Knowledge landscape of open access in academic libraries through bibliometric analysis 2020-2025

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ABSTRACT

Background: The digital era transformation has changed the role of academic libraries, which initially served as repositories for physical collections and have evolved into facilitators of digital information access and initiators of change in open-access management. The COVID-19 pandemic accelerated the adoption of open access due to the urgent need for unrestricted access to scientific information. **Purpose:** This study aimed to map the knowledge landscape of open access in academic libraries through a comprehensive bibliometric approach for 2020-2025, identifying dominant themes, intellectual structures, collaboration patterns, and emerging trends. **Methods:** Data were collected from the Scopus database using the TITLE-ABS-KEY search strategy ("open access" AND "academic library"). Analysis was conducted using Bibliometrix in R Statistical Software version 4.3.0 and Biblioshiny, covering Conceptual Structure Analysis, Multiple Correspondence Analysis, Intellectual Structure Analysis, Social Structure Analysis, and Thematic Evolution Analysis. **Results:** The analysis showed that 118 documents from 57 publication sources were dominated by collaborative research (72.1%), with limited international collaboration (6.78%). Publication productivity peaked in 2020 (26 articles) and then declined continuously. The United States dominated with 114 citations, followed by Pakistan (36) and South Africa (33). Institutional repositories, digital libraries, and scholarly communication have emerged as central themes connecting various aspects of research. **Conclusion:** The open-access knowledge landscape has evolved from a focus on technical infrastructure to a strategic, holistic approach. **Implications:** This research provides practical guidance for librarians and policymakers to develop more effective strategies in the digital transformation era.

Keywords: Academic libraries; Bibliometric analysis; Institutional repositories; Open access; Scholarly communication

INTRODUCTION

The transformation of open-access activities into academic activities also accelerates the current scientific publication process, which has become a paradigm and has developed significantly in recent years. Academic libraries are crucial for providing information-related service infrastructure

in higher education institutions and for implementing and facilitating open access to information.

It is also revealed that libraries can transform and identify institutional values, and improve communication with administration and faculty to enhance internal capacity development and address the challenges of evolving scientific publishing activities, which continue to evolve toward open access (Schlak & Macklin, 2024). This highlights the strategic role of academic libraries as agents of change, bridging institutional goals with global trends in scholarly communication. Through this transformation, libraries not only support the dissemination of research but also strengthen the culture of openness and collaboration within higher education institutions. Acting as catalysts connecting researchers, administrators, and policymakers, libraries help create ecosystems where information flows more freely and equitably. Today, libraries serve as facilitators and innovators, ensuring that open access practices extend beyond information delivery to include capacity building, digital literacy, and long-term knowledge preservation, thereby fostering sustainable academic growth.

Furthermore, academic libraries are undergoing a digital revolution that affects the creation, distribution, and access to scientific information. The role of academic libraries is not only to serve as repositories of physical collections but also to transform into dynamic facilitators of digital information access (Goddard & Brundy, 2024; Hadad & Aharony, 2024). Recent research indicates that academic libraries have undergone a significant transformation, evolving from their traditional role as content access providers to becoming leaders of change in the scholarly communication ecosystem (Goddard & Brundy, 2024; Hadad & Aharony, 2024). In this new capacity, libraries actively manage open-access agreements, guide researchers through the open publication process, and provide essential facilities to support the transition to a more open and sustainable publishing model. This transformation underscores the libraries' proactive role in shaping institutional strategies for knowledge dissemination while ensuring that open-access initiatives align with the broader goals of transparency and sustainability in scholarly communication. In this role, libraries are no longer passive service units but active contributors to institutional policymaking, research evaluation, and innovation management. By integrating digital technologies, metadata standards, and open science principles, libraries promote the equitable distribution of knowledge while maintaining academic integrity and long-term data stewardship. Their active involvement ensures that the open access movement not only enhances research visibility but also strengthens the ethical and sustainable foundations of the global scholarly ecosystem.

Information and communication technology development provides opportunities for academic libraries to offer innovative services, including institutional repositories, open-access policy advocacy within institutions, and open-access publishing services. During the COVID-19 pandemic, academic libraries provided open access to meet the urgent need for unlimited access to scientific information, especially health-related information. This is further supported by findings that open access has proven crucial during the COVID-19 period, providing fast and free access, particularly to vital health

information for frontline medical personnel worldwide, and addressing geographic and economic barriers to quality information (Christianson et al., 2025).

Second, the emergence of disruptive technologies, such as artificial intelligence and blockchain, presents both opportunities and challenges that require evidence-based strategic planning. Third, increasing pressure from funding agencies and institutional policies mandating open-access publication creates an imperative for libraries to understand best practices and implementation models. Fourth, the widening digital divide between developed and developing countries in open access adoption requires a comprehensive understanding of global collaboration patterns to ensure equitable knowledge distribution. Without a systematic mapping of the current knowledge landscape, academic libraries risk implementing fragmented strategies that fail to address these interconnected challenges effectively.

The growing literature on open access in academic libraries indicates that a small group of productive researchers and elite institutions, including those from China and the United States, dominate publications on this topic. Still, some findings suggest that collaboration between researchers has decreased. This phenomenon creates significant geographic and disciplinary gaps and suggests that developing countries have made minimal contributions (La-Cruz-orbe et al., 2025).

However, in the context of academic libraries, comprehensive mapping is needed to understand patterns, trends, and development directions in this field. Bibliometric mapping plays an essential role in understanding the research landscape by visualizing the evolution of topics and distinguishing saturated areas

from emerging fields, thereby guiding researchers toward future strategic directions (Mariyamah et al., 2024; Rullyana, 2024; Salmia et al., 2023).

Given the complexity of open access development in academic libraries, systematic bibliometric analysis is necessary to identify dominant themes, collaboration patterns, and emerging trends in this specific domain. Such analysis evaluates research impact using citation metrics and bibliographic data, capturing the field's overall structure while revealing its development trajectory (Fan et al., 2025; Hasugian & Nadeak, 2024).

This study aimed to map the landscape of open-access knowledge in academic libraries through a comprehensive bibliometric approach from 2020 to 2025. This study identified dominant themes, intellectual structures, collaboration patterns, and emerging trends in discussions about open access in academic libraries. This study was expected to provide theoretical contributions to understanding this field's conceptual evolution and provide practical guidance for librarians, library managers, and policymakers to develop effective open access strategies during the digital transformation phase. The writing structure of this article began with an introduction, followed by research methods, results, discussion, and conclusion.

RESEARCH METHODS

This study employed a bibliometric approach to map the open-access knowledge landscape in academic libraries from 2020 to 2025. The Scopus database was selected as the data source due to its broader coverage of peer-reviewed literature in library science disciplines,

comprehensive bibliographic metadata, and export compatibility with bibliometric analysis tools. Data analysis was conducted using the Bibliometrix package in R Statistical Software version 4.3.0, while data visualization was performed through Biblioshiny, a web-based graphical interface that generates interactive network visualizations, thematic maps, three-field plots, and Bradford's Law distributions to identify research trends and collaboration patterns (Mitha & Omarsaib, 2025; Silva et al., 2022).

Bibliographic data collection was carried out through the Scopus database in the period 2020-2025. The search strategy used was a combination of keywords: TITLE-ABS-KEY ("open access" AND "academic library") AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (OA , "all")). The use of open-access article criteria in the academic library landscape encompasses journal articles published between 2020 and 2025, written in various languages, and primarily in the social sciences, drawn from articles from various countries. In addition, open-access articles were used in the Scopus database. The Scopus search returned 57 results, yielding 118 documents that met the study's criteria.

The study conducted a bibliometric analysis using the Bibliometrix package within the R Statistical Software environment version 4.3.0. Bibliometrix was used and chosen because it can perform comprehensive bibliometric analysis, ranging from descriptive analysis to sophisticated science mapping. The analysis process began with data cleaning to eliminate duplicate records and standardize the formatting of author names and institutional affiliations. Data analysis used bibliometric software to identify patterns of researcher collaboration, research topic trends, and citation networks.

The analysis method used three types of structural analysis: Conceptual Structure Analysis, Multiple Correspondence Analysis (MCA), and Correspondence Analysis, to map conceptual relationships between research themes. Intellectual Structure Analysis analyzed co-citations to identify theoretical foundations and key references in open-access knowledge. Social Structure Analysis explores collaborative networks between authors, institutions, and countries to understand social dynamics within the research community. Thematic Evolution Analysis was used to track the development of research themes from 2020 to 2025, providing emerging, evolving, or declining themes. Clustering analysis was applied through keyword co-occurrence networks to identify groups of interrelated topics and collaboration networks to map patterns of cooperation between researchers. All visualizations and statistical analyses were automatically generated by Biblioshiny, using default parameter settings optimized for bibliometric analysis.

RESULTS AND DISCUSSION

This section presented the findings of the bibliometric analysis aligned with the research objectives, which aimed to identify dominant themes, intellectual structures, collaboration patterns, and emerging trends in open access research in academic libraries during the period 2020-2025. The analysis began with a data overview, followed by a systematic examination of each research objective, and concluded with a comprehensive mapping of the knowledge landscape.

According to bibliometric analysis, the results included 118 documents published acrossd 57 publication sources between 2020 and 2025, with an average document age of 2.86 years and a citation rate of 3.72 per document. This indicated an active academic dialogue within the open-access domain of academic libraries. The dataset presented results from peer-reviewed articles involving 263 authors, highlighting the dominant collaboration pattern (72.1% collaborative work vs 27.9% single authorship). The average number of co-authors per document was 2.42, and the international collaboration rate was 6.78%. This indicated a strong preference for small-scale, primarily domestic or regional collaborative research. The high terminological diversity, as reflected in 379 author keywords and 223 Keywords Plus, indicated active conceptual evolution in this field. At the same time, the equitable distribution of publications across multiple sources might suggest a healthy and diverse publishing ecosystem without the dominance of a single source.

Table 1

Data Overview: Main Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2020:2025
Sources (Journals, Books, etc.)	57
Documents	118
Annual Growth Rate %	-15.81
Document Average Age	2.86
Average citations per doc	3.72
References	3879
DOCUMENT CONTENTS	
Keywords Plus (EN)	223
Author's Keywords (DE)	379
AUTHORS	
Authors	263
Authors of single-authored docs	32
AUTHORS COLLABORATION	
Single-authored docs	33
Co-Authors per Doc	2.42
International co-authorships %	6.78
DOCUMENT TYPES	
Article	118

Source: Result of data processing from Biblioshiny, 2025

A healthy publishing ecosystem, as identified in previous research, required a balance between various publication channels and knowledge dissemination. This ecosystem should encompass bibliodiversity, featuring a diverse of open-access pathways, and provide simulations, including institutional repositories, open-access journals, preprints, and traditional publication pathways, to ensure the representation of emerging researchers and new fields of knowledge. To create a healthy ecosystem, a coordinated national approach with

long-term infrastructure support, sustainable funding, and a commitment to maintaining community-regulated publication channels is necessary, as these channels serve as the basis for equitable and sustainable knowledge dissemination. This indicates that an open-access publishing ecosystem within academic libraries can be considered robust (Catterall et al., 2025; Schultz & Pritychenko, 2024).

The following discussion focused on the level of open-access-related scientific productivity in academic libraries during the period 2020-2025, which exhibited fluctuations with a decreasing trend. Of the 118 articles analyzed, 2020 had the highest productivity, with 26 publications, possibly reflecting increased awareness of and the importance of open access during the COVID-19 pandemic. The analysis also showed that productivity decreased in 2021 to 20 articles, then rose again in 2022 to 24 publications. However, it experienced a consistent decline in 2023 (19 articles) and 2024 (18 articles). While 2025 data showed 11 articles through the mid-year observation period, this indicated a continuous downward trend, with an average annual productivity of 19.7 articles per year. This publication productivity pattern suggested that open access in academic libraries remained a relevant trend. Still, research intensity has decreased after reaching a peak at the beginning of the pandemic. This is also evident in the findings, indicating that the COVID-19 pandemic has led to a significant increase in open access, prompting major publishers to make their content open access to accelerate the publication of researchers' findings (Višić, 2022).
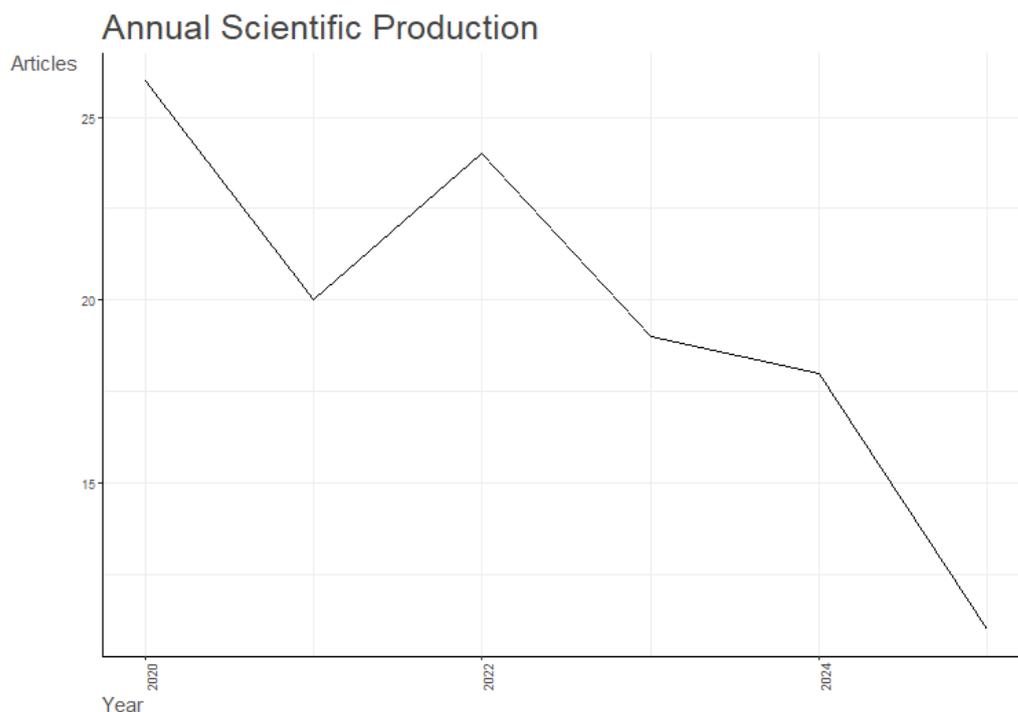

Figure 1. Annual Scientific Production
Source: Biblioshiny, 2025

Next is a depiction of the discussion on visualizing the relationships among Authors, Keywords, and Sources, or other combinations, to illustrate the "landscape mapping" described in the article's title. Based on the bibliometric analysis

demonstrated in the alluvial diagram, research on open access in academic libraries from 2020 to 2025 exhibits a diverse distribution of research topics, with a primary focus on several key areas. The diagram indicates that research on open access in academic libraries encompasses various aspects, including technological infrastructure, open access

policies, and practical implementation in academic library environments. This visual data flow illustrates the strong connection between concepts such as digital repositories, open-access rules, academic libraries, and scholarly communication, indicating that research in this field tends to be multidisciplinary and interrelated.
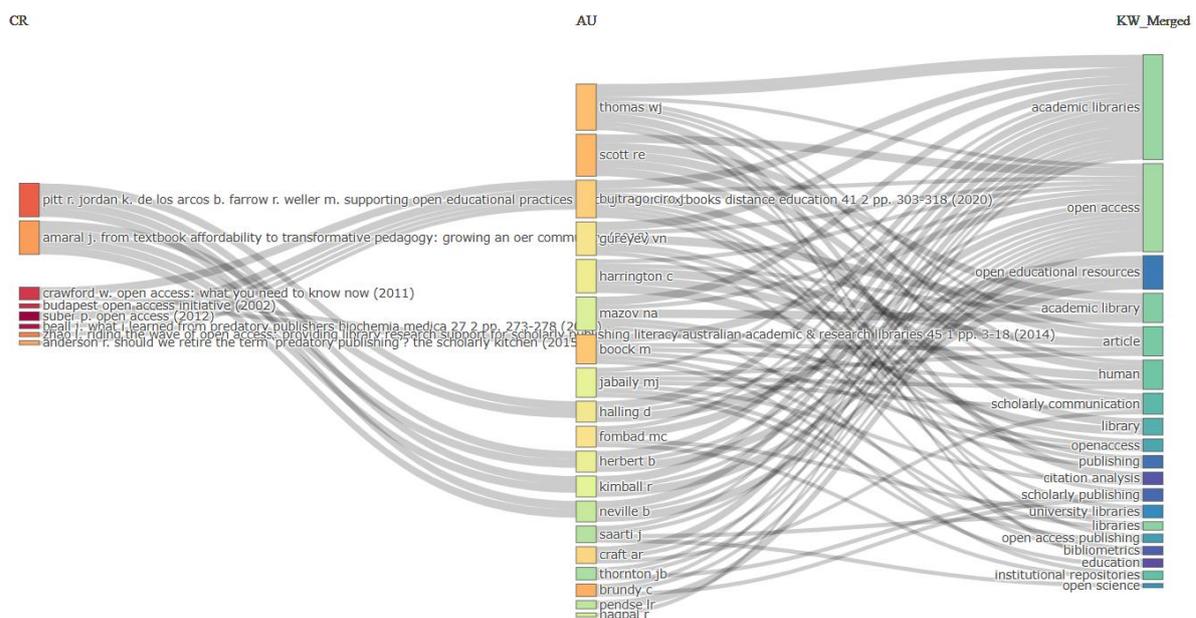

Figure 2. Three-Field Plot
Source: Biblioshiny, 2025

The flow pattern seen in Figure 2 also suggests a thematic evolution in open access research, where topics related to digital collection management have developed into more contemporary issues such as the sustainability of open access platforms, the integration of new technologies, and the impact of institutional policies on the implementation of open access in academic library environments. The visual results of the landscape mapping from the title of this article are also in line with several research publications that show that open access is

indeed related to institutional repositories as storage and dissemination infrastructure, scholarly communication as a scientific communication system that is evolving from traditional formats to multimedia (podcasts), and is also related to policies, integrity handling, altmetrics as alternative metrics, platform interoperability, and also the transformation of the role of libraries in supporting a more dynamic and transparent scientific communication ecosystem (Bordignon, 2025; Powell et al., 2025; Symulevich et al., 2025).
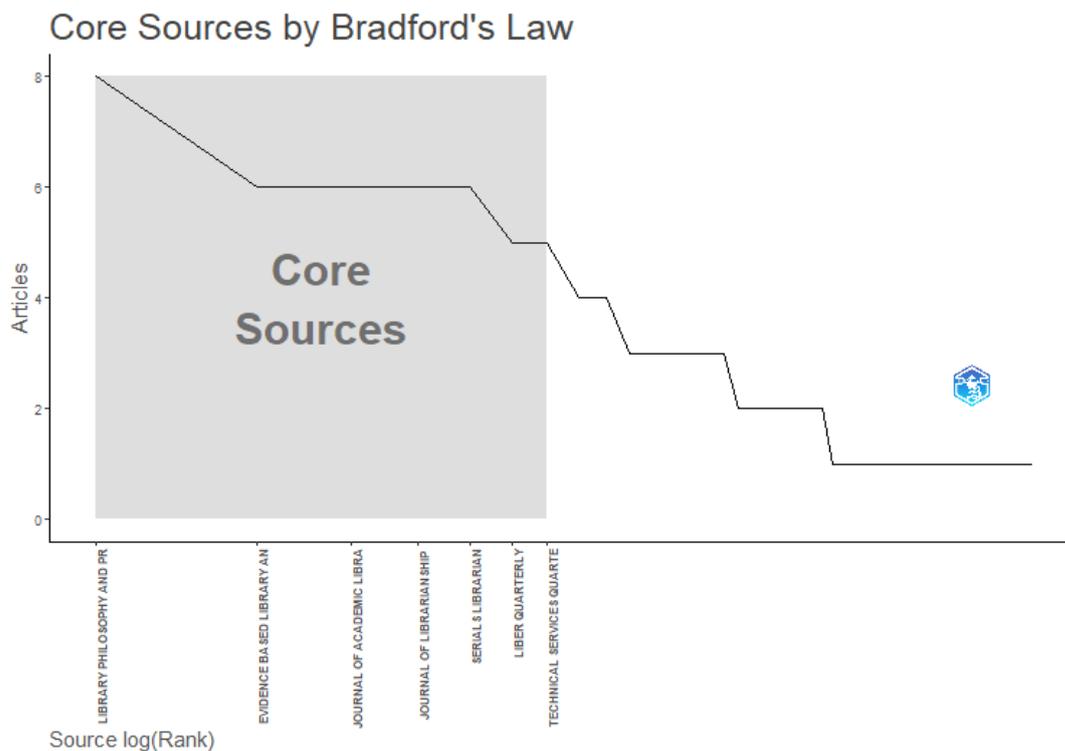
Figure 3. Bradford's Law Analysis
Source: Biblioshiny, 2025

Furthermore, when associated with the distribution of core sources based on Bradford's Law in Figure 3, the findings show that there is a typical pattern of publication concentration in the open access academic library literature, namely that a small number of journals contribute disproportionately to the total publications in this field. The Core Sources Zone features eight articles that demonstrate the dominance of several specialist journals, including Library Philosophy and Practice, Evidence-Based Library and Information Practice, and the Journal of Academic Librarianship, in open-access research in academic libraries. These journals have consistently published high-quality works. However, there is a drastic decrease in the number of articles as the source ranking increases (from 8 articles in the core zone to less than two articles in the outer zone), which shows that the validity of Bradford's Law in the context of library bibliometrics, and

provide an indication that the topic of open access is increasingly relevant in the period 2020-2025. Quality publications are still concentrated in journals that have a specific focus on academic library practices and policies.

To complement the source distribution analysis, an examination of citation impact revealed the intellectual influence of open access research in academic libraries. The average citation rate of 3.72 per document indicated moderate scholarly engagement, though this metric demonstrated considerable variation across the corpus. Citation patterns suggested that while the topic of open access consistently attracted attention, the field had not yet produced landmark studies with exceptionally high citation counts that would signal a paradigmatic shift in the discipline.

An analysis of the most cited articles revealed several dominant research themes that resonated with the academic

community. Studies focused on the implementation of institutional repositories, the adoption of open-access policies, and the economic sustainability of open-access models have garnered the most citations, reflecting persistent concerns about practical implementation challenges. These citations indicated that practitioners and researchers prioritized empirical evidence and case studies that offered actionable insights over purely theoretical frameworks. The relatively even distribution of citations across multiple works, rather than concentration in a few highly cited papers, further supported the earlier observation that this field remained in a developmental stage without established canonical texts.

Temporal citation patterns also warranted attention. Articles published in 2020-2021 accumulated more citations than more recent publications, which is expected, given the time lag in citation accumulation. However, the analysis of citation half-life suggested that open access literature in academic libraries maintained relevance for approximately 3-4 years before citation rates declined, indicating a field characterized by rapid knowledge turnover and emerging trends. This relatively short citation half-life underscored the dynamic nature of open access implementation, in which technological advances and policy changes quickly render previous approaches outdated.

Furthermore, the low rate of international co-authorship (6.78%) correlated with citation patterns, in which domestically produced research was cited primarily in regional or national contexts. This suggested opportunities to enhance global research impact through increased international collaboration and cross-cultural comparative studies, thereby broadening the applicability and citation reach of open-access research in academic libraries.
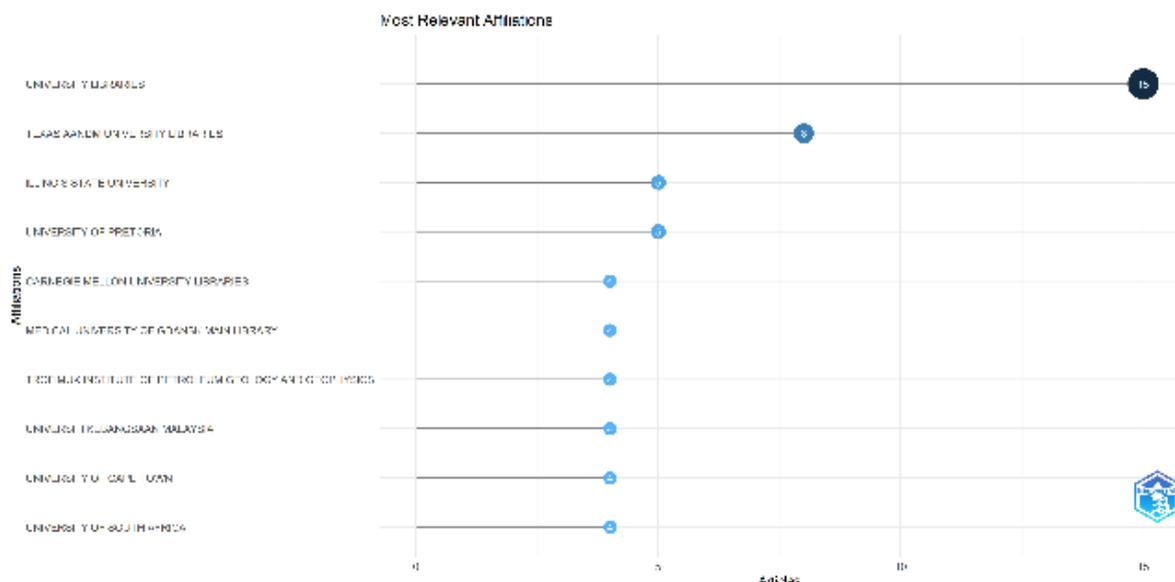

Figure 4. Analysis of Relevance, Country, and Affiliation between Authors
Source: Biblioshiny, 2025

Entering into the discussion of the results of mapping the evolution of author productivity along with affiliations and countries of origin of authors related to the publication of articles discussing open access in the scope of academic libraries, it

was seen that the results of research on open access in academic libraries showed the dominance of certain institutions and countries in the knowledge landscape for the period 2020-2025. Nevertheless. the United States led significantly in the number of citations (114), followed by Pakistan (36), South Africa (33), and Canada (32), indicating that while the U.S. remained a major research center, there were substantial contributions from other developing countries, including Pakistan and South Africa, which indicated global attention to open access issues.

Regarding institutional affiliation, "University Libraries" generally dominated with 15 articles, followed by Texas A&M University Libraries (8 articles), and several other universities, including Illinois State University, the University of Pretoria, and Carnegie Mellon University Libraries, which also made significant contributions. The relatively even distribution of authors with several leading researchers (Brundy C, Scott RE, and Thomas WJ, each with 3 papers) showed that this field was still in its infancy, with no single researcher dominating, indicating broad collaboration

opportunities and the need for more interdisciplinary research in optimizing the implementation of open access in academic libraries.

In line with research collaboration opportunities with various interdisciplinary institutions, it is also critical to optimize modern research activities, as research problems are increasingly complex and not limited to a single discipline. Challenges related to cultural barriers across disciplines, science, and the humanities can be overcome with appropriate strategies, such as increasing cross-faculty networks and using indirect communication. Research institutions should develop systems that support international collaboration and high-quality publications, and adjust these systems to better align with industry needs and the Sustainable Development Goals. A multidisciplinary collaborative approach to model activities can improve research quality, strengthen the institution's reputation, and create a lasting impact on society (Alfirević et al., 2025; Dalton et al., 2021; Newman, 2025).

Figure 5. Network Co-occurrence Analysis
Source: Biblioshiny, 2025

In addition to answering questions about the open-access knowledge landscape in academic libraries, Figure 5, demonstrates that research conducted in the academic library environment reveals a complex, interconnected knowledge landscape during the period 2020-2025. This knowledge map depicts the concepts of "open access" and "academic libraries" as central points connecting various research clusters, and shows the crucial role of academic libraries as key facilitators in the open access ecosystem. The network's distribution of nodes and connections illustrates the evolution of research focused on the technical aspects of open access implementation. It extends to policy discussions, digital collection

management, and institutional strategies.

The close connections between clusters showsthat research in this field has developed into an interdisciplinary domain integrating perspectives from library science, information technology, and knowledge management, with a trend toward more collaborative. sustainable service models that favor open access to scientific publications. This is also corroborated by the discovery that library science has transformed from simply book management to a field integrated with information technology, knowledge management, informatics, human resource management, law, education, and various socio-cultural aspects of the modern information society.
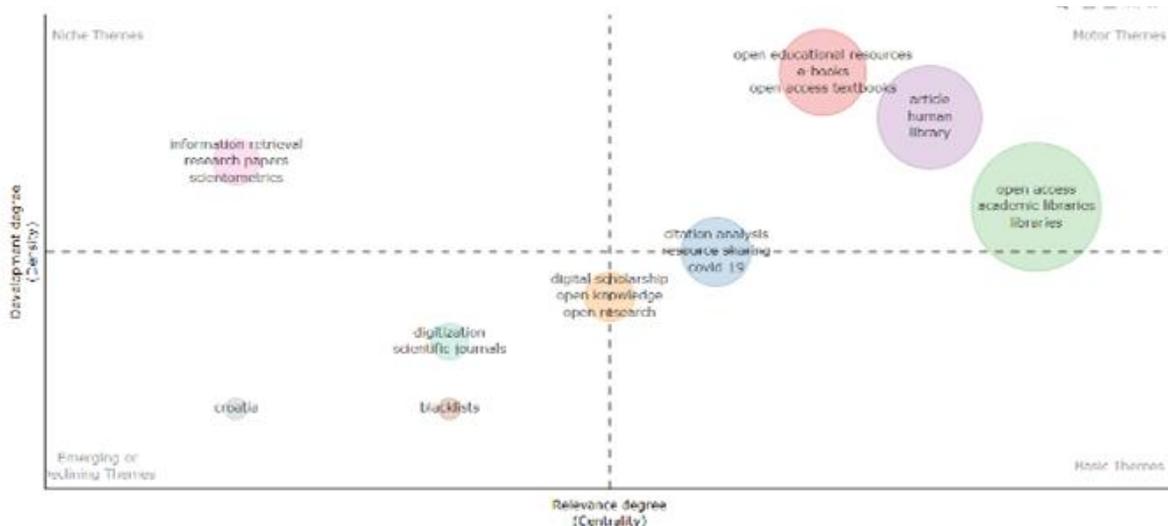

Figure 6. Thematic Map Analysis Source: Biblioshiny, 2025

On the other hand, the study of open access in academic libraries for the period 2020-2025, as shown in Figure 6, also reveals the dynamic evolution of themes, which are divided into four strategic quadrants with distinct characteristics. The upper-left quadrant indicates emerging but isolated themes, such as information and user behavior research. In contrast, the upper-right quadrant

displays mature and strongly interconnected core themes, such as "open access repositories", "academic libraries", and "digital libraries", which are the main drivers of research in this field. The position of "blockchain" in the lower- left quadrant indicates that the themes are still in the early stages of exploration, characterized by low density. In comparison, the lower-right quadrant

shows established core themes but tend to decline in relevance.

This distribution pattern suggests that open access research in academic libraries has entered a consolidation phase, in which the primary focus shifts from basic infrastructure development to service optimization and the integration of new technologies, with institutional repositories and digital libraries as central elements that connect various aspects of research within the open access ecosystem. The shift in open access research, which addresses not only infrastructure issues but also shifts related to the optimization of open access services, is also reflected in several recent studies that suggest that academic libraries have now placed the optimization of open access services as a top priority in digital transformation, as shown by the implementation of several academic libraries that provide free and online access to thousands of academic collections to support learning and research without time and place restrictions (Amelia & Ananda, 2024; Rizky Pratama & ., 2024; Utami, 2022).

Overall, the transformation of the knowledge landscape indicates a shift from a technical-operational to a more strategic, holistic approach to managing academic information resources. The emergence of new themes, such as blockchain, suggests that the research community is beginning to explore disruptive technologies to address authentication challenges, long-term preservation, and transparency in scientific publications. Furthermore, the concentration of mature themes indicates that academic libraries have established a solid foundation for implementing open access, but now face new challenges in systems integration, interoperability, and business model sustainability. The presented strategic map hints that future

research will increasingly focus on developing more adaptive and sustainable solutions, emphasizing inter-institutional collaboration and protocol standardization to create a more efficient and inclusive open-access ecosystem.

CONCLUSION

This bibliometric investigation of 118 Scopus-indexed documents (2020-2025) reveals that open-access research in academic libraries has evolved from a technical and operational concern to a strategic, holistic approaches to scholarly information management. An analysis of the intellectual structure identifies institutional repositories, digital libraries, and scholarly communication as central pillars, with Library Philosophy and Practice, Evidence-Based Library and Information Practice, and the Journal of Academic Librarianship established as core journals following Bradford's Law of distribution. Collaboration patterns demonstrate a geographic concentration led by the United States (114 citations) and a strong co-authorship preferences (72.1% multi-authored publications), yet international cooperation remains limited to 6.78%, indicating substantial untapped potential for global research networks. The temporal analysis reveals a peak in publications during the COVID-19 pandemic, followed by a decline through 2024-2025, suggesting a transition from exploratory studies to implementation-focused initiatives. This study acknowledges limitations including reliance on the Scopus database and a restricted 2020-2025 timeframe, while future research should investigate strategies to strengthen international collaborative networks between developed and developing countries and explore

practical integration frameworks for emerging technologies in academic library contexts.

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AUTHORS CONTRIBUTIONS

All authors have made substantial contributions to the study conception and design, data analysis, manuscript preparation, and approved the final version of the manuscript. MPB: Writing (original draft), Writing (review & editing), Conceptualization, Methodology, Formal Analysis, Data Curation. IY: Software development, investigation, data curation, and writing the original draft. SNA: Formal Analysis, Data Curation.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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DATA AVAILABILITY

Bibliometric data generated during this study were derived from the Scopus database, and the processed data are included in the manuscript.

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