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Analysis of Factors Affecting Lecturers' Research Quality through the Use of Digital Libraries

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CONTENT

ABSTRACT

Background: The research quality of lecturers is a critical measure of the overall performance of higher education institutions. Digital libraries have become a vital resource in facilitating academic research by offering easy access to a wide array of scholarly materials. However, despite their advantages, many lecturers still face challenges in utilizing digital libraries effectively, impacting the quality of their research. **Objective:** This study aims to analyze the factors affecting the quality of lecturers' research through the use of digital libraries, focusing on aspects such as information literacy, access to technology, institutional support, and training. **Method:** The study employs a qualitative descriptive approach using a literature review method. Relevant articles, books, and academic papers were collected, analyzed, and synthesized to identify key factors influencing research quality. **Result:** The study finds that factors such as lecturers' information literacy skills, institutional policies, and access to technology are critical in maximizing the use of digital libraries for research. Additionally, the role of librarian support and comprehensive training is significant in improving research quality. **Conclusion**: Improving digital literacy, providing institutional support, and offering training on the use of digital libraries are crucial for enhancing lecturers' research quality. By addressing these barriers, institutions can help lecturers fully leverage digital libraries to improve their academic output. **Contribution;** This study contributes to understanding the essential factors that impact the effective use of digital libraries in academic research. The findings can guide higher education institutions in enhancing the support systems and resources available to lecturers, ultimately improving the overall research output of academic staff.

KEYWORDS

Factors affecting lecturers; Research quality; Digital libraries

1. INTRODUCTION

The quality of lecturers' research serves as a key benchmark in evaluating the overall performance of higher education institutions, as it significantly contributes to academic advancement, innovation, and global competitiveness. High-quality research not only strengthens the reputation of universities but also supports the development of evidence-based teaching practices and knowledge dissemination (Diery et al., 2021). In the current digital era, the emergence of digital libraries has transformed the research landscape by offering lecturers quick and efficient access to an extensive collection of scholarly literature, journals, and other academic resources. Digital libraries offer a more

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flexible and cost-effective alternative to conventional libraries, allowing lecturers to access up-to-date references from various disciplines without the limitations of time and physical space (Yakubu et al., 2022).

Despite these advantages, the optimal utilization of digital libraries by lecturers is still limited due to several challenges (Jabeen et al., 2017). Factors such as insufficient digital literacy skills, lack of comprehensive training, inadequate institutional policies, and technical barriers often hinder lecturers from maximizing the potential of these resources. Consequently, these limitations can negatively affect the quality, relevance, and impact of research outcomes. Recognizing this gap, this study aims to analyze the key factors affecting lecturers' research quality through the use of digital libraries. Particular attention is given to the roles of technological integration, access to resources, user competencies, and institutional support in enhancing research productivity and ensuring that lecturers can produce high-quality scientific work aligned with current academic trends. According to Article 1 of Law No. 14 of 2005, lecturers are professional educators and scholars responsible for transforming, developing, and disseminating knowledge, technology, and the arts through education, research, and community service. As the main driving force in academia, lecturers must possess strong data analysis skills to produce valid and relevant research. Proper and accurate data analysis is a crucial component of any research. Today, digital libraries have made it much easier to obtain data. However, despite easier access to digital libraries, many lecturers still face various challenges in fully utilizing these resources (Rafiq et al., 2021).

The quality of lecturers' research plays a pivotal role in advancing knowledge and enhancing the academic reputation of higher education institutions (Lafuente-Ruiz-de-Sabando et al., 2018). As the demand for high-quality research continues to grow, it is crucial to understand the factors that influence the research output of lecturers. In the modern era, digital libraries have become essential tools for academic research, providing easy access to vast amounts of scholarly resources. However, despite the availability of these digital tools, their utilization by lecturers remains suboptimal in many cases. The use of digital libraries is influenced by a range of factors, both technical and personal (Xu & Du, 2018). Information literacy skills, which enable lecturers to search for, evaluate, and utilize academic resources effectively, are crucial for maximizing the potential of digital libraries (Kong, 2014).

Additionally, access to reliable technology and institutional policies that support digital library usage are significant factors in determining research quality (Joo & Choi, 2015). Beyond these factors, personal conditions such as time management, motivation, and the individual lecturer's research habits also play a critical role in determining how effectively they can use digital libraries (Rahman et al., 2024). Understanding these factors is crucial for institutions to develop effective support systems and training programs that enhance the research capabilities of lecturers, ultimately improving the quality of academic research.

Various factors influence lecturers' research. For example, a study found that organizational support significantly contributes to lecturers' research performance, with an influence percentage of 32.5%. Other factors, such as the lecturers' individual attributes, also contribute. Facilities, funding, and academic demands play important roles. Lecturers' expertise and academic background are also critical, and senior lecturers with strong educational backgrounds tend to conduct more productive research (Margaretha, 2012). Nevertheless, many talented young lecturers are also leveraging digital libraries to publish their research.

Digital libraries provide a vast collection of books, journals, and scientific literature that can be accessed anytime and anywhere. A study conducted at the Indonesian Computer University found that elements such as management support, individual capability, and the availability of digital resources have a significant impact on the quality of lecturers' research (Kuniatai, 2027). The fact remains that many lecturers face technical issues or lack the knowledge to use digital libraries effectively.

Several relevant studies have evaluated various components affecting the quality of lecturers' research through digital libraries. Mustomi (2018) explained that lecturers' attributes greatly influence students' learning motivation. Students' perception of a communicative lecturer who can deliver material effectively can enhance student engagement in the learning process. This shows that lecturers' attributes not only affect students' learning motivation but can also contribute to the quality of the research they produce. Kustiyati (2017) stated that lecturers' competencies, including pedagogical and professional competence, are crucial in determining the quality of implementing the Tridharma Perguruan Tinggi (Three Pillars of Higher Education). Lecturers with high competence in their field are more capable of producing high-quality research. The ability to access and utilize digital library resources is a key component of this competence. Syaripuddin et al. (2021) stated that the webinar aimed to provide knowledge of the latest methodologies to assist in planning and conducting research. Ansori et al. (2019) discussed how respondents positively received the digital library at YARSI University, as most of their expectations were met. This is evident from the generally positive statements made by the respondents, with more than 50% demonstrating an understanding of the digital library. From these studies, it can be concluded that institutional support in the form of training and the provision of adequate infrastructure is crucial for increasing the utilization of digital libraries. Further-

more, lecturers often face challenges such as unstable internet connectivity, limited access to specialized collections, and inadequate training on how to utilize digital libraries. These factors contribute to the low utilization rate of digital libraries in lecturers' research activities.

The research gap identified in this study lies in the under-explored area of how various factors influencing the use of digital libraries impact the quality of lecturers' research. While previous studies have focused on the technological aspects of digital libraries, few have thoroughly examined the specific barriers and facilitators that lecturers encounter in utilizing these tools for research purposes. Existing literature often neglects the role of institutional policies, the varying levels of information literacy among lecturers, and the critical support provided by librarians. Additionally, the impact of training programs on lecturers' ability to effectively use digital libraries to enhance research quality remains inadequately explored. Future research could further investigate the interplay between these factors, focusing on how they collectively affect the quality of research output and the development of effective strategies for improving digital library usage in academic environments.

This study aims to identify the various factors that influence the quality of lecturers' research when using digital libraries. Therefore, it seeks to analyze these factors through a literature review approach, which is an appropriate method to examine such factors. Some challenges encountered in this study include unstable internet connectivity and limited access to specific collections. This research is expected to provide recommendations to library managers and educational institutions on how lecturers can effectively utilize digital libraries. Ultimately, this will help improve research quality in higher education.

2. METHOD

2.1 Research Design

This study employs a library research design with a qualitative descriptive approach. This method is chosen to provide a detailed and in-depth analysis of the factors that influence the quality of lecturers' research through the use of digital libraries. Library research involves collecting relevant data from various library sources, followed by reading, note-taking, and processing this data. This approach is particularly suited for examining existing literature and drawing conclusions based on the analysis of secondary sources.

2.2 Research Object

The research object in this study consists of various literature sources that discuss the relationship between the quality of lecturers' research and the use of digital libraries. These sources include academic books, journal articles, conference proceedings, research reports, scientific magazines, mass media, and academic papers. The research primarily focuses on literature published between 2010 and 2024, covering both physical and digital library collections. The selection of sources aims to encompass a wide range of perspectives on the topic while excluding primary data collection methods such as interviews or observations.

2.3 Data Collection

The data collection process was structured in the following steps: 1) Identification of Topics and Keywords: Initial identification of the key topics and keywords related to the research focus, such as "digital libraries," "lecturers' research quality," and "information literacy," which guided the selection of relevant literature; 2) Compilation of a Working Bibliography: A working bibliography was created based on the initial list of references found from academic databases and library catalogs; 3) Scheduling of Research Time: The research process was planned to ensure that there was sufficient time to gather a comprehensive and diverse set of literature sources; 4) Reading, Recording, and Grouping of Literature: The literature was carefully read, with notes taken and grouped according to the research variables, including the factors affecting research quality and the use of digital libraries; 5) Critical Evaluation of Findings: A thorough evaluation of the findings from various sources was conducted, focusing on the relevance and validity of the information.

2.4 Data Analysis

Data analysis in this study was carried out using content analysis and qualitative descriptive techniques. This involved interpreting the content of the selected literature to identify recurring themes and patterns related to the use of digital libraries in enhancing lecturers' research quality. The analysis was performed in three main stages: 1) Data Reduction: Identifying and selecting key information relevant to the research questions while discarding irrelevant or redundant data; 2) Data Presentation: Organizing the data into thematic categories that highlight the factors influencing the quality of research through digital libraries; 3) Conclusion Drawing: Synthesizing the findings

from the various sources to conclude the factors that affect the use of digital libraries and their impact on research quality. This process provided a comprehensive understanding of how digital libraries contribute to improving the quality of academic research among lecturers.

3. RESULT AND DISCUSSION

3.1 Result

Based on the results of data collection on the analysis of factors affecting the quality of lecturers' research through the use of digital libraries, the findings are presented in the table below:

Table 1. Findings on Factors Affecting Lecturers' Research Quality through the Use of Digital Libraries

Factor	Description	Impact on Research Quality
Information Literacy Skills	Lecturers' ability to efficiently search, assess, and utilize information from digital libraries.	Higher information literacy improves the quality of research by enabling lecturers to access relevant and reliable sources more effectively.
Access to Technology	Availability and usability of digital libraries, including the speed and reliability of the internet and platforms.	Access to up-to-date and reliable technology is essential for maximizing the use of digital libraries, leading to better research outcomes.
Institutional Policies	Policies and guidelines set by institutions to support the use of digital libraries in research.	Supportive institutional policies ensure that digital libraries are accessible and used effectively by lecturers, contributing to high-quality research.
Support from Librarians	Assistance provided by library staff in navigating and utilizing digital resources effectively.	Adequate librarian support enhances lecturers' ability to make the most of digital library resources, improving research quality.
Training on Digital Libraries	Availability of training programs for lecturers to improve their skills in using digital libraries.	Well-trained lecturers in using digital libraries are more likely to produce high-quality research due to better information retrieval and resource utilization skills.
Convenience of Use	Ease of access, usability, and user-friendly features of digital library platforms.	A convenient and easy-to-use digital library platform enables lecturers to quickly find relevant research materials, thus improving efficiency and the overall quality of their research.
Individual Lecturer Conditions	Personal factors, such as time management, motivation, and research focus, that influence the use of digital libraries.	Individual conditions affect how well lecturers engage with digital libraries. Those with strong personal research habits and motivation are more likely to use digital libraries effectively.
Technical Barriers	Challenges such as poor internet connection, limited access to digital platforms, or technical difficulties.	Technical barriers reduce the effectiveness of digital libraries, potentially leading to delays in research and lower-quality outcomes.

The table above identifies and describes various factors that significantly impact the quality of lecturers' research through the use of digital libraries. Information literacy skills are crucial, as lecturers with higher proficiency in navigating digital resources can access relevant and reliable information more effectively, thereby improving research quality. Access to technology, such as fast and reliable internet and digital library platforms, is equally important for maximizing the potential of these resources. Institutional policies and librarian support play a vital role by ensuring digital libraries are accessible and effectively utilized, which directly contributes to better research outcomes. Additionally, training programs that enhance lecturers' skills in using digital libraries are essential for improving research quality. The convenience of use and ease of access to digital platforms also make a significant difference, as user-friendly systems allow for efficient research processes. Finally, individual factors such as time management, motivation, and focus, alongside technical barriers like poor internet connection, can either hinder or enhance the effectiveness of digital library use, ultimately influencing the quality of lecturers' research.

3.2. Discussion

The findings of this study highlight several critical factors that affect the quality of lecturers' research through the use of digital libraries. One of the key factors identified is the level of information literacy among lecturers. Lecturers who possess strong information literacy skills can more efficiently search, evaluate, and utilize the vast amount of resources available in digital libraries, which in turn improves the quality and relevance of their research.

This finding highlights the need for targeted training programs to enhance information literacy skills, as well as the importance of making digital resources easily accessible. Access to technology also plays a pivotal role; lecturers with reliable internet and access to well-maintained digital library platforms experience fewer barriers to research and can better utilize digital resources, leading to higher-quality academic output (Liu et al., 2025). However, the study also highlights that institutional policies and librarian support are essential in facilitating the effective use of digital libraries. Universities and research institutions that provide clear guidelines and sufficient resources, along with knowledgeable librarians who can assist in navigating digital tools, contribute significantly to the research productivity and quality of lecturers.

On the other hand, the study also highlights several challenges that can impede the effective use of digital libraries, ultimately affecting the quality of research. One such challenge is the technical barriers, such as poor internet connectivity or limitations in accessing digital platforms, which can disrupt the research process. These technical difficulties often hinder lecturers from fully utilizing the digital resources available to them. Furthermore, the individual conditions of lecturers, including their time management skills and motivation, are significant determinants of how effectively they use digital libraries (Shahzad & Khan, 2023). Lecturers with strong personal research habits and the drive to engage with digital tools are more likely to produce high-quality research (Guillén-Gámez & Mayorga-Fernández, 2020). Conversely, those facing personal challenges or lacking sufficient motivation may struggle to leverage the full potential of digital libraries. The study suggests that addressing these barriers through institutional support, training, and improved access to technology is essential to ensure that digital libraries can be fully utilized to enhance the quality of research conducted by lecturers.

To become lecturers who provide the best service to students, universities need to understand what criteria define a professional, high-quality lecturer as expected by students. According to Kustiyati (2017), quality lecturers must possess strong pedagogical competencies, including the ability to plan, implement, and evaluate the learning process. They must also be able to create an enjoyable and interactive learning environment so that students feel engaged in the learning process (Mustomi, 2018). Professional lecturers have a significant influence on the quality of the teaching and learning process. Professional lecturers not only master the teaching materials but also employ effective and well-organized teaching methodologies, indicating that improving lecturers' methodological competence can create better learning conditions for students (Murni & Burhanudin, 2017).

Lecturers' performance not only affects the quality of the university but also has a direct impact on the development of their academic careers. Lecturers often spend most of their time on teaching, while research, primarily published research, is minimal and only meets the minimum requirements (Suhartini, 2020). Lecturers must understand research methodology to design effective research. Therefore, it is crucial for educational institutions to continuously provide training and resources to support lecturers' understanding of research methodologies. A lecturer's grasp of research methodology strongly influences the quality of students' theses, dissertations, and other academic works.

In today's competitive academic publishing era, the quality of lecturers' research is expected to be one of the key indicators of higher education quality. One way to produce high-quality scientific work is by utilizing digital libraries for research. If references in conventional libraries are outdated or insufficient, the presence of digital libraries makes research more efficient and accessible. Various technologies have emerged as Indonesia enters the Industrial Revolution 4.0 era, including those that apply to libraries, as digital libraries have been developed (Pradana, 2020). A digital library, also referred to as an electronic library, is an organization that provides expert staff and resources to curate, organize, provide access, translate, disseminate, maintain integrity, and ensure that digital collections remain accessible and affordable for a specific community (Saleh, 2019).

Researchers have highlighted the benefits of digital libraries. Digital libraries not only make information easily accessible at any time and from anywhere but also play a crucial role in enhancing the education and research of both students and faculty in higher education institutions. A heavy teaching load or extensive administrative tasks should no longer be a barrier for lecturers to find research references in libraries. Digital libraries can support lecturers' research in various ways: they accelerate the development of information and knowledge in digital formats, save storage space, provide multiple access for borrowers, and reduce costs due to the availability of computers (hardware, software) and network infrastructure 24/7. Therefore, digital libraries are often referred to as virtual libraries, electronic libraries, or libraries without walls.

One of the key factors driving research productivity is the interest and awareness of the importance of research. Additionally, research suggests that the expectations of junior and senior lecturers differ in conducting research. Junior lecturers tend to be motivated by extrinsic factors, while senior lecturers are more motivated by intrinsic reasons (Margaretha et al., 2012). According to researchers, lecturers' motivation and interest in research are influenced by their experience and understanding of using information technology, particularly digital library

platforms such as Google Scholar, JSTOR, ResearchGate, IEEE Xplore (ieeexplore.ieee.org), MUSE (muse.jhu.edu), the National Digital Library of Indonesia (Perpusnas), and Academia.edu.

By using these platforms, lecturers can collaborate in research, access diverse literature, and share knowledge. Additional factors affecting lecturers' research include the impact of access to digital libraries on academic studies and the facilitation of global dissemination of research findings. Journals, articles, e-books, and other types of scientific resources essential for the research process can be accessed quickly and widely through digital libraries. Digital libraries with comprehensive collections and access to the latest materials in various fields are more frequently used by lecturers. This is because digital libraries utilize advanced search algorithms and filtering options, allowing searches to be conducted based on year, type of publication, or specific keywords. However, some platforms can only be accessed through institutional subscriptions or paid access.

One of the most important components is information literacy skills. Lecturers who are skilled in searching, evaluating, and critically using information will be more effective in utilizing digital resources. Without these skills, even with access, using invalid or irrelevant sources may hinder the quality of research. Several factors can make it challenging for lecturers to use digital libraries effectively for research. Not all lecturers have the necessary experience or technical skills. Furthermore, a lack of understanding of advanced search features, filters, and reference management tools can obstruct efficient access to digital collections.

Consequently, training programs offered by journals or institutions may be limited due to geographical restrictions or may require special subscriptions. Additionally, unstable or slow internet connections in remote areas further complicate access. For lecturers working in institutions with limited budgets or universities with restricted international subscriptions, obtaining necessary materials can be difficult. Libraries can organize training and workshops to help users with information retrieval, reference management, and effective use of digital library technologies. Moreover, the increasing availability of Open Access content has played a significant role in reducing costs and expanding access to scholarly articles and publications. With more freely accessible content, lecturers can utilize a broader range of resources without being hindered by subscription fees.

The strength of this research lies in identifying the key factors that affect lecturers' research quality through the use of digital libraries. The study highlights that improving digital literacy, providing adequate institutional support, and offering training on the use of digital libraries are crucial for enhancing lecturers' research quality. By addressing these barriers, educational institutions can help lecturers fully utilize digital libraries, ultimately improving their academic output. This research makes a significant contribution to understanding the essential factors that influence the effective use of digital libraries in academic research and provides valuable guidance for higher education institutions to enhance the support systems and resources available to lecturers, thereby improving overall research quality.

4. IMPLICATIONS AND CONTRIBUTIONS

4.1 Research Implications

The theoretical implications of this study contribute to the existing body of knowledge on research quality in higher education, particularly in relation to the use of digital libraries. By highlighting the interplay between information literacy, access to technology, institutional policies, and personal factors, this study provides a comprehensive framework that extends theories on academic research and digital tool utilization. It emphasizes the importance of not only the technological aspects but also the human and institutional factors that influence research outcomes. The findings suggest that the quality of research is deeply interconnected with lecturers' ability to navigate digital resources effectively, which aligns with theories of digital literacy and self-regulation. Furthermore, the study highlights the importance of integrating support structures, such as training programs and librarian assistance, into academic environments to maximize the utilization of digital libraries. This theoretical contribution can inform future research on digital resource utilization in education and provide insights for the development of policies and practices that enhance the quality of academic research.

4.1 Research Contributions

The contribution of this study lies in its comprehensive exploration of the factors influencing the quality of lecturers' research through the use of digital libraries. By identifying key elements such as information literacy, access to technology, institutional policies, and personal conditions, the study provides valuable insights into how these factors collectively impact research quality. It emphasizes the importance of both technological infrastructure and human factors, such as training and librarian support, in optimizing the use of digital libraries. This research not only enriches our understanding of the academic research process but also offers practical recommendations for

higher education institutions to enhance their research support systems. Furthermore, it highlights the need for more targeted interventions, including training programs and policy reforms, to enhance lecturers' engagement with digital libraries, ultimately contributing to higher-quality academic output.

5. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

5.1 Research Limitations

A limitation of this study is its exclusive reliance on secondary data from literature sources, which may introduce bias due to the selection criteria and methodologies of the original studies. The study is also limited to publications from 2020 to 2024, potentially overlooking important foundational research or emerging trends from prior periods that could have provided a more comprehensive view of the factors affecting lecturers' research quality. Furthermore, the research primarily focuses on digital library use in higher education contexts, which may not fully capture the diverse challenges and opportunities faced by lecturers in various educational settings or disciplines. The absence of primary data, such as direct surveys or interviews with lecturers, also limits the ability to explore personal experiences and perspectives in greater depth. Future research could overcome these limitations by incorporating a wider range of sources, expanding the scope of analysis across various academic environments, and collecting primary data for more comprehensive insights.

5.1 Recommendation for Future Research Directions

Further research could focus on a more in-depth evaluation of the impact of institutional policies and librarian support on lecturers' use of digital libraries. Furthermore, additional research could investigate how social and cultural factors within the academic environment, such as collaboration among lecturers or access to research communities, impact the effectiveness of digital library use. Research can also identify specific challenges faced by faculty members in their research processes and develop innovative solutions to address these obstacles. Finally, experiments or longitudinal studies involving intensive training for faculty members in the use of digital libraries can provide insights into the direct relationship between improved digital skills and the quality of research produced.

6. CONCLUSION

The study highlights the pivotal role digital libraries play in enhancing the quality of lecturers' academic studies by offering convenient access to a broad range of scholarly materials. In the digital age, these libraries serve as essential tools for lecturers to conduct research, update their knowledge, and contribute to academic advancements. However, despite the vast availability of digital resources, many lecturers continue to encounter obstacles that prevent them from effectively utilizing these libraries. Key challenges include insufficient information literacy skills, limited access to technology, and a lack of institutional support. These barriers prevent lecturers from making full use of digital libraries, which in turn negatively impacts the quality of their academic studies.

The findings of this study emphasize the critical importance of improving lecturers' digital literacy as a foundational step toward enhancing their ability to navigate and utilize digital libraries effectively. Information literacy, which includes skills such as search techniques, critical evaluation of sources, and efficient resource management, is essential for lecturers to fully capitalize on the potential of digital libraries. Beyond digital literacy, institutional policies and support structures are also key to fostering an environment that encourages lecturers to integrate digital library resources into their academic practice. This support can take the form of providing access to the latest technological tools, offering dedicated librarian support, and developing institutional programs that promote continuous professional development for lecturers.

In conclusion, the study stresses that a holistic approach to improving lecturers' study quality through the use of digital libraries requires addressing several interrelated factors. These include enhancing digital literacy, providing robust institutional support, and offering targeted training programs to ensure lecturers are equipped with the skills and resources they need to thrive in an increasingly digital academic landscape. By tackling these issues, higher education institutions can foster a more supportive and effective research environment, ultimately empowering lecturers to leverage digital libraries to their fullest potential. This, in turn, will contribute to the enhancement of academic studies and the advancement of knowledge in higher education, leading to better academic outcomes and a more dynamic research culture within universities.

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CRediT Authorship Contribution Statement

All authors discussed the results, contributed to the final manuscript, and approved the final version for publication. Desika Handayani: Conceptualization; Methodology, Writing - Original Draft. Ririn Rizki Apdasuli: Conceptualization, Formal analysis, Data Curation. Desy Eka Citra Dewi: Conceptualization, Writing - Review & Editing.

Declaration of Generative AI (GenAI) Usage in Scientific Writing

The authors state that in this study, artificial intelligence (AI) was used to support the data collection and analysis process, particularly during the literature review phase. AI tools were employed to streamline the identification of relevant academic sources, categorize findings, and identify key themes from various academic documents. Additionally, AI-supported software was utilized for content analysis, which facilitated the processing of large volumes of data, thereby enabling a more efficient synthesis of information related to the factors affecting lecturers' research quality through the use of digital libraries. The use of AI enhanced the accuracy and efficiency of the research process, allowing for a more comprehensive and systematic analysis of the literature. All instances of Generative AI usage in this article were conducted by the authors in accordance with the SAJGTIE GenAI Tool Usage Policy, with the authors assuming full responsibility for the originality, accuracy, and integrity of the work."

Conflict of Interest Statement

The authors declare that they have no conflicts of interest related to the publication of this study. The research was carried out with complete independence, and no financial or personal affiliations influenced the study's results.

Informed Consent Statement

The author declares that this study is a literature review and does not involve human participants, personal data, or any other subjects. Therefore, written and verbal informed consent is not required. The entire research process was conducted in accordance with academic ethical standards, upholding scientific honesty, integrity, and the ethical use of legitimate sources.

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