisenberg (2020) pointed that the pandemic leads to a shift in library reference services from face-to-face to online or telephone. Whether on-site or through the mail, access to printed materials has plummeted. An ALA (2020) survey further revealed that over half of academic and research libraries had seen eliminations or reductions in planned hiring, professional development funding, print collection budgets, and program budgets.

However, studies relating to the pandemic published in the selected international journals were less than those published in selected Chinese journals. Such phenomenon may be due to a) the fact that the pandemic first outbreak in China, resulting in Chinese scholars paying attention to this topic earlier than international scholars; b) international peer-reviewed journals may be more cautious about publishing-related studies. The current study's researchers conducted another study on U.S. public libraries' responses to the outbreak in the early days worldwide and submitted it to an international journal. It was rejected, for the pandemic situation was unclear that it was impossible to determine whether the study was rigorous. Subsequently, a longitudinal research method was used to modify the study and published in an international journal several months later.

A guest editor of the *Journal of Academic Librarianship*, da Silva (2020), reflected on a large number of predatory publications on COVID-19 and pointed a mix of poor science, sloppy peer review, superficial editorial handling, and exploitative behavior had provided fertile ground for predatory publishing to expand and thrive even among indexed journals, threatening academic authority and social order. Such a situation also deserves the Chinese academic library journal's vigilance.

## Limitations and future research

Six top journals related to academic librarianship in China and internationally were selected as a sample in this study without including other journals with less impact, which may lead

to bias in the results. Researchers can apply the longitudinal research method to examine the research trend change.

## Conclusion

This study investigates the top authors and the most frequent keywords in selected journals about academic librarianship, and conducts a keywords network analysis and cluster analysis to investigate the frequent keywords and themes that appeared in research articles in top journals relating to academic librarianship published in China and internationally from 2016 to 2020. With such methods, researchers aimed to understand the current development in the field in the past five years and make comparisons. The results indicated that researchers in mainland China were less active in international journal publications. The research in China appeared to emphasize reading promotions, space construction and applying new technology in service to cope with external challenges and improve service quality. International journals focus more on interdisciplinary and professional communication. The study's findings advocate academic libraries in China to play an essential role in interdisciplinary research and communication with international scholars.

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