

Enhancing research productivity through bibliometric analysis: A community service training for academics

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Abstract

Academics often face challenges in effectively navigating and analyzing the vast and growing body of scientific literature, which limits their ability to identify collaboration opportunities and emerging research trends. This study highlights developing and implementing a community service program to enhance academics' research productivity through bibliometric analysis training. Conducted online on September 6, 2024, the program gathered 34 lecturers and researchers from diverse fields. The training comprehensively introduced bibliometric concepts and practical applications, utilizing tools such as VOSviewer and Scopus Analyze. Participants gained skills in processing bibliographic data, mapping collaboration networks, and identifying emerging research trends. The initiative improved participants' understanding of bibliometric techniques and empowered them to enhance research quality and productivity. Positive feedback from participants underscores the program's success and potential to drive broader academic impact.

Keywords: Bibliometric analysis, research productivity, community service, training program.

Abstrak

Penelitian ini menyoroti pengembangan dan pelaksanaan program pengabdian masyarakat yang bertujuan meningkatkan produktivitas penelitian para akademisi melalui pelatihan analisis bibliometrik. Program ini diselenggarakan secara daring pada 6 September 2024 dan melibatkan 34 dosen serta peneliti dari berbagai bidang. Pelatihan ini memberikan pemahaman mendalam tentang konsep bibliometrik serta aplikasi praktisnya dengan menggunakan alat seperti *VOSviewer* dan *Scopus Analyze*. Peserta memperoleh keterampilan dalam mengolah data bibliografis, memetakan jaringan kolaborasi, dan mengidentifikasi tren penelitian terkini. Inisiatif ini berhasil meningkatkan pemahaman peserta tentang teknik bibliometrik dan memberdayakan mereka untuk meningkatkan kualitas serta produktivitas penelitian. Umpan balik positif dari peserta menegaskan keberhasilan program ini dan potensinya untuk memberikan dampak yang lebih luas dalam dunia akademik.

Kata kunci: Analisis bibliometrik, produktivitas penelitian, pengabdian masyarakat, program pelatihan.

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1. Introduction

Bibliometric analysis has emerged as a pivotal methodology in academia. It provides researchers with quantitative tools to assess publications, measure scholarly impact, and identify emerging trends. This approach is particularly beneficial for navigating the ever-expanding body of scientific literature and fostering interdisciplinary collaborations. The following discussion outlines the primary aspects of bibliometric analysis and its implications for advancing research.



Bibliometric studies have illuminated dynamic trends in various research fields. For example, the domain of mesenchymal stem cells in cardiovascular diseases has experienced significant publication activity, with China leading in research output. However, these contributions often need more high-quality articles, as Jiang et al. (2024) noted. Similarly, in the field of ophthalmology, systematic reviews and meta-analyses have grown at an impressive annual rate of 21.26%, reflecting an increasing emphasis on evidence-based practices (Fu et al., 2023). Such analyses spotlight areas of intense scientific focus and identify opportunities for improving research quality and innovation.

Bibliometric tools, such as VOSviewer, are instrumental in mapping collaborations and visualizing the interconnectedness of researchers and institutions. For instance, research on obsessive-compulsive disorder reveals that developed countries dominate collaborations and scholarly output (Tang et al., 2023). The lack of broader collaboration, as highlighted by Vlase and Lähdesmäki (2023), underscores the need for more inclusive and diverse partnerships across institutions.

Academics today face numerous challenges in keeping pace with the rapid growth of scientific literature. With the overwhelming volume of publications, researchers often struggle to identify critical trends, collaboration opportunities, and impactful studies within their fields. This issue is further compounded by limited access to advanced bibliometric tools and training, particularly in developing regions, which restricts the capacity of academics to analyze and enhance their research productivity effectively. Bibliometric analysis has been recognized as a pivotal methodology in addressing these challenges, providing quantitative tools to evaluate publications, measure scholarly impact, and uncover emerging research trends (Garner et al., 2018).

Despite its transformative potential, bibliometric analysis poses challenges for researchers, particularly those with limited technical expertise or access to resources (Suyoto et al., 2024). These barriers prevent the full utilization of bibliometric techniques, potentially limiting research visibility and the development of impactful collaborations (Purwanto, Tafridj, et al., 2024b). Addressing these gaps through training and resource allocation is essential to maximize the benefits of bibliometric analysis in the academic landscape (Purwanto, Tafridj, et al., 2024a).

The importance of this activity lies in its ability to address these barriers by equipping researchers with the skills to analyze large datasets, identify collaboration networks, and improve their academic visibility. Limited technical expertise and resources often hinder academics from utilizing bibliometric tools to their full potential, particularly in underrepresented regions. As Jiang et al. (2024) highlighted, this gap usually results in missed opportunities for high-impact research and collaboration. Fu et al. (2023) further emphasized that structured training can enhance the quality of systematic reviews and research outputs, which is essential for driving innovation and academic excellence. Researchers risk falling behind in a competitive global educational landscape without such initiatives.

Recognizing this need, a community service initiative was launched to enhance academics' research capacity through bibliometric analysis training. This program aimed to equip participants with theoretical knowledge and practical skills to integrate bibliometric tools into their research workflows. By utilizing platforms like VOSviewer and Scopus Analyze, the training provided a comprehensive introduction to analyzing bibliographic data and visualizing research networks.

Held on September 6, 2024, the online training session brought together 34 lecturers and researchers from diverse fields. The event sought to empower participants to improve their research productivity and publication quality by strategically using bibliometric insights. Through an interactive and hands-on approach, the training emphasized practical applications, fostering an environment where participants could directly apply what they learned to their research contexts. This paper outlines the training initiative's methods, outcomes, and broader impact.

2. Community development method

The bibliometric analysis research training was conducted online on September 6, 2024, using the Zoom platform. This program was designed to equip participants with theoretical knowledge and practical experience in applying bibliometric analysis methods. Thirty-four lecturers and researchers participated in the event, representing various campuses and study programs. Participants came from universities in Jakarta, Banten and West Java, and other institutions. They teach in diverse study programs, including management, engineering, and social sciences. This diversity enriched the discussions and ensured the applicability of bibliometric analysis across multiple disciplines. The training began with an opening session led by the moderator, followed by a welcome address from the head of the Tri Dharma Perguruan Tinggi community. This session introduced the training objectives and highlighted the importance of bibliometric analysis in advancing research quality and impact.

The theoretical presentation session provided a comprehensive introduction to bibliometric analysis. Key topics included the definition and benefits of bibliometric analysis, an introduction to Scopus Analyze, an overview of tools like VOSviewer, and strategies for identifying research trends and collaboration networks (Purwanto, Nugraha, et al., 2024). The material was delivered interactively, utilizing slide presentations and live discussions to engage participants effectively.

The practical segment of the training focused on hands-on exercises with bibliometric tools. Facilitator demonstrated using Scopus Analyze and VOSviewer, guiding participants through critical tasks such as importing and processing bibliographic data from the Scopus database, analyzing collaboration networks among researchers, clustering keywords, and visualizing analysis results (Purwanto, Iskandar, et al., 2024). Direct technical support was provided, and participants practiced each step collaboratively to solidify their understanding.

Following the practical session, a discussion and Q&A session addressed any challenges encountered during the exercises. Participants had the opportunity to seek

solutions to technical issues and inquire about the application of bibliometric analysis in their research. This interactive session provided valuable insights and personalized guidance.



Figure 1. Q&A Session

The event concluded with a closing session and evaluation. Participants completed an online questionnaire to provide feedback on their experience, and the community service team summarized the key takeaways from the training while expressing gratitude to the participants.

Zoom served as the primary platform for communication and collaboration, with VOSviewer being the primary tool for bibliometric analysis simulations. Technical guides and training materials were shared via downloadable links, ensuring accessibility for all participants. The online format allowed individuals from various locations to participate actively and effectively, overcoming geographical barriers and promoting inclusivity in the learning process.

3. Results community development

The bibliometric analysis training conducted on September 6, 2024, via Zoom successfully achieved its objectives, providing significant outcomes for the participants and the broader academic community. The main results are summarized as follows:

Enhanced Understanding of Bibliometric Analysis

Participants demonstrated an improved grasp of bibliometric analysis concepts, particularly their utility in research and academic publications. This was evidenced by the active discussions and their ability to identify research trends and potential collaboration opportunities through bibliographic data analysis.

Participants understood the fundamental concepts of bibliometric analysis, including its benefits for research and academic publication. This was evident in the discussions and Q&A sessions, where participants demonstrated their ability to identify research trends and recognize potential collaboration opportunities through bibliographic data analysis.

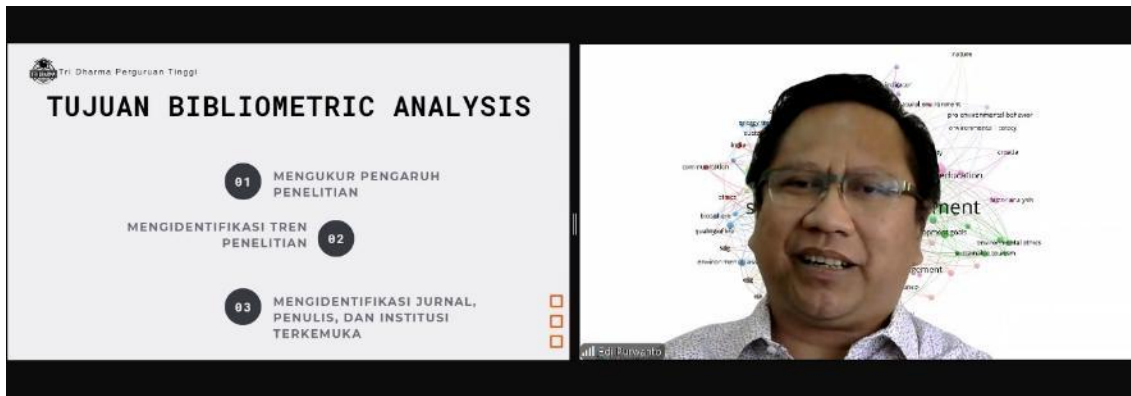


Figure 2. Facilitator Introducing Bibliometric Analysis

As shown in Figure 2, the facilitator provided an introductory explanation of the concepts and objectives of bibliometric analysis. The material covered three key aspects: (1) measuring research impact, (2) identifying research trends, and (3) recognizing prominent journals, authors, and institutions relevant to specific research fields. This explanation was supported by visualizations and relevant network maps, offering participants a comprehensive understanding of how bibliometric analysis can enhance research quality and productivity (Pitaloka et al., 2024). The session was met with enthusiasm, as participants actively engaged by asking questions about the practical applications of the method.

Mastery of Tools and Analytical Techniques

Participants demonstrated the ability to effectively use the VOSviewer software for (1) Processing bibliographic data from databases such as Scopus and (2) Creating research network visualizations based on keywords, author collaborations, and publication trends.

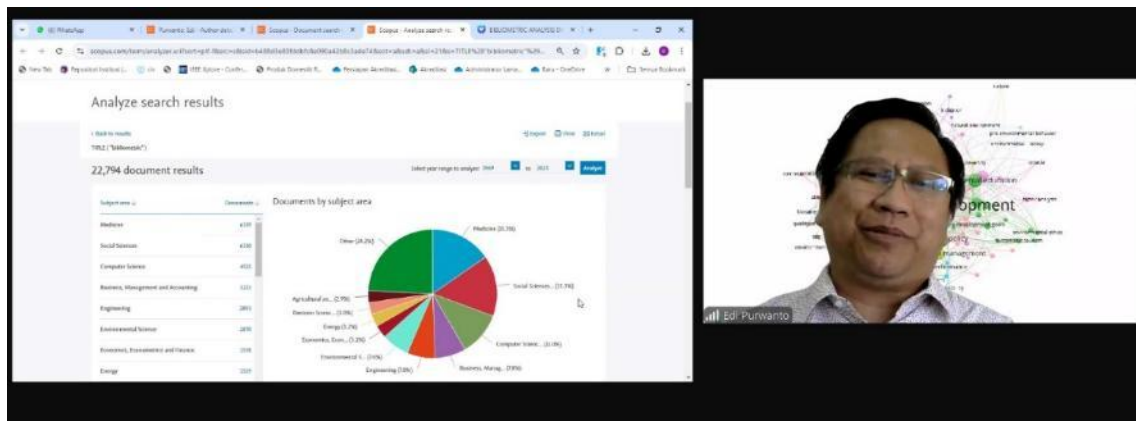


Figure 3. Facilitator Demonstrating Scopus Analyze

As illustrated in Figure 3, the facilitator provided an example of utilizing the Scopus Analyze feature to analyze publication data comprehensively. The results, visualized as a distribution diagram of documents across subject areas, highlighted the proportion of research in various fields such as computer science, engineering, and social sciences (Dwianika et al., 2024). The facilitator explained how to leverage this feature to explore research trends, evaluate the distribution of study areas, and identify emerging topics. This explanation aimed to help participants understand how Scopus

analysis tools can support research strategies and publication efforts, reinforcing their grasp of bibliometric data relevance for designing more focused and competitive studies.

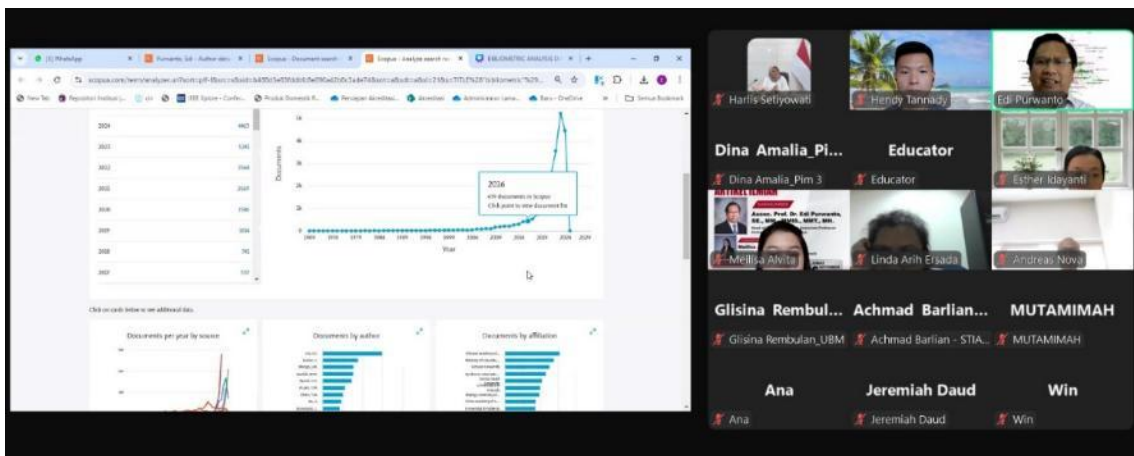


Figure 4. Advanced Demonstration of Scopus Analyze

Figure 4 showcases a more advanced demonstration of the Scopus Analyze feature, where the facilitator examined publication trends over time. The visualization depicted the growth of publication volume year by year, offering insights into the increasing research activity on specific topics (Purwanto & Irawan, 2023). Additionally, the facilitator highlighted document distribution by institutional affiliation and author, enabling participants to identify prominent institutions and individuals within their research areas.

This session provided participants with practical knowledge on how to utilize Scopus data for strategic research decision-making. Participants were encouraged to use this data to select relevant research topics and build collaborative networks with leading authors or institutions. The demonstration enhanced participants' technical skills in employing bibliometric tools to meet their research and publication needs.

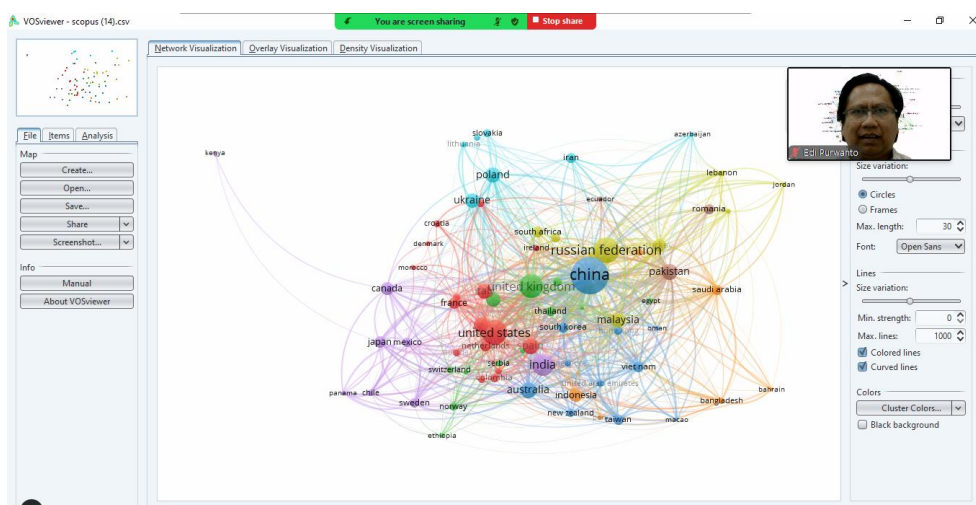


Figure 5. Bibliographic Coupling by Countries

Figure 5 illustrates the facilitator teaching participants how to visualize bibliographic coupling by country using the VOSviewer software. This visualization highlights the

relationships between countries based on shared references in scientific publications. Larger nodes, such as those representing China, the United States, and the Russian Federation, indicate more publications and stronger connections with other nations. The colors of the nodes and the connecting lines depict clusters of collaboration or more robust connectivity within specific groups of countries.

The facilitator explained that this analysis can help identify dominant and highly active countries in particular research topics. It also aids participants in understanding global collaboration patterns and the positioning of their own country within the global research network. This session provided participants with valuable insights into potential international collaboration opportunities to explore in the future.

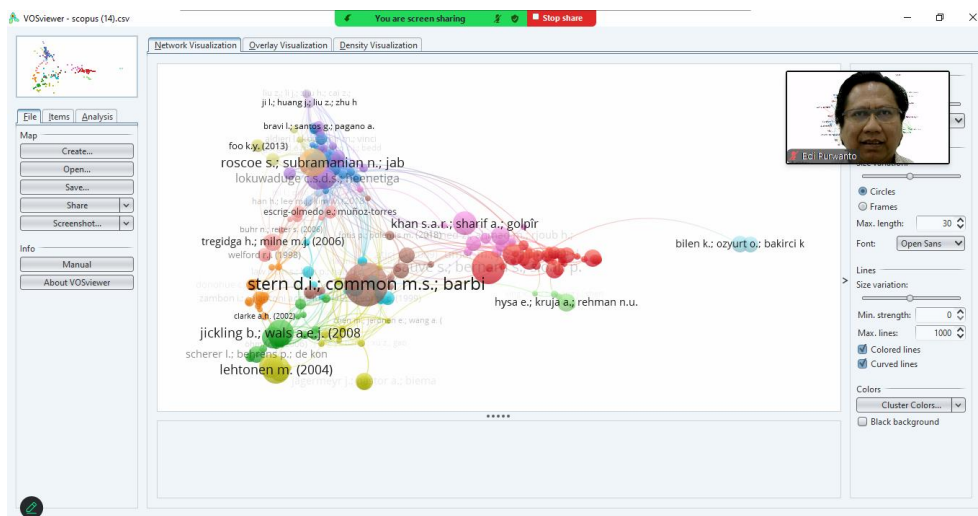


Figure 6. Bibliographic Coupling by Documents

Figure 6 presents a visualization of bibliographic coupling by documents generated using the VOSviewer software. In this visualization, each node represents a research document, with the node size indicating the document's connectivity based on shared references. Larger nodes, such as works authored by Stern D.I., Common M.S., and Barbier E.B., signify highly connected documents, reflecting their significant influence within a specific research network. The lines connecting nodes illustrate shared references between documents, while node colors represent clusters or thematic groupings of documents with similar topics.

The facilitator explained that this analysis is instrumental in identifying key documents within a research field, which can serve as critical references for participants when preparing literature reviews. Additionally, the visualization helps participants understand the interconnections between documents in the research network, providing a clearer perspective on the literature structure and strengthening their ability to define relevant research directions.

Figure 7 presents a citation map visualizing the relationships between authors and influential publications within a specific research field. Generated using VOSviewer, the map displays nodes representing publications or authors. The size of each node reflects the level of influence, as measured by the number of citations received. Larger nodes, such as those representing works by Stern D.I., Common M.S., and Barbier

E.B., indicate significant academic impact. The connecting lines between nodes illustrate citation relationships, signifying contributions to developing knowledge networks in the field.

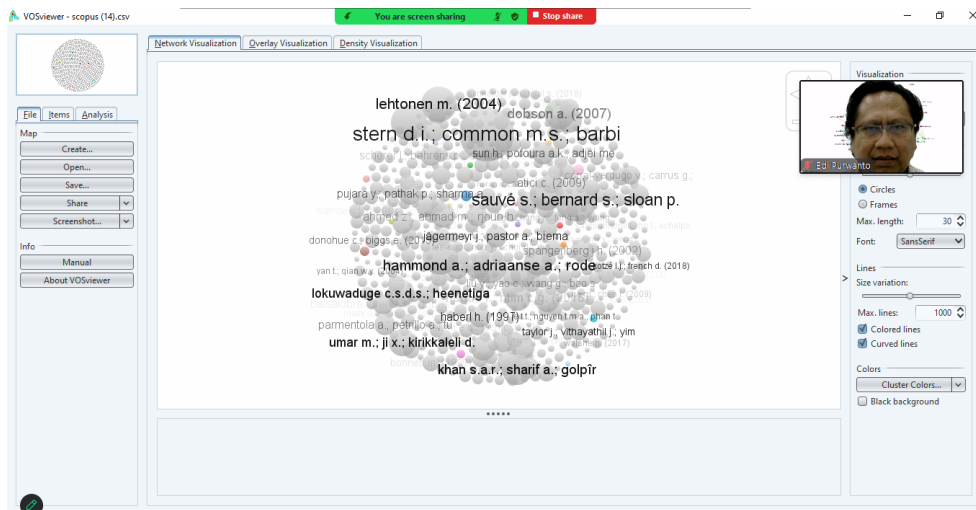


Figure 7. Citation Map of Influential Authors and Publications

The facilitator explained that this map is precious for identifying seminal works that serve as foundational references in research. Participants were encouraged to analyze citation patterns to discover key authors and publications relevant to their research topics. This visualization provided strategic insights for participants to strengthen their literature reviews and expand their research networks effectively.

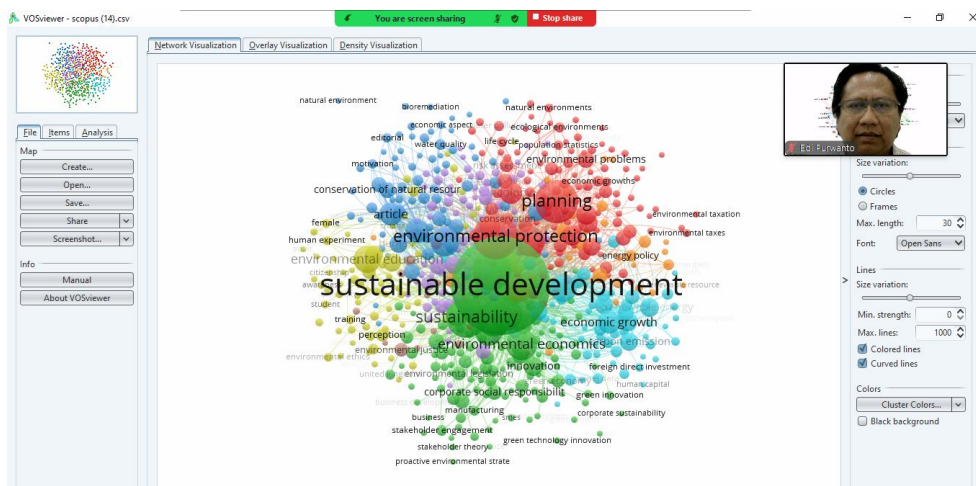


Figure 8. Network Visualization of Co-occurring Keywords

Figure 8 illustrates a network visualization highlighting the connections between frequently co-occurring keywords in research publications on specific topics. Created using VOSviewer, the visualization emphasizes how keywords such as *sustainable development*, *environmental protection*, and *sustainability* occupy central positions in the network, reflecting their high relevance and frequency in the literature.

Each node in the visualization represents a keyword, with its size corresponding to the frequency of its occurrence in documents. Node colors indicate thematic clusters or related research topics, such as the red cluster focusing on *planning and policy*, the green cluster centered on *sustainability*, and the blue cluster associated with

environmental protection and *economic growth*. Lines connecting nodes represent relationships between keywords, showcasing how these concepts interrelate within the research framework.

The facilitator emphasized that this analysis enables participants to identify critical topics, emerging trends, and conceptual interconnections in their fields. By leveraging this information, participants can strategically focus their research efforts, identify growing areas of interest, and deepen their understanding of the literature's structure. Additionally, this visualization is crucial for exploring interdisciplinary collaboration opportunities in sustainable research initiatives.

Commitment to Action & Evaluation

Several participants expressed their intention to immediately implement bibliometric analysis methods in their research activities and committed to enhancing their scientific publication productivity using these tools. To assess the training's success, participants were asked to complete an online questionnaire after the event. The results revealed overwhelmingly positive feedback.

The training successfully enhanced participants' competencies in bibliometric analysis. Most participants expressed readiness to integrate these methods into their research and publication strategies, which is expected to contribute significantly to the productivity of the academic community.

The training was deemed a success, achieving its planned objectives. Technology and interactive approaches were crucial factors contributing to its effectiveness. With the valuable feedback from participants, the program holds great potential for further development to create an even broader impact.

Discussion

The bibliometric analysis training demonstrated its relevance and practicality in equipping participants with essential skills to enhance their research productivity (Garner et al., 2018). The program provided a balanced approach by introducing theoretical foundations and hands-on exercises, allowing participants to understand the concepts and immediately apply them in practice (Pernitez-Agan et al., 2024). Tools such as VOSviewer and Scopus Analyze were particularly effective in helping participants visualize collaboration networks, analyze bibliographic data, and identify emerging research trends. Feedback from participants highlighted the usefulness of bibliometric techniques in refining research strategies, identifying influential works, and fostering international collaborations. Despite the online format, the training overcame geographical barriers, offering an inclusive learning experience emphasizing interactivity and accessibility (Kandeel et al., 2023).

Participants' challenges, such as limited prior exposure to bibliometric tools and technical difficulties, were mitigated through personalized guidance and support from the facilitators (Asampong et al., 2023). This underscores the importance of effectively addressing skill gaps and providing adequate resources to implement bibliometric techniques (Lo Hog Tian et al., 2022; Cassell et al., 2022). The training's success

indicates its potential to serve as a model for future community service programs to enhance academic research capacity, particularly in regions with limited access to advanced research methodologies (Penkunas et al., 2021).

Implications

The outcomes of this training underscore the strategic importance of bibliometric analysis in advancing academic research and publication quality. By fostering a deeper understanding of bibliometric tools, the program improved participants' technical skills and positioned them to contribute more effectively to global research networks. Identifying research trends and establishing collaborations can significantly enhance the visibility and impact of academic work, particularly for researchers in developing countries. Furthermore, the program's interactive and practical approach is a replicable framework for similar initiatives, emphasizing the value of hands-on learning in skill development.

The positive feedback from participants also suggests broader implications for institutional research strategies. Universities and research organizations can integrate bibliometric training into their capacity-building programs to foster a culture of data-driven decision-making in research. By doing so, they can strengthen their research output, attract international collaborations, and improve their overall standing in the academic community.

Future Initiatives

Building on the success of this training, future community service programs could expand their scope to include more advanced bibliometric techniques and a more comprehensive range of participants. For example, tailored sessions could be designed for specific disciplines, enabling researchers to address unique field challenges. Additionally, incorporating follow-up workshops or mentorship programs could help participants consolidate their skills and apply bibliometric tools to their ongoing research projects.

Another potential avenue for development is the establishment of regional bibliometric hubs or online communities where researchers can share resources, exchange best practices, and collaborate on bibliometric studies. These hubs could serve as platforms for fostering long-term engagement and capacity building. Finally, leveraging partnerships with universities, research institutions, and funding agencies could ensure the sustainability and scalability of such initiatives, ultimately contributing to a more globally connected and productive academic community.

4. Conclusion

The bibliometric analysis training program successfully achieved its objectives, demonstrating significant contributions to enhancing academics' research productivity and capacity. By integrating theoretical knowledge with practical exercises, participants developed essential skills in processing bibliographic data, mapping collaboration networks, and identifying emerging trends. Tools such as VOSviewer and Scopus Analyze proved effective in facilitating these outcomes. The positive feedback

received underscores the program's impact, highlighting its relevance and practicality for researchers from diverse disciplines.

This initiative addressed participants' immediate needs and established a foundation for broader academic collaboration and innovation. By overcoming geographical and technical barriers through an accessible online format, the program set a benchmark for future community service projects. Continued efforts to expand and refine such training programs will ensure sustained growth in research quality and global academic engagement, particularly in underrepresented regions.

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