

Research Patterns on Information Quality in Library Services: Bibliometric Evidence

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ABSTRACT: This study investigates global research patterns on information quality in library services through a bibliometric analysis of 75 scholarly documents published between 2015 and 2025. Amid increasing digital transformation in libraries, ensuring the quality of information that defined by accuracy, relevance, timeliness, and accessibility has become crucial for effective service delivery. Despite rising scholarly interest, the field remains fragmented, with limited visual or data-driven syntheses. This study aims to fill that gap by analyzing publication trends, key contributors, collaborative networks, and thematic structures using Scopus-indexed data and bibliometric tools such as VOSviewer. The results reveal a significant increase in publication activity after 2020, reflecting a post-pandemic digital pivot in library systems. A small number of prolific authors and regionally concentrated co-authorship clusters dominate the research output, while cross-regional collaborations remain limited. Thematic analysis identifies four dominant research strands user satisfaction, technical systems (quality control and machine learning), digital content platforms, and contextual roles of librarians. Temporal visualization suggests an evolution from foundational metadata concerns to algorithmic and AI-driven approaches. This study contributes a structured knowledge map that not only synthesizes fragmented literature but also offers strategic insight into future research and practice in managing information quality in increasingly digital library environments.

KEYWORDS: Information quality; Library services; Bibliometric analysis

I. INTRODUCTION

Libraries today are no longer mere repositories of physical books but are evolving into dynamic knowledge hubs that play a role in supporting education, social inclusion, and access to trustworthy information (Halaburagi & Mukarambi, 2024). As services and resources become increasingly digitized, the quality of information provided by libraries has become a central concern (Laumer, Maier, & Weitzel, 2017). Information quality that defined by dimensions such as accuracy, relevance, timeliness, completeness, and accessibility, is widely recognized as a key determinant of user satisfaction, service efficiency, and institutional credibility (Anjarwati & Apollo, 2019). As libraries adapt to digital transformation and strive to meet evolving user expectations, the need for high-quality information has become even more pressing. The rapid growth of digital content, open-access platforms, and user-generated resources has introduced both opportunities and challenges in maintaining information reliability and consistency. In library environments, especially those operating under government or municipal structures, the assurance of information quality directly affects not only user trust but also the credibility and legitimacy of library services as public institutions (Li & Shang, 2020). Ensuring the quality of information is not merely a technical or operational issue; it is a strategic concern that intersects with policy, technology, and user experience.

Within the field of Library and Information Science, information quality has been studied from multiple perspectives which are technical (metadata accuracy, cataloguing standards), organizational (information policies and governance), and user-centric (perceived usefulness and credibility) (Aydın Çolak & Eroğlu, 2025). Prior studies have explored the role of information quality in enhancing digital collections (Ali et al., 2023), improving library service quality (Ahmad & Abawajy, 2014), and facilitating user engagement in both academic and public library settings (Narendra, 2018). Moreover, recent technological advancements such as artificial intelligence have pushed libraries to reassess how information quality impacts digital service innovation (Nicholson, 2019). Despite growing scholarly interest, the field remains fragmented, with limited attempts to consolidate existing knowledge in a structured, visual manner. While some studies have adopted conceptual or narrative review approaches, there has been no comprehensive bibliometric analysis specifically focused on information quality within the context of library services. Bibliometric

Research Patterns on Information Quality in Library Services: Bibliometric Evidence

analysis provides a powerful method for identifying research trends, intellectual structures, and thematic evolutions (Kumar, 2025), and has already proven useful in adjacent areas such as library service quality and digital literacy.

Given the interdisciplinary nature of information quality, which intersects with information science, management, user behavior, and digital infrastructure, a structured and data-driven approach is essential to capture the breadth and evolution of scholarship in this domain. Bibliometric mapping offers more than just publication counts (Kumar, 2025); it reveals patterns of collaboration, core thematic clusters, and emerging areas of inquiry that may otherwise remain unnoticed in traditional reviews. Applying this method specifically to the study of information quality in libraries can uncover the intellectual landscape of the field and guide both academics and practitioners in shaping evidence-based strategies and research agendas. Although bibliometric studies have been applied to various topics in Library and Information Science, such as service quality (Ashiq, Ur Rehman, Muneeb, & Ahmad, 2022), no study to date has systematically mapped global research patterns specifically on "information quality in library services." This gap limits our ability to understand the intellectual foundations of the field, identify leading contributors, or anticipate emerging research frontiers. A bibliometric overview is needed to synthesize existing literature, reveal collaborative networks, and provide strategic insight for future research and practice.

To address the research gap identified in the literature and to guide the bibliometric exploration of information quality in library services, this study is driven by the following research questions: (1) What are the publication trends and patterns in the field of information quality in library services over the last decade? (2) Who are the most influential authors, institutions, and journals contributing to this field? (3) What are the dominant themes and keyword clusters in the literature on information quality and library services? This study aims to conduct a bibliometric analysis of global scholarly publications from 2015 to 2025 that focus on information quality in library services. The objective is to map publication trends, identify key contributors and collaborations, and explore the thematic structure of the field using visualization tools such as VOSviewer. The findings are expected to contribute a data-driven knowledge map that supports future academic research and practical improvements in library service design.

II. RESEARCH METHODS

This study employs a quantitative bibliometric analysis approach to systematically examine the global scholarly literature on information quality in library services. Bibliometric methods are particularly suited for mapping publication patterns, identifying influential contributors, and visualizing thematic structures within a research domain (José de Oliveira, Francisco da Silva, Juliani, César Ferreira Motta Barbosa, & Vieira Nunes, 2019). The design involves data collection from a reputable scientific database, followed by performance analysis and science mapping using bibliometric software. By adopting a bibliometric approach, this study seeks to move beyond anecdotal or narrative understandings and provide a quantifiable, visual, and reproducible overview of how the topic of information quality in library services has evolved over time. Unlike traditional literature reviews, bibliometric analysis enables researchers to identify underlying patterns, such as co-authorship networks, keyword co-occurrences, and citation dynamics, which reveal the structure and maturity of the field (Kumar, 2025). This approach is especially valuable in emerging or fragmented domains, where synthesizing dispersed knowledge is critical for shaping future research directions and policy frameworks.

A. Data Source and Search Strategy

The data were retrieved from **Scopus**, one of the largest and most widely used abstract and citation databases for peer-reviewed literature. Scopus was chosen due to its broad coverage of high-quality journals in the fields of library and information science, as well as its compatibility with bibliometric tools such as VOSviewer.

The search query used to collect relevant publications was as follows:

TITLE-ABS-KEY ("information quality" AND "library service*" OR "library services")

To ensure the relevance and quality of the dataset, the search query was carefully constructed to retrieve documents that explicitly addressed the intersection between information quality and library services. The search was limited to publications from 2015 to 2025, representing the most recent decade of scholarly activity. This time frame was selected to capture current developments and thematic shifts in the field, particularly in response to the rapid digital transformation of libraries during and after the COVID-19 pandemic, a period that saw increased research output in digital information systems (Ashiq, Jabeen, & Mahmood, 2022). Only journal articles and conference proceedings were included, as these document types represent peer-reviewed and academically rigorous contributions that are commonly used in bibliometric analyses to ensure data consistency and scientific validity (Lim, Kumar, & Donthu, 2024). The search was further narrowed to publications written in English, the dominant language of international scholarly communication, ensuring broader accessibility and comparability of results across regions (MacFarlane, Russell-Rose, & Shokraneh, 2022). Finally, to reflect the interdisciplinary nature of the topic, the search was limited to works indexed under Social Sciences, Computer Science, and Information Systems, which collectively encompass the technical,

Research Patterns on Information Quality in Library Services: Bibliometric Evidence

organizational, and user-oriented dimensions of information quality in library environments (Gusenbauer & Haddaway, 2020). The final dataset, exported in .RIS formats, included **75** publications after removing duplicates and irrelevant records through manual screening.

B. Data Analysis Tools

The tool used for bibliometric analysis is **VOSviewer** (Kumar, 2025) for constructing and visualizing bibliometric networks such as co-authorship, co-occurrence of keywords, and citation networks. To ensure a comprehensive understanding of the collected data, the analysis in this study was carried out through a series of structured bibliometric procedures, combining performance analysis and science mapping techniques. To address the research questions and achieve the study's objectives, a series of five distinct bibliometric techniques were employed, each offering complementary insights into different dimensions of the scholarly landscape surrounding information quality in library services. First, a descriptive analysis was conducted to identify annual publication trends, the most productive countries, prolific authors, frequently cited journals, and key citation metrics, an approach widely recommended for assessing scientific productivity and research impact. Second, a co-authorship analysis was performed to map collaborative patterns among authors and institutions, helping to visualize the structure and intensity of academic networks. Third, the study applied a keyword co-occurrence analysis to uncover major thematic areas and research clusters by analyzing the frequency and co-appearance of keywords, which is a common method for revealing conceptual linkages within a field. Fourth, a citation and co-citation analysis was used to identify the most influential works and map the intellectual foundations of the domain, based on the frequency with which publications are cited individually or together. Lastly, a thematic evolution analysis was carried out using the overlay visualization feature in VOSviewer, which enabled the tracking of emerging and declining research topics across the publication timeline. Together, these techniques provided a comprehensive, multi-dimensional understanding of how the discourse on information quality in library services has evolved over the past decade.

III. RESULT AND DISCUSSION

A. Trends and Patterns of Publication (2015–2025)

A total of **75 documents** related to *information quality in library services* were indexed in **Scopus** during the period **2015 to 2025**, consisting of **81.3% peer-reviewed journal articles** and **18.7% conference proceedings**. This distribution reflects a strong preference among researchers to publish in formal academic outlets, indicating the perceived importance and maturity of the topic within the field of Library and Information Science. The data also shows that conference papers, while fewer in number, likely serve as platforms for early-stage conceptual discussions or applied case studies, particularly relevant in a field that intersects both theory and library practice. Overall, this composition suggests that scholarly engagement with the subject is well-grounded in academically recognized research pathways, enabling sustained theoretical development and dissemination (Kunisch, Denyer, Bartunek, Menz, & Cardinal, 2023).

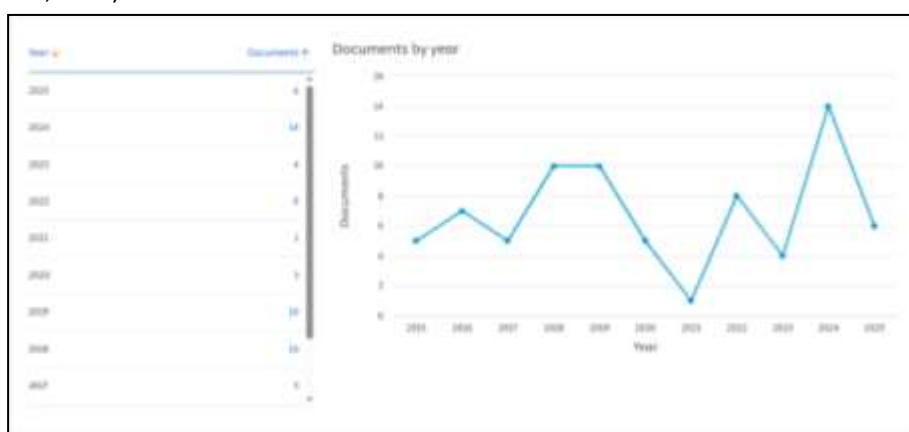


Figure 1. Document by Year

Source: Scopus.com

Over the span of the decade, the **annual publication trend** reveals a fluctuating yet progressively intensifying focus on the topic. The **highest research output** occurred in **2024**, with a total of **14 publications**, followed closely by **2023 with 10 documents**. This recent surge may be attributed to an increasing global recognition of the strategic value of information quality in shaping equitable and responsive library services in the digital age. Prior peaks in **2018 and 2019**, each with **10 publications**, indicate that the academic conversation around IQ in libraries was already gaining traction in the pre-pandemic period. By contrast, **2015 (1**

Research Patterns on Information Quality in Library Services: Bibliometric Evidence

document) and **2016 (5 documents)** mark a period of low output, perhaps reflecting the field's early-stage discourse, where the concept of information quality in library contexts was still nascent and primarily addressed within broader information systems literature. The pattern suggests that scholarly momentum accelerated particularly after 2020, aligning with broader digital transformation efforts across library systems worldwide.

A **notable decline** in publication activity occurred in **2020 (5 publications)** and **2021 (1 publication)**, which can reasonably be linked to the global academic disruptions brought about by the COVID-19 pandemic. During this time, many researchers faced limited access to resources, suspended fieldwork, and shifting institutional priorities, factors that likely contributed to reduced scholarly output in Library and Information Science and related fields. However, this temporary contraction was followed by a strong recovery beginning in 2022, signifying not just a return to academic productivity but also a renewed focus on the strategic roles of digital access, information trustworthiness, and system resilience, issues that were thrown into sharp relief during the pandemic. The sharp rise in 2024 publications could reflect both delayed outputs and heightened interest in rethinking library service models for a post-pandemic world.

Taken together, these data reveal a sharply increasing research interest in the intersection of *information quality* and *library services*, particularly in light of changing user behaviors, technological disruptions, and the evolving expectations of public institutions in the digital era. Libraries are no longer just repositories of knowledge; they are active service providers whose effectiveness hinges on the quality of the information they curate and disseminate. Thus, the observed publication trends reflect an academic response to real-world shifts that indicating that researchers are increasingly invested in understanding, measuring, and improving IQ to support more inclusive, efficient, and trustworthy library services. This observation is consistent with trends in broader Library and Information Science bibliometric studies, which note that post-2020 research increasingly emphasizes **digital innovation**, **metadata reliability**, and **user-centered information environments** as central pillars of library transformation.

B. Influential Authors and Collaboration Networks

The co-authorship network visualization reveals the **collaborative structure of scholarly contributions** in the domain of information quality in library services. The network is divided into **three primary clusters**, each representing tightly knit author groups with strong internal collaboration patterns. The **red cluster**, centrally featuring **Zha, X.**, **Yan, Y.**, and **Wang, Q.**, reflects a robust network of researchers focused on metadata quality, user-centered service models, and digital library development. These scholars show high interconnectivity, suggesting recurring joint publications and sustained academic partnerships. The **green cluster** is anchored by **Li, L.**, who collaborates with authors such as **Dong, Q.**, **Luo, J.**, **Li, Z.**, and **Zheng, J.**. This group appears to concentrate on technical and system-oriented dimensions of information quality, including cataloging accuracy and system performance evaluation. The **blue cluster**, involving **Cao, F.**, **Zhang, J.**, **Yang, H.**, and **Liu, K.**, forms a smaller but distinct collaboration group, likely focused on digital service design and information architecture.

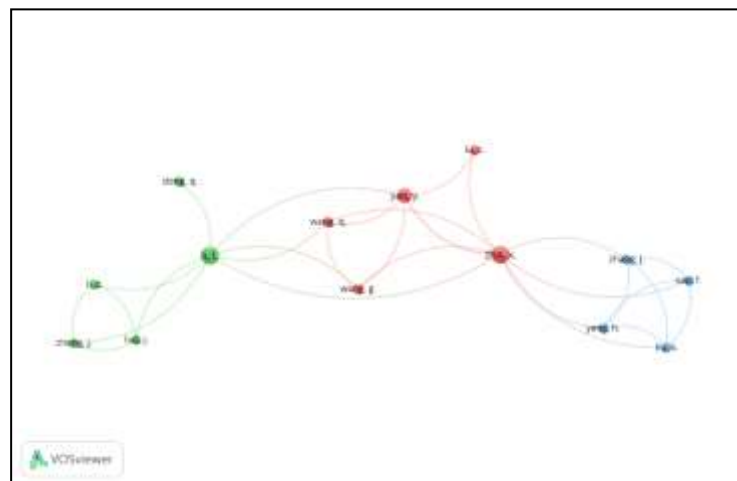


Figure 2. Author Visualization

Source: VOSviewer

The network suggests that **most collaboration is regionally concentrated**, with each cluster appearing to reflect shared institutional or geographic affiliations. While some cross-cluster connections exist, particularly between **Zha, X.** and **Li, L.**, the overall structure highlights the absence of wide-scale international collaboration, indicating that research on this topic is still largely conducted within isolated academic silos. Strengthening transnational and cross-disciplinary networks may therefore enhance the diversity and global relevance of future scholarship in this area. The visualization reinforces earlier findings that a

Research Patterns on Information Quality in Library Services: Bibliometric Evidence

small number of highly active contributors shape the intellectual trajectory of the field, emphasizing the need for more inclusive and diversified research efforts.

C. Co-authorship and Collaboration Patterns

The co-authorship network visualization, generated using VOSviewer (Figure 2), reveals three distinct collaboration clusters, indicating active but relatively regionally-bound author communities:

1. The **red cluster**, where **Zha, X.**, **Yan, Y.**, and **Wang, Q.** are central, reflects a dense collaboration network primarily focused on metadata quality and user experience in digital libraries.
2. The **green cluster**, led by **Li, L.**, includes collaborators such as **Dong, Q.**, **Luo, J.**, and **Zheng, J.**, with work often grounded in technical system performance and cataloging accuracy.
3. The **blue cluster**, connected to **Cao, F.** and **Liu, K.**, appears smaller and possibly more specialized, with emphasis on digital service access and system architecture.

Although some inter-cluster connections are evident, particularly linking **Zha, X.** and **Li, L.**, the visualization suggests that most research efforts are still conducted within regional or institutional silos, rather than through broad international collaboration. This finding points to an opportunity for future research to encourage more transnational and interdisciplinary partnerships, which could enhance both theoretical diversity and global applicability of research findings in this field.

The concentration of contributions among a limited group of authors underscores the importance of thought leadership and network centrality in shaping research directions on information quality. The observed cluster structure is consistent with other Library and Information Science domains, where regional research hubs (e.g., East Asia) dominate output but often lack deep interregional collaboration (Donthu et al., 2021). Expanding these collaborative ties could yield richer comparative studies, particularly valuable for addressing the varying challenges of information quality across library systems in different sociotechnical contexts.

D. Thematic Structure and Keyword Clusters

The **keyword co-occurrence** analysis identified a complex thematic landscape, with **"information quality"** emerging as the most central and frequently co-occurring term. This term serves as the nucleus of several interconnected clusters, each representing distinct research foci within the broader field (Figure 4).

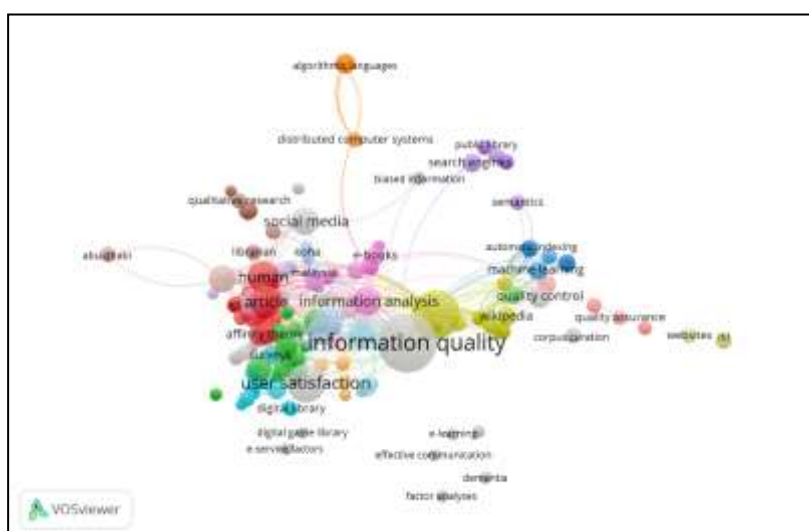


Figure 3. Network Visualization

Source: VOSviewer

The keyword co-occurrence analysis revealed four dominant thematic clusters that reflect the diverse and interdisciplinary nature of research on information quality in library services. The first cluster centers on user-centric themes, characterized by keywords such as user satisfaction, digital library, surveys, and affinity theory. These terms underscore a significant focus on user perception and experience, suggesting that much of the literature explores how information quality impacts user engagement and satisfaction, particularly in the context of digital service delivery. The second cluster highlights technical and system-oriented themes, with terms such as machine learning, automatic indexing, quality control, and quality assurance. This indicates a growing scholarly interest in algorithmic and automated methods for managing and evaluating information quality, often drawn from computer science and information retrieval disciplines. A third cluster revolves around digital content and media, including

Research Patterns on Information Quality in Library Services: Bibliometric Evidence

keywords like Wikipedia, social media, websites, and e-books. These reflect the challenges and opportunities posed by open, user-generated platforms and the expanding digital information environment within which libraries now operate. Lastly, the fourth cluster focuses on librarianship and contextual factors, as evidenced by terms like human, librarian, qualitative research, and Malaysia. These suggest a body of research that investigates localized or role-based dimensions of information quality, including the influence of library staff, institutional practices, and regional conditions. Together, these thematic areas offer a comprehensive view of how scholars conceptualize and operationalize information quality across technical, user-centered, media-driven, and contextual domains.

The **overlay visualization** (figure 4) illustrates the temporal evolution of research themes in the domain of information quality in library services from 2016 to 2024, using color gradients to indicate the average publication year associated with each keyword. Earlier research, shown in cooler tones (blue to green), centered on foundational concepts such as search engines, distributed computer systems, algorithmic languages, and qualitative research. These keywords reflect early efforts to conceptualize information quality through technical system performance and basic retrieval frameworks. As the timeline advances, newer research topics begin to emerge in yellow tones, indicating publications from more recent years, particularly 2021 to 2024. These include machine learning, automatic indexing, corpus curation, quality control, and e-service factors which signal a significant thematic shift toward automation, algorithmic processing, and digital infrastructure management.

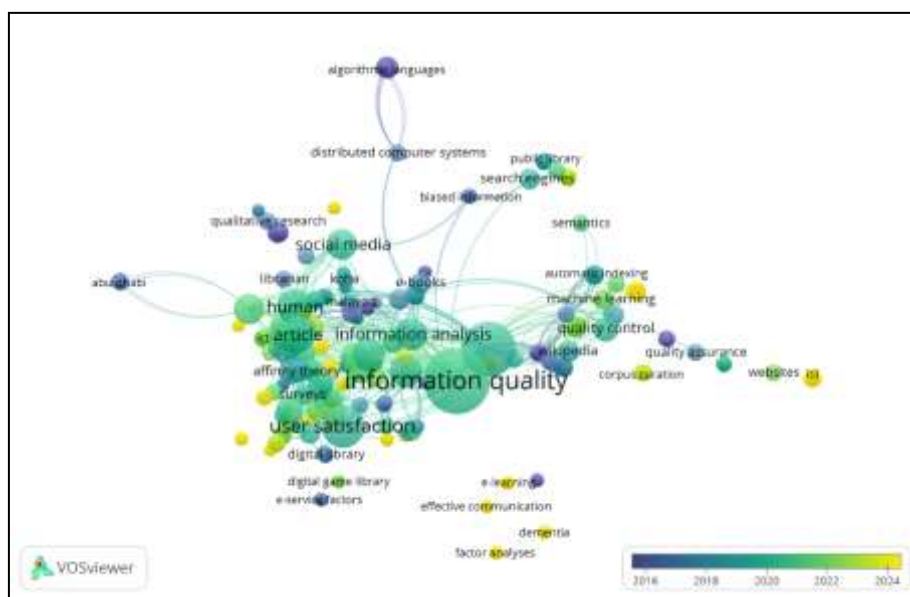


Figure 4. Overlay Visualization
Source: VOSviewer

This shift suggests that the discourse on information quality is not static but continuously adapting to broader changes in the digital information ecosystem. Libraries are increasingly integrating artificial intelligence, data-driven tools, and cross-platform information systems into their operations, resulting in a move from manual, human-centered quality assessment toward automated, scalable, and predictive quality management. Additionally, the persistence of user-focused terms such as user satisfaction, digital library, and information analysis in both earlier and later years indicates that user experience remains a consistent concern throughout the evolution of the field. Thus, the overlay visualization not only reveals emerging research frontiers but also confirms the interdisciplinary convergence between Library and Information Science and computational fields such as machine learning, semantic indexing, and digital governance.

The **density visualization** (Figure 5) provides a heatmap-like representation of the most intensively researched themes within the literature on information quality in library services. In this map, the color intensity reflects the frequency and centrality of keyword occurrences, where brighter, yellow-toned areas indicate higher research concentration and darker, blue-toned areas reflect less explored topics. At the core of the map, *information quality*, *user satisfaction*, *information analysis*, and *article* appear as the most prominent and heavily studied terms, forming the conceptual backbone of the field. These central terms are surrounded by closely related keywords such as *digital library*, *surveys*, *affinity theory*, and *human*, indicating a strong user-centric and evaluative research orientation in the literature.

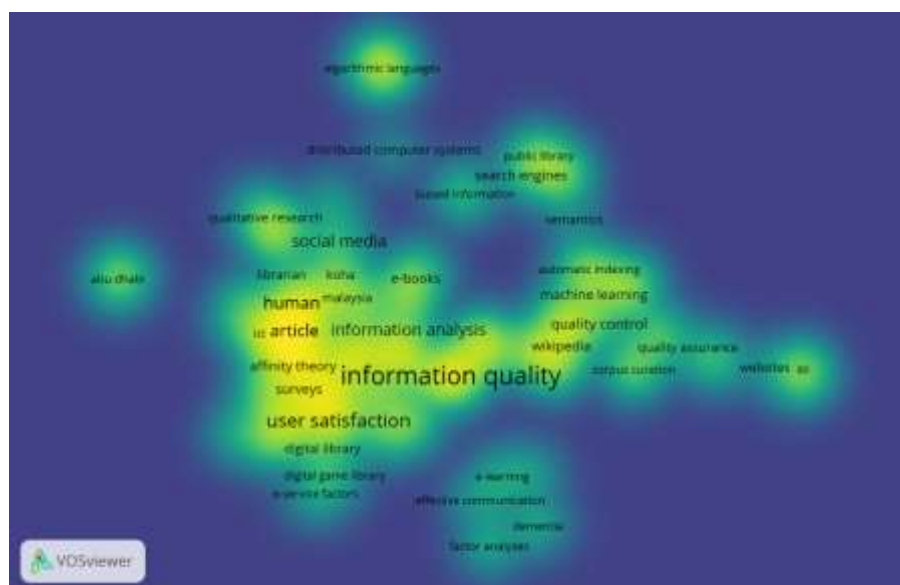


Figure 5. Density Visualization

Source: VOSviewer

Moving outward from the core, several other research themes begin to emerge with **moderate intensity**, such as *machine learning*, *quality control*, *Wikipedia*, *automatic indexing*, and *quality assurance*. These represent a **growing interest in technical and computational approaches** to managing information quality, suggesting the field's gradual shift toward automation, data-driven tools, and cross-platform evaluation frameworks. Meanwhile, **peripheral and less frequently explored areas**, marked by darker zones, include *e-learning*, *dementia*, *effective communication*, and *factor analyses*. These represent **niche or emerging topics** that have not yet gained significant attention in the literature but could offer fruitful avenues for future investigation. Their presence on the map suggests a potential for interdisciplinary expansion, particularly into areas where information quality intersects with health information systems, accessibility studies, or specialized user populations. Overall, the density visualization confirms that research in this domain is not only centralized around well-established themes but also **diversifying into new technical, contextual, and user-related dimensions**, aligning with the broader

The keyword analysis demonstrates that the literature on information quality in library services has matured to encompass both theoretical and applied dimensions, ranging from conceptual analyses of user satisfaction to technical concerns involving machine-driven indexing and automated validation. The observed thematic evolution aligns with broader digital transformation trends in the Library and Information Science field, where libraries are no longer passive providers of curated content but active mediators of digital knowledge ecosystems. The findings also suggest that future research should further explore **AI-assisted evaluation**, **cross-platform information quality**, and **policy frameworks** for public digital libraries.

IV. CONCLUSION

This study set out to map the research landscape surrounding *information quality in library services* through a bibliometric analysis of 75 documents published between 2015 and 2025. The findings reveal a steadily growing scholarly interest in the topic, particularly in the post-2020 period, as libraries have undergone significant digital transformation. The upward trend in publications, peaking in 2024, highlights how concerns around reliable, accessible, and user-centered information have become central to modern library operations. The analysis also identified a small group of highly productive authors, including Zha, X. and Chiu, P.S., along with three distinct regional collaboration clusters. While active co-authorship networks exist, global collaboration remains limited, signaling opportunities for more transnational academic partnerships. Thematic analysis of keywords further illustrates the diversity and evolution of the field. Central themes such as *user satisfaction*, *information analysis*, and *quality control* intersect with emerging areas like *machine learning*, *automated indexing*, and *digital platforms*, suggesting a shift from traditional metadata concerns toward more dynamic, technology-driven approaches to managing information quality. These findings not only provide a knowledge map for scholars but also emphasize the importance of advancing both theoretical and practical frameworks that integrate user needs, technological innovations, and governance mechanisms in the delivery of high-quality library services. Future research could benefit from deeper exploration of underrepresented topics such as ethics, accessibility, and algorithmic transparency as libraries continue to evolve in increasingly complex digital ecosystems.

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