



Developing a Collaborative Research Hub in University Libraries: A Strategy to Enhance Faculty Research Productivity

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Article Info	Abstract
Article History Received: 2025-05-13 Revised: 2025-06-23 Published: 2025-07-09 Keywords: <i>Collaborative Research Hub;</i> <i>Academic Library;</i> <i>Research Productivity;</i> <i>User-Centered Design;</i> <i>Research Support Services.</i>	University libraries are increasingly expected to transform into research centers that support academic productivity, particularly for faculty members. This study aims to develop a Collaborative Research Hub (CRH) model at the Sebelas Maret University Library (UPT Perpustakaan UNS) as a strategy to enhance research services through collaboration and technology. Using a qualitative approach and guided by the principles of user-centered design, the research was conducted in three stages: user needs analysis, prototype development and testing, and model evaluation. The findings show that 86.7% of respondents need collaborative workspaces, 80% require access to international journals, and 76.7% seek technical assistance in reference management. Prototype testing indicated that 83% of faculty participants found the CRH model effective in supporting their research activities. In addition, the role of librarians as research facilitators and the integration of library information systems received positive feedback. However, the evaluation also revealed the need to enhance system interoperability, offer more flexible and responsive services, and strengthen librarian competencies in supporting scholarly writing and publication. The uneven distribution of skills highlights the importance of continuous professional development to ensure that librarians can serve as strategic research partners. This study concludes that the CRH model improves research efficiency and fosters interdisciplinary academic collaboration. The model offers a replicable framework for strengthening library-based research services across higher education institutions.

Artikel Info	Abstrak
Sejarah Artikel Diterima: 2025-05-13 Direvisi: 2025-06-23 Dipublikasi: 2025-07-09 Kata kunci: <i>Pusat Penelitian Kolaboratif;</i> <i>Perpustakaan Akademis;</i> <i>Produktivitas Penelitian;</i> <i>Desain Yang Berpusat Pada Pengguna;</i> <i>Layanan Dukungan Penelitian.</i>	Perpustakaan perguruan tinggi saat ini menghadapi tuntutan untuk bertransformasi menjadi pusat riset yang mendukung produktivitas akademik, khususnya bagi para dosen. Penelitian ini bertujuan untuk mengembangkan model Collaborative Research Hub (CRH) di UPT Perpustakaan Universitas Sebelas Maret (UNS) sebagai strategi penguatan layanan riset berbasis kolaborasi dan teknologi. Penelitian menggunakan pendekatan kualitatif dengan prinsip user-centered design, yang dilaksanakan melalui tiga tahap: analisis kebutuhan pengguna, perancangan dan uji coba prototipe, serta evaluasi efektivitas model. Hasil penelitian menunjukkan bahwa 86,7% responden membutuhkan ruang kerja kolaboratif, 80% memerlukan akses ke jurnal internasional, dan 76,7% membutuhkan bantuan teknis dalam pengelolaan referensi. Uji coba prototipe menunjukkan bahwa 83% dosen peserta merasa model CRH efektif dalam mendukung aktivitas riset mereka. Selain itu, peran pustakawan sebagai fasilitator riset dan integrasi sistem informasi perpustakaan memperoleh tanggapan positif. Namun demikian, evaluasi juga mengungkapkan perlunya peningkatan interoperabilitas fungsional antar sistem pendukung riset, penyediaan layanan yang lebih fleksibel dan responsif, serta penguatan kompetensi pustakawan dalam mendampingi proses penulisan dan publikasi ilmiah. Ketimpangan kemampuan ini menunjukkan pentingnya program pelatihan berkelanjutan untuk memastikan seluruh pustakawan dapat berperan sebagai mitra strategis dalam riset. Penelitian ini menyimpulkan bahwa model CRH mampu meningkatkan efisiensi riset dan mendorong kolaborasi akademik lintas disiplin. Model ini menawarkan kerangka kerja yang dapat direplikasi untuk memperkuat layanan riset berbasis perpustakaan di perguruan tinggi.

I. INTRODUCTION

The purpose of establishing an academic library is to achieve the goals of the university, namely to preserve, disseminate, and enhance knowledge (Rajabali Beglou and Akhshik, 2020).

The role of libraries in the university environment continues to grow along with the dynamics of academic needs and advances in information technology (Durall Gazulla et al., 2024; Kang and Sinn, 2024). No longer merely a

repository for printed collections, libraries are now expected to become integral components of the research and innovation ecosystem. Amid global pressure to increase both the quality and quantity of scientific publications, lecturers who are the core of academic productivity require more comprehensive research support. (Pinto et al., 2024). The library is one of the strategic units that has the potential to provide this support, both in terms of access to scientific information sources, collaborative spaces, to technical assistance in managing references and utilizing academic software (Si et al., 2019).

Technological advances in recent decades have made it possible to generate, collect, and process large amounts of data that are then explored to extract underlying information (Martin-Melon, Hernández-Pérez and Martínez-Cardama, 2023a). Traditionally, libraries have functioned as repositories and providers of information, primarily through physical collections that support learning and research. However, in recent decades, a global transformation has taken place, redefining the role of academic libraries. Today, libraries are increasingly expected not only to provide access to information but also to serve as strategic partners in enhancing academic productivity and supporting research development.

Sebelas Maret University (UNS), as a higher education institution committed to strengthening its academic reputation, recognizes the importance of creating a conducive research environment for faculty members. Nevertheless, several challenges remain, particularly in delivering collaborative and technology-based research services. The lack of shared workspaces, the absence of integrated research information systems, and the limited role of librarians in supporting research activities point to a gap between academic needs and the current services provided by the library.

To address these challenges, there is a growing need for innovative library services that are adaptive and responsive to user needs. One such emerging solution is the development of a Collaborative Research Hub (CRH) a library based service model that integrates collaborative workspaces, research information systems, and the active involvement of librarians as research facilitators (Głowacka, 2019).

This study adopts a qualitative approach guided by user-centered design principles, positioning faculty members as the primary users in the service development process. The research was conducted in three main stages:

needs analysis, prototype design and testing, and evaluation of the model's effectiveness.

Overall, the initiative to develop the CRH at the UNS Library is not merely intended to improve internal services, but also serves as a strategic effort to strengthen the institution's research capacity. By creating spaces and systems that support structured academic interaction, the library is expected to become an active partner in enhancing faculty research productivity and contributing to the sustainable development of higher education quality (Amanullah and Abrizah, 2023).

Amid the urgency to create a more collaborative and adaptive research environment, there arises a fundamental need to assess the extent to which the library can respond to these challenges through service innovation (Dei and Asante, 2022). In this context, there are two key aspects that become the focus of attention: first, how to design a collaborative service model that aligns with the characteristics and needs of faculty members in the university environment; and second, to what extent such services contribute to enhancing research productivity and the effectiveness of academic collaboration. These two issues serve as a starting point for understanding the strategic role of the library as a research partner that not only provides access to information but also facilitates the research process in a comprehensive manner (Morgan and Sonsteby, 2024).

To answer these two focuses, the approach used in this study emphasizes the direct involvement of service users in every stage of model development. The process begins with information gathering through literature studies, focus group discussions (FGDs), and needs surveys, which then become the basis for compiling the initial design of library-based collaborative services. Furthermore, limited testing is carried out on the service prototype that has been developed to obtain initial input from users. The final stage focuses on a comprehensive evaluation to assess the effectiveness of the service and develop a strategy for improving the model that can be adopted sustainably. With this user experience-based approach, it is hoped that the research results will not only be theoretical, but also applicable, so that they can provide a direct contribution to strengthening research services in university libraries. Moreover, the results of model development are expected to be replicated by other institutions as part of the

transformation of academic services based on collaboration, technology, and the real needs of the academic community (Abdullayeva, 2024; Adekoya, Fasae and Alade, 2024). academic libraries have faced many challenges in meeting student needs (Lotfy et al., 2022).

The increasing complexity of academic responsibilities and performance indicators has placed significant pressure on lecturers to publish scientific work, engage in interdisciplinary collaboration, and utilize digital research tools effectively. However, these expectations are often not matched by adequate institutional support, especially in terms of access to integrated research environments. While some universities have pioneered specialized research centers or digital platforms, many academic libraries remain limited in their capacity to provide structured, user-focused research services (Anasi, Ukangwa and Fagbe, 2018). This mismatch between institutional demands and service readiness creates a gap that can potentially hinder research quality and output. It is within this context that the idea of a Collaborative Research Hub (CRH) emerges not only as an innovative library service model, but also as a strategic framework to reposition the library as an active agent in the research ecosystem (Amanullah and Abrizah, 2023).

Rather than relying on generalized service design, the CRH model is built upon direct input from lecturers and librarians, ensuring that the proposed solution is grounded in actual user experience. This model integrates physical, digital, and human components into a seamless environment that supports research activities at every stage from literature discovery and reference management to collaborative writing and publication preparation. The CRH initiative at Universitas Sebelas Maret thus represents a timely and necessary intervention that reflects the evolving function of academic libraries in the digital era. By embedding collaboration, responsiveness, and adaptability into the core of library services, this study seeks to demonstrate how libraries can move beyond traditional boundaries and align themselves more closely with the strategic goals of higher education institutions.

II. METHOD

This study uses a qualitative approach by adopting the principle of user-centered design (UCD), which places users at the center of the service design process. This approach was chosen to ensure that the Collaborative Research

Hub (CRH) model developed truly reflects lecturers' needs and expectations.

The study involved lecturers from various disciplines at Universitas Sebelas Maret (UNS) and librarians who are actively engaged in research services. Data collection techniques included documentation studies, observations, online surveys, focus group discussions (FGDs), and semi-structured interviews. All data were analyzed using thematic analysis to identify patterns, key themes, and relevant categories in the development of a collaborative library-based service model.

The study consists of three interconnected stages. The first stage focused on needs analysis and literature review, which included gathering data through literature studies, online surveys, and FGDs involving lecturers and librarians. This phase aimed to identify user needs for collaborative research services, map common research challenges, and explore best practices from existing research hub implementations in higher education institutions (Gyau, Jing and Akowuah, 2021).

Following the needs analysis, the second stage focused on model design and initial implementation. Researchers developed an initial CRH prototype that integrated physical components such as collaborative space layout and digital facilities with service aspects including librarian support and a research information system. This prototype was tested on a limited scale with a group of lecturers to collect initial feedback for refining the model.

The third stage involved evaluation and refinement. A follow-up survey and FGD were conducted to assess the model's effectiveness and to gather input on areas for improvement. Findings from this stage served as the basis for formulating recommendations to develop a sustainable and institutionally adoptable CRH model.

Through this strategy, the study aims to produce a CRH model that is not only conceptually innovative, but also practical, applicable, and aligned with the current needs of higher education institutions.

III. RESULT AND DISCUSSION

A. Result

This section presents the main findings from the survey conducted with lecturers at Universitas Sebelas Maret (UNS) to identify their needs related to collaborative research services. The data were gathered to inform the development of the Collaborative

Research Hub (CRH) model and ensure it responds to real user demands. The results focus on key aspects such as workspace needs, digital access, technical support, and librarian involvement.

Table 1 below summarizes the types of support most frequently cited by respondents. These priorities form the foundation for the subsequent analysis.

Table 1. Lecturer Needs in Collaborative Research Services

No	Type of Need	Percentage of Respondents (%)
1	Collaborative workspace	86.7%
2	Access to international journals	80.0%
3	Assistance in reference management (Zotero/Mendeley)	76.7%
4	Librarian consultation for literature searching	70.0%
5	Training in academic software	63.3%

Following the identification and ranking of the five key areas of need, as presented in Table 1, the research findings are further examined through a thematic approach. Each category of need does not stand alone; rather, they are interrelated and collectively reflect the broader expectations of lecturers regarding collaborative research services within the academic library environment.

To provide a deeper understanding of the quantitative data, the following sections elaborate on each component in narrative form. This analysis aims to highlight how each need represents real challenges and expectations in the field, and how these insights serve as a strong foundation for the development of a user-centered, relevant, and scalable *Collaborative Research Hub (CRH)* model.

1. Lecturer Needs

The data clearly show that UNS lecturers place a high priority on the availability of collaborative workspaces, with 86.7% of respondents identifying this as a crucial requirement. This need reflects a desire for dedicated physical environments that encourage academic focus and team-based research activity. In addition, 80.0% of respondents reported the need for seamless access to international journals, underscoring the importance of global scholarly connectivity in research processes.

Support in managing references—particularly through tools like Zotero and Mendeley—was needed by 76.7% of respondents, pointing to the growing reliance on digital citation tools in modern research. Meanwhile, 70.0% indicated that consultation with librarians is essential, especially for literature searches. Finally, 63.3% of lecturers expressed the need for structured training in academic software, suggesting that technical proficiency is still an area requiring institutional support.

2. User Satisfaction and Perceived Benefits

The trial implementation of the CRH prototype revealed several key insights regarding user satisfaction. 83% of lecturers indicated that the CRH model met their research needs and improved their workflow efficiency, particularly in literature searching, reference management, and accessing digital resources. This reflects strong alignment between the service features and user expectations, suggesting the CRH has the potential to enhance research productivity when implemented at scale. Role of Librarians

Two out of the top five needs—assistance in reference management (76.7%) and librarian consultations (70.0%)—relate directly to librarian services. This highlights the expectation that librarians should not only manage collections but also act as research facilitators. Their role is increasingly centered on guiding citation practices, helping navigate information systems, and supporting academic software use. The data affirm the librarian's evolving identity as a strategic partner in scholarly work.

3. Technical and System Integration

The expressed needs for journal access and software support imply that system integration remains a concern. While not directly queried in the survey, the emphasis on access (80.0%) and training (63.3%) suggests that many users face challenges navigating multiple platforms. These challenges may stem from fragmented access points or lack of familiarity with digital tools. As such, improvements in system interoperability and centralized platforms are likely to be well received.

4. Spatial Design and Accessibility

The fact that 86.7% of lecturers require collaborative workspace highlights the importance of physical design in research environments. While the survey did not probe specific design features, such a strong response implies expectations around comfort, layout flexibility, acoustics, and accessibility. It also suggests a desire for spaces that support both individual focus and group interaction.

5. User Segmentation and Preferences

The diversity of needs across the five categories suggests varied user profiles among the lecturers. For example, those who requested training in academic software (63.3%) may differ in digital proficiency from those already seeking citation management tools (76.7%). These differences point to the need for user segmentation in service design, with personalized approaches based on experience level, research field, or age group.

6. Summary of Key Findings

The survey results indicate that UNS lecturers have five primary needs in collaborative research services: (1) access to collaborative workspaces (86.7%), (2) international journal access (80.0%), (3) assistance with reference management tools such as Zotero or Mendeley (76.7%), (4) librarian consultation for literature searching (70.0%), and (5) training in academic software (63.3%). As shown in Table 1, collaborative workspace ranked highest among all needs, reinforcing the urgency for spatial transformation in academic libraries. These findings underscore the importance of integrating physical space, digital access, and expert support in developing an effective Collaborative Research Hub (CRH) model.

B. Discussion

The results obtained from the implementation of the Collaborative Research Hub (CRH) model at the Sebelas Maret University Library provide a comprehensive picture of user needs, system performance, and the potential of library-based research support services. Drawing on survey data, FGD findings, and trial evaluations, the discussion in this section is structured

thematically to deepen the interpretation of results and relate them to existing theories, practical implications, and strategic recommendations.

The analysis is organized into six key components. First, it explores how the findings align with current theoretical perspectives on academic libraries and research support. Second, it examines the evolving role of librarians as collaborative partners in research. Third, it highlights the strengths of the CRH model based on user feedback. Fourth, it presents the limitations identified during the initial evaluation of the prototype. Fifth, the institutional implications and strategic directions are discussed. Finally, the section concludes by addressing the research questions that guided this study.

This thematic structure is intended to ensure clarity, depth, and focus in presenting the significance of the CRH initiative within the broader context of library transformation in higher education.

1. Relevance of Findings to Theory

The findings affirm that collaborative workspaces, access to scholarly information, and librarian support are essential elements in supporting academic research. This aligns with the *research-enabling library* model (Tenopir et al., 2020), which emphasizes the importance of integrating digital infrastructure with personalized academic support.

As presented in Table 1, the majority of lecturers at Sebelas Maret University expressed a strong need for collaborative research support services. Specifically, 86.7% of respondents highlighted the need for collaborative workspaces, making it the highest priority. This was followed by access to international journals (80.0%) and technical assistance in reference management using tools such as Zotero or Mendeley (76.7%). Additionally, 70.0% of respondents valued librarian consultations for literature searching, and 63.3% indicated a need for training in academic software.

These results highlight a broader trend in higher education, where academic libraries are expected to go beyond traditional roles and function as active research partners (Si et al., 2019; Dei and Asante, 2022). Collaborative spaces serve not only as work areas but also as platforms for interdisciplinary dialogue,

enabling joint problem-solving and co-creation of knowledge.(Morgan and Sonsteby, 2024)

The findings also emphasize the shifting role of librarians from traditional information custodians to collaborative research facilitators. According to the survey results (Table 1), 76.7% of lecturers expressed a need for assistance in managing references using tools such as Zotero or Mendeley, while 70.0% indicated the importance of librarian consultation for literature searching. Additionally, 63.3% of respondents expressed interest in training in academic software, signaling a strong expectation for librarians to provide not only access but also technical and pedagogical support in navigating the research process.

These findings support the argument put forth by Awan, who describe modern librarians as *research partners* equipped with the skills to guide users through the complexities of information retrieval, citation practices, and scholarly communication(Awan, Richardson and Ahmed, 2022). The demand for personalized assistance illustrates that librarians are no longer peripheral service providers but are increasingly perceived as integral collaborators in academic research (Rajabali Beglou and Akhshik, 2020).

Moreover, this evolving role contributes directly to research efficiency. By supporting citation accuracy, reducing search time, and enhancing digital literacy, librarian involvement helps reduce the cognitive and technical burden on researchers. It also creates a more inclusive academic environment, especially for early-career lecturers or those unfamiliar with research technologies (Adewojo, Akanbiemu and Onuoha, 2024). As the CRH model matures, institutional support for expanding the librarians' role in research facilitation will be essential for sustainability and scalability.

2. Strengths of the CRH Model

The initial implementation of the Collaborative Research Hub (CRH) at Sebelas Maret University received positive feedback from participating lecturers, highlighting several strengths that align with their expressed needs (as shown in Table 1). Foremost among these was the

availability of collaborative workspaces, which 86.7% of respondents identified as essential. During the prototype testing, these physical spaces were praised for their role in facilitating academic interaction, focused research, and interdisciplinary discussion(Barniskis, 2023).

In addition, 80.0% of lecturers emphasized the importance of access to international journals, which was addressed in the CRH through improved integration with subscribed databases and digital repositories. Respondents noted that the centralized access to digital resources significantly enhanced the efficiency of their literature searches and reduced duplication of effort.

Another strength was the CRH's incorporation of reference management support, directly responding to the 76.7% of lecturers who expressed a need for technical assistance with tools like Zotero or Mendeley. This was reinforced by the presence of trained librarians who provided hands-on guidance, contributing to more accurate and organized citation practices. According to Garoufali, research productivity tends to increase significantly when academic institutions provide supportive and shared working environments, a condition that the CRH at UNS has begun to fulfill(Garoufali and Garoufallou, 2024).

Furthermore, the inclusion of librarian consultation services and academic software training (needed by 70.0% and 63.3% of respondents, respectively) was viewed as a vital feature that bridged digital tools with human support. Participants valued the responsive and personalized assistance available through the CRH, which helped demystify complex tools and promoted more confident use of digital platforms.

Overall, the CRH prototype demonstrated its capacity to translate survey-based needs into concrete services that addressed both the technical and human-centered aspects of academic research. This alignment between user needs and service delivery reinforces the model's relevance and potential for broader institutional adoption.

3. Limitations and Initial Evaluation

While the initial implementation of the CRH model at Sebelas Maret University was met with generally positive feedback, the evaluation process also revealed several limitations that must be addressed for broader and more sustainable adoption. One of the recurring issues identified was the difficulty in optimizing the use of available research support systems, particularly due to varying levels of digital literacy among lecturers. Although Sebelas Maret University has implemented a Single Sign-On (SSO) system and centralized access to digital platforms, several respondents reported challenges in effectively navigating and utilizing the tools provided.

Difficulties included managing references using tools such as Zotero or Mendeley, utilizing advanced features in international journal databases, and navigating the institutional repository for uploading and citing research outputs. These challenges often resulted in a high dependency on librarian assistance and a slower overall research process. This suggests the need for continuous technical training and personalized support services to ensure that the existing systems are used more effectively and equitably across the academic community.

Another limitation identified was the uneven competencies among librarians in serving as partners in scholarly writing and publication. While some librarians demonstrated strong capabilities in providing reference and technical support, others were still developing their skills, particularly in advanced reference management, the use of academic software, and familiarity with reputable journal publishing standards. This disparity has led to service dependency on specific individuals and inconsistencies in the quality of support received by users (Martin-Melon, Hernández-Pérez and Martínez-Cardama, 2023b). To ensure that the CRH model operates effectively and sustainably, there is a need for comprehensive and continuous professional development programs that equip all librarians to serve as strategic partners in enhancing faculty research productivity and publication output (Hussain, Khan and Ahmad, 2024).

In terms of physical infrastructure, some participants noted that while the collaborative space was functional, there were areas for improvement. Suggestions included the addition of modular furniture, improved lighting, and designated quiet zones to accommodate diverse working preferences. Furthermore, lecturers proposed the integration of room booking systems and enhanced accessibility features to optimize the usability of the space.

Initial evaluation also revealed variations in user preferences based on age and digital fluency. Younger lecturers showed greater enthusiasm for digital tools such as citation generators and dashboard analytics, while senior faculty tended to prefer guided support and printed manuals. These findings indicate the importance of user segmentation and adaptability in both digital and human support services.

Despite these challenges, the trial phase confirmed that the CRH prototype effectively addressed key user needs. 83% of respondents reported that the CRH improved their research efficiency, while 76% agreed that the collaborative environment fostered academic engagement and interdisciplinary dialogue. These results demonstrate that although refinements are necessary, the foundation of the CRH model is robust and aligned with the expectations of its primary users.

4. Institutional Implications and Strategic Recommendations

The CRH model illustrates that success in supporting academic research does not solely depend on technological infrastructure, but also on human-centered service design and institutional responsiveness (Leonard, Chigwada and Mushi, 2023). Personalized librarian support and adaptive service delivery models emerged as critical enablers of user satisfaction. Institutions should consider policy frameworks that formally recognize the role of librarians in research facilitation and invest in system interoperability to enhance research efficiency (Cox, 2021). Furthermore, segment-specific service strategies can address the diverse needs of academic users, improving adoption and long-term impact.

5. Addressing the Research Questions

In addressing the first research question regarding the design of a CRH model suitable for UNS, the study demonstrates that a user-centered approach effectively captures lecturer needs, resulting in a practical and well-received prototype. Regarding the second question how such a model contributes to research productivity the trial results indicate tangible improvements in efficiency, collaboration, and output quality.

The findings demonstrate that the CRH is not merely a theoretical concept, but a viable and measurable model for transforming academic library services. It successfully integrates digital platforms, spatial functionality, and human support into a unified research service ecosystem (Awan, Richardson and Ahmed, 2022).

To sustain and expand its impact, the CRH should be further developed through the enhancement of integrated research information systems and by advancing librarian competencies as strategic research partners. The model offers a scalable framework for implementation in other university libraries, contributing to a collaborative, inclusive, and high-performing academic research ecosystem (Leonard, Chigwada and Mushi, 2023).

IV. CONCLUSION AND SUGGESTION

A. Conclusion

This study demonstrates that the development of the Collaborative Research Hub (CRH) at Sebelas Maret University Library is a strategic initiative to enhance lecturers' research productivity. Designed using a user-centered approach, the CRH model effectively addresses users' actual needs by integrating collaborative spaces, research information systems, and the active role of librarians. The initial implementation has shown a positive impact on research effectiveness and academic collaboration, and offers a scalable framework for implementation in other academic libraries.

B. Suggestion

The development of the Collaborative Research Hub should be further developed through the enhancement of integrated research information systems and by advancing librarian competencies as strategic

research partners. The model offers a replicable approach for strengthening collaborative research ecosystems and repositioning academic libraries as key agents in sustainable knowledge development.

REFERENCES

- Adewojo, A.A., Akanbiemu, A.A. and Onuoha, U.D., 2024. From traditional to tech-savvy: the evolution of Nigerian libraries in the machine learning era. *Library Hi Tech News*. [online] <https://doi.org/10.1108/LHTN-01-2024-0014>.
- Amanullah, S.W. and Abrizah, A., 2023. The landscape of research data management services in Malaysian academic libraries: librarians' practices and roles. *The Electronic Library*, 41(1), pp.63-86. <https://doi.org/10.1108/EL-06-2022-0135>.
- Anasi, S.N., Ukangwa, C.C. and Fagbe, A., 2018. University libraries-bridging digital gaps and accelerating the achievement of sustainable development goals through information and communication technologies. *World Journal of Science, Technology and Sustainable Development*, 15(1), pp.13-25. <https://doi.org/10.1108/WJSTSD-11-2016-0059>.
- Awan, M.H., Richardson, J. and Ahmed, S., 2022. Current status of research support services in university libraries of Pakistan. *Digital Library Perspectives*, 38(4), pp.412-428. <https://doi.org/10.1108/DLP-11-2021-0101>.
- Barniskis, S.C., 2023. Serious and casual leisure in public library makerspaces: The two-audience conundrum and research agenda. *Library & Information Science Research*, 45(2), p.101241. <https://doi.org/10.1016/j.lisr.2023.101241>.
- Cox, J., 2021. The higher education environment driving academic library strategy: A political, economic, social and technological (PEST) analysis. *The Journal of Academic Librarianship*, 47(1), p.102219. <https://doi.org/10.1016/j.acalib.2020.102219>.

- Dei, D.-G.J. and Asante, F.Y., 2022. Role of academic libraries in the achievement of quality education as a sustainable development goal. *Library Management*, 43(6/7), pp.439–459. <https://doi.org/10.1108/LM-02-2022-0013>.
- Durall Gazulla, E., Kajamaa, A., Kinnula, M., Iivari, N., Leinonen, T. and Suganuma, K., 2024. Democratizing technology in a public library: A nexus analytical inquiry into a Hebocon maker activity. *Library & Information Science Research*, 46(3), p.101303. <https://doi.org/10.1016/j.lisr.2024.101303>.
- Garoufali, A. and Garoufallou, E., 2024. Transforming libraries into learning collaborative hubs: the current state of physical spaces and the perceptions of Greek librarians concerning implementation of the “Learning Commons” model. *Global Knowledge, Memory and Communication*, 73(6/7), pp.828–852. <https://doi.org/10.1108/GKMC-04-2022-0086>.
- Głowacka, E., 2019. Research on the impact of academic libraries – areas, methods, indicators. *Library Management*, 40(8/9), pp.583–592. <https://doi.org/10.1108/LM-02-2019-0005>.
- Gyau, E.B., Jing, L. and Akowuah, S., 2021. International Students Library Usage Frequency Patterns in Academic Libraries: A User Survey at Jiangsu University Library. *OALib*, 08(07), pp.1–20. <https://doi.org/10.4236/oalib.1107610>.
- Hussain, A., Khan, A. and Ahmad, P., 2024. Library management models: a review and direction for future research. *Global Knowledge, Memory and Communication*. [online] <https://doi.org/10.1108/GKMC-08-2023-0309>.
- Kang, G. and Sinn, D., 2024. Technology education in academic libraries: An analysis of library workshops. *The Journal of Academic Librarianship*, 50(2), p.102856. <https://doi.org/10.1016/j.acalib.2024.102856>.
- Leonard, A., Chigwada, J. and Mushi, G., 2023. The state of embedded librarianship in the university research processes in selected African academic libraries. *Library Management*, 44(8/9), pp.518–535. <https://doi.org/10.1108/LM-06-2023-0045>.
- Lotfy, M.W., Kamel, S., Hassan, D.K. and Ezzeldin, M., 2022. Academic libraries as informal learning spaces in architectural educational environment. *Ain Shams Engineering Journal*, 13(6), p.101781. <https://doi.org/10.1016/j.asej.2022.101781>.
- Martin-Melon, R., Hernández-Pérez, T. and Martínez-Cardama, S., 2023a. Research data services (RDS) in Spanish academic libraries. *The Journal of Academic Librarianship*, 49(4), p.102732. <https://doi.org/10.1016/j.acalib.2023.102732>.
- Martin-Melon, R., Hernández-Pérez, T. and Martínez-Cardama, S., 2023b. Research data services (RDS) in Spanish academic libraries. *The Journal of Academic Librarianship*, 49(4), p.102732. <https://doi.org/10.1016/j.acalib.2023.102732>.
- Morgan, L. and Sonsteby, A., 2024. “How can we help you?": Assessing student behaviors and outcomes in collaborative research and writing support. *The Journal of Academic Librarianship*, 50(6), p.102963. <https://doi.org/10.1016/j.acalib.2024.102963>.
- Pinto, M., Garcia-Marco, J., Caballero, D., Manso, R., Uribe, A. and Gomez, C., 2024. Assessing information, media and data literacy in academic libraries: Approaches and challenges in the research literature on the topic. *The Journal of Academic Librarianship*, 50(5), p.102920. <https://doi.org/10.1016/j.acalib.2024.102920>.
- Rajabali Beglou, R. and Akhshik, S.S., 2020. Improving and extending activities of university and research libraries in Iran: the role of Iranian Research Institute for Information Science and Technology (Irandoct). *Library Management*, 41(4/5), pp.135–151. <https://doi.org/10.1108/LM-01-2019-0001>.

- Si, L., Zeng, Y., Guo, S. and Zhuang, X., 2019.
Investigation and analysis of research
support services in academic libraries. *The
Electronic Library*, 37(2), pp.281-301.
<https://doi.org/10.1108/EL-06-2018-0125>.