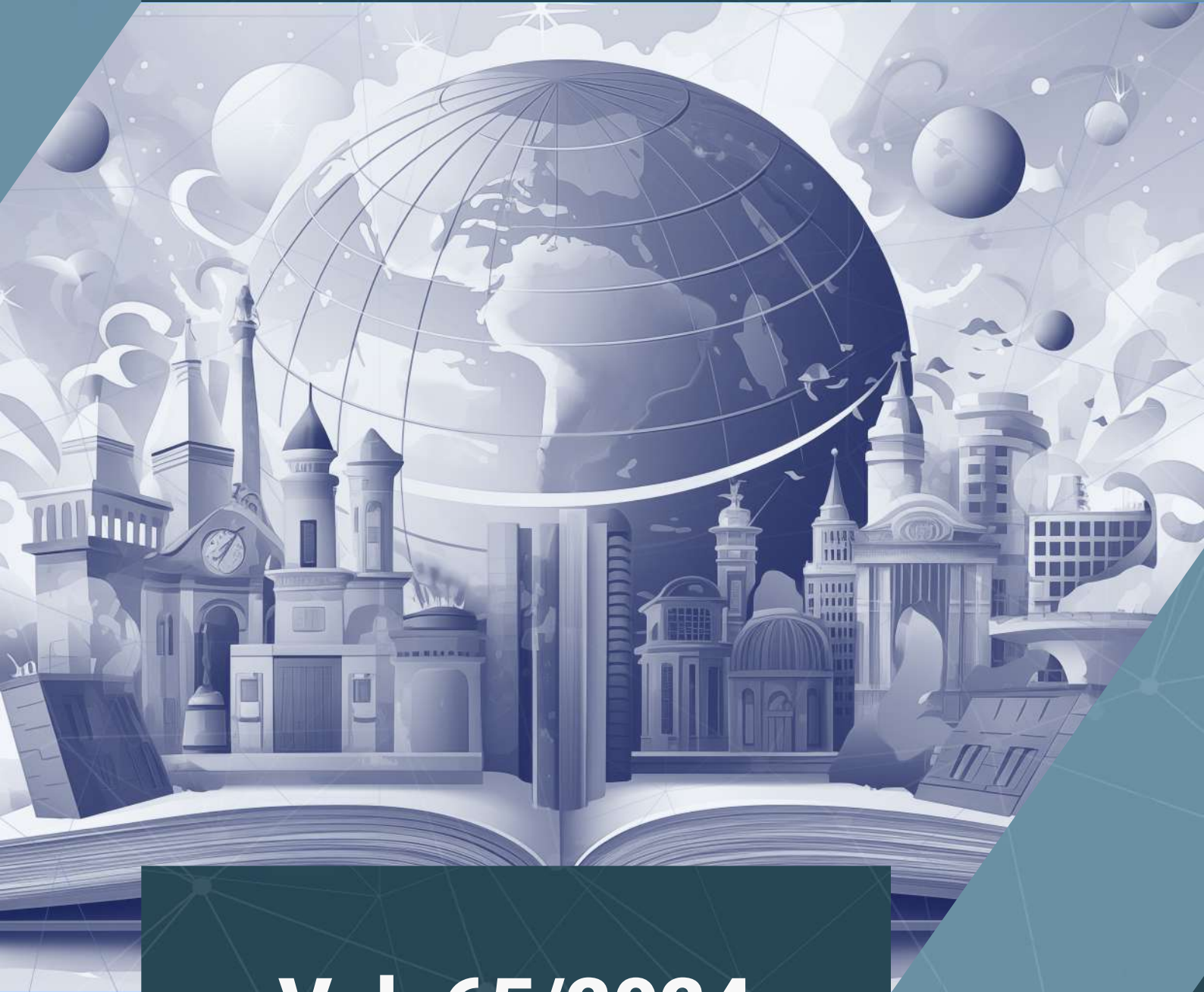




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A Bibliometric Analysis of Geographical Studies: A case study, Universitas Negeri Manado

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ABSTRACT

This bibliometric study aims to analyse the research contributions of Universitas Negeri Manado (Unima) in the field of geography. The web application Biblioshiny and the bibliometric software VOSviewer were used for this purpose. The analysis uses visual representations of sources, authors and documents to illuminate the conceptual, intellectual and social structures within which these elements operate, thus providing insights that can inform future directions in geography research and identify avenues for improvement. The results show a significant increase in geography research publications in Unima, particularly noticeable from 2020 onwards. This suggests an increased interest and focus on the part of lecturers and researchers. In particular, the journals *Geographia: Geography Education and Research* and *Episentrum Journal*, it can be concluded from this analysis that they represent the two most important platforms for the publication of geography research at Unima. This is in line with the principle of Bradford's Law, which describes the uneven distribution of scholarship within a discipline. The contributions of leading researchers such as Xaverius Erick Lobja (XEL), Hermon Maurits Karwur (HMK) and Maxi Tendean (MT) are significant. This is evidenced by their extensive publications and their impact on the geography literature at Unima. The distribution pattern of authors and articles follows Lotka's law, where a small proportion of authors are highly productive, while most publish fewer articles. In addition, this study highlights the continuity of research over a long period of time, illustrating a deep commitment to the advancement of geographical knowledge at Unima. Keyword analysis and direct citation network construction were used to identify areas of focus in geography research. This study provides a comprehensive understanding of the evolution of geography research at Unima, providing a basis for strategic decision-making in shaping future research directions and fostering collaboration among researchers in the field.

Keywords: *bibliometric analysis, geography research, Universitas Negeri Manado (Unima), Biblioshiny, VOS viewer, research trends.*

1. INTRODUCTION

Geographic research is a crucial element in elucidating the intricacies of spatial phenomena and the multifaceted ways in which humans interact with their environment. [1], [2]. Universitas Negeri Manado (Unima) is a significant contributor to the field of geography in Indonesia. However, a comprehensive bibliometric evaluation of geography research at Unima is currently unavailable. Geography is an essential discipline for understanding the intricate complexities of our global environment. [3], [4], [5]. As a field of study

that is constantly evolving, research in geography is conducted by lecturers and researchers with the objective of obtaining results that are not only theoretical, but also have practical applications [6], but it's also practical [7], [8], furthermore, they facilitate the advancement of scientific knowledge [9], [10].

The findings of research conducted by lecturers and researchers are frequently disseminated through the publication of articles in a range of academic journals, both nationally and internationally. These publications present a valuable opportunity for the scientific community to stay abreast of the latest developments

and insights emerging from research [11]. Moreover, the act of disseminating research findings is an integral aspect of the professional obligation incumbent upon lecturers and researchers in their respective domains of scholarship [12]. Through the dissemination of their research findings in academic journals and other publications, they contribute to the advancement of scientific knowledge and the expansion of scientific comprehension [13], [14]. Moreover, academic publications serve to illustrate the institution's dedication to the advancement of knowledge and its contributions to society [15]. In order to facilitate the dissemination of knowledge and research findings [16], [17], the publications produced reflect the university's commitment to maintaining strong and productive relationships with both the wider academic community and the public at large [7], [18], [19]. Consequently, publications serve not only as an indicator of individual success in research, but also as a measure of the extent to which the university is making a meaningful contribution to the advancement of science and the betterment of society [19]. In addition to the publication of academic journals, there are numerous other formats in which research can be disseminated, including books, academic chapters, articles, and collections of articles. The aforementioned types of publications facilitate access to and utilisation of research outcomes by both the general public and experts, thereby advancing scientific knowledge [20]. In the context of scientific development, the analysis of research trends within a given field and the identification of individuals and researchers who have conducted research on a particular topic over a specified time period represents a crucial aspect of knowledge pertaining to educators and researchers [16], [21], [22].

Bibliometrics is a set of mathematical and statistical methods for quantitatively evaluating various forms of published literature, including academic journals, the authors of those articles, and other published works in a variety of fields [12], [21], [23], [24], [25]. A bibliometric analysis was conducted [26]. The overall centres can be observed by lecturers and researchers, who can also estimate development trends in a scientific field. To date, this convenient analytical approach has been applied in the field of physical geography [27], [28], Geographic Information System [29], Spatial analysis [14], Geography education [30], dan Human geography [16]. The present study aims to gain insight into the role of Unima in relation to geographical studies, employing a bibliometric analysis approach. This is with a view to offering valuable information for future research and identifying areas for enhancement in the field of geography.

2. MATERIALS AND METHODS

2.1. Data sources and research strategies

The data were sourced from the Google Scholar (GS) core database and extracted on 15 April 2024. In accordance with the established learning protocol, the search formula was constructed as follows: **Ts = [(‘geography’ OR ‘geography science’) AND (‘geography education’ OR ‘human geography’ OR ‘university’ OR ‘state’ OR ‘Manado’)]**. This formula was used to search for literature published between 2003 and 2024. Two reviewers undertook an independent review of the titles and abstracts of the above records. Any discrepancies that arose during the screening process were resolved through discussion between the two reviewers or by consulting a third reviewer if necessary. Finally, 160 publication records from 184 articles were screened according to the theme of geography at Universitas Negeri Manado. The extracted data included reference type, title, journal, publication date, author name and affiliation, and abstract.

2.2. Analysing data

The BIB files were imported into Biblioshiny, a web application for bibliometric tools developed in R version 2023.12.1 Build 402 (Institute for Statistics and Mathematics, Vienna, Austria; www.r-project.org) [31], [32]. The application is primarily employed for the visualisation of document sources, authors, and analyses, as well as the presentation of these elements in a conceptual, intellectual, and social structure, utilising the Bibliometrix package. Furthermore, the process was repeated using VOSviewer version 1.6.20, a bibliometric program for the construction and visualisation of networks, in order to validate the results [33], [34]. The analysis of annual scientific production and average citations was conducted in order to evaluate the overall trends within the field. The contribution of country journals and authors of significant influence to research production was evaluated based on the number of citations they received. In order to identify the journals and authors that are at the centre of attention in this field, bibliometric analysis methods, such as Bradford's law, Lotka's law, and the h-index, were employed. Furthermore, a visualisation of the collaboration between research titles and abstracts was conducted in order to gain insight into the dynamics of relationships within the field of geography research. To identify areas of interest, a keyword analysis was conducted, along with a review of key documents and the construction of direct citation networks. Furthermore, an in-depth examination of the specific content of relevant articles was conducted in order to gain a deeper understanding of the trending topics in the field.

3. RESULTS

3.1. Annual Publication and Quotation

A search process conducted on Google Scholar yielded 184 articles deemed relevant to the topic under investigation. The inaugural digitally recorded geography research publication at Universitas Negeri Manado, complete with full citation information, was published in 2003. This inaugural publication pertains to the subject of forest destruction and preservation in Kei Kecil Sub-district, Southeast Maluku Regency, Maluku Province. The number of articles published per year exhibited a marked increase in 2020. In 2018 and 2019, the number of articles published per year increased to 13. However, a notable surge in growth has only been observed since 2020, suggesting that lecturers (teaching staff) are engaged in scientific advancement or exploring novel research avenues. This underscores the growing significance of geography in the realm of education and its immense potential for further development. As illustrated in Figure 1, the number of article citations reached its highest point in 2006 and 2024, indicating the emergence of pivotal research outcomes in those years.

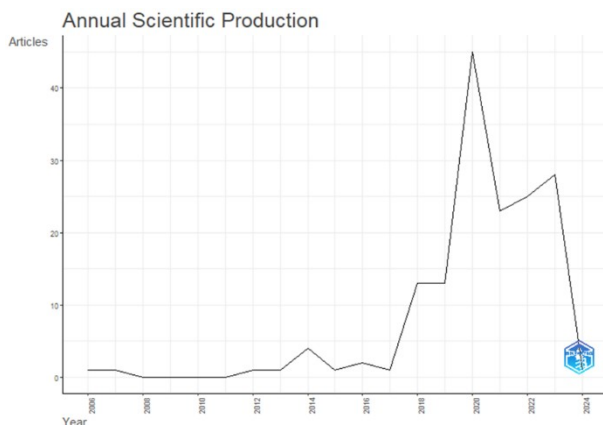


Figure 1 Annual Scientific Production Chart

3.2. Most Relevant Sources

In order to gain insight into the relevant literature on this topic (Figure 2), Geographia: The Journal of Geography Education and Research was identified as the primary source, with the highest number of articles (38). The Episentrum Journal was the second most prolific source, with 16 articles, while the proceedings from the 3rd International Conference on Social Sciences (ICSS 2020) and the International Conference on Social Science 2019 (ICSS 2019) contributed 10 and 9 articles, respectively. These publications also made valuable contributions to the expansion of insights on this topic.

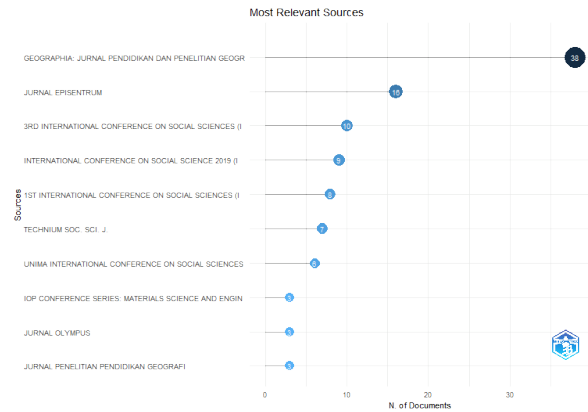


Figure 2 Graph of most relevant sources

3.3. Core sources by Bradford's Law

The concept of Bradford's Law, which originated in the field of information science, describes the distribution pattern of documents or scholarly works within a specific subject area. The concept posits that the number of documents or scholarly works on a given subject is unevenly distributed, with the majority of works concentrated in a few key information sources or journals. In the context of this study (Figure 3), the frequency of document occurrence in Geographia is as follows: The Journal of Geography Education and Research is cited 38 times, representing a cumulative frequency of 38. This indicates that the journal contains 38 documents in total. In contrast, the frequency of document occurrence for Episentrum Journal is 16, with a cumulative frequency of 52. In total, the Episentrum Journal contains 52 documents. This pattern suggests that the majority of documents or scholarly works on geography may be concentrated in a few key journals, such as Geographia and Episentrum Journals, in accordance with the principle of Bradford's Law. This serves to confirm that in order to gain a comprehensive understanding of a given subject, it is often of the utmost importance to pay close attention to and utilize key sources of information that have a significant impact within that particular field of knowledge.

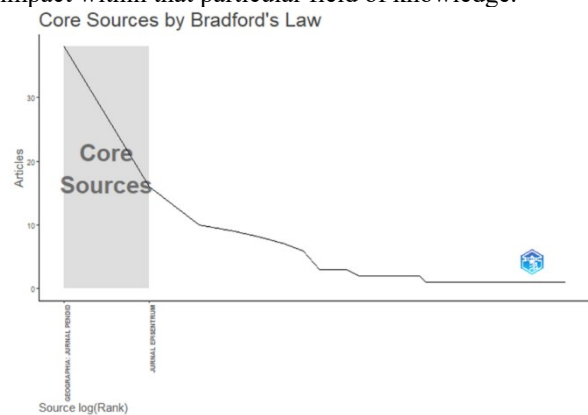


Figure 3 Core sources by Bradford's Law Chart

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3.4 Sources' Production over time

Sources' Production over Time

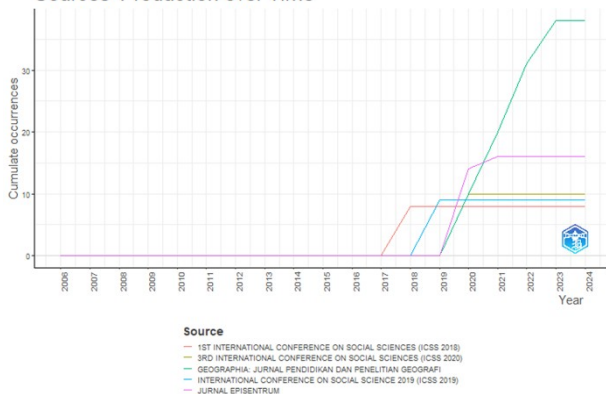


Figure 4 Chart Sources' production over time

Regarding the journals produced, two journals stand out, namely Geographia: Journal of Geography Education and Research and Episentrum Journal (Figure 4). Geographia: Journal of Geography Education and Research has 10 articles in 2020 and 38 in 2024, while Episentrum Journal has 14 articles in 2020 and 16 in 2024.

3.5 Most Relevant Authors

This study shows that the most relevant author (Figure 5) in geography research is Xaverius Erick Lobja XEL (Figure 5) with 24 articles, followed by Hermon Maurits Karwur HMK with 22 articles. This is followed by Maxi Tendean MT with 16 articles, Calvin Salindeho Andaria KSA with 14 articles, Denny Maliangkay DM and Joyce Christian Kumaat JCK with 11 articles. While the fractional article or h-index of 9.08 by Maxi Tendean MT and vice versa Calvin Salindeho Andaria KSA of 4.28.



Figure 5 Graph of most relevant authors

3.6 Author production over time

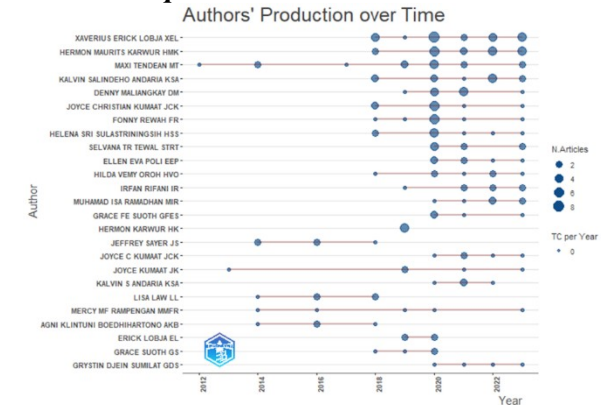


Figure 6 Graph of authors over time

Meanwhile, the most relevant authors are those who have published influential papers as far as the researched topic is concerned. Figure 6 above shows that some geography researchers at Universitas Negeri Manado are consistent in their research. For example, Maxi Tendean MT, who was identified in 2012, has published consistent articles until 2024, followed by Joyce Christian Kumaat JCK from 2013 to 2023, followed by Mercy Mf Rampengan MMFR, who has written consistently from 2014 to 2023.

3.7 Author Productivity through Lotka's Law

The principle of Lotka's law is that the more articles written, the fewer authors who write them; on the contrary, the more authors, the fewer articles produced. As shown in Figure 7 above, geographical research shows that there are 196 authors who published 1 (one) article with a frequency of 0.78, in addition to articles by 2 (two) researchers as many as 21 articles with a frequency of 0.083, while for 3-4 authors as many as 7 articles with a frequency of 0.03.

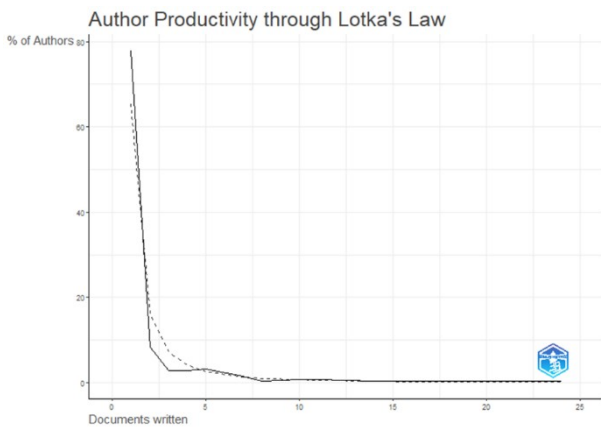


Figure 7 Chart Author Productivity through Lotka's Law

3.8 Network and Density Visualisation

The focus was on uncovering the unique and hidden connections between different aspects of the previously identified concepts in this second phase of the literature review. The analyses were carried out using the VOSviewerTM application, which is able to read the bibliographic information from data downloaded from scientific databases such as Google Scholar, and then to apply analyses to uncover the connections and to present the information in a graphical form.

When visualizing networks, concepts are represented by circles connected by straight lines called edges. The size of the circles reflects the relative weight of the elements in the analysis; larger circles indicate more important or more frequently mentioned concepts. The use of uniform colors in some circles indicates the formation of clusters where these concepts often appear together in publications. The lines between the circles reflect relationships based on co-citations: the shorter the line, the more co-citations there are between the concepts.

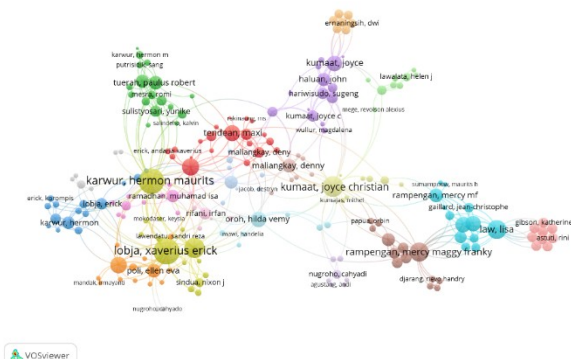


Figure 8 Network visualization graph

Two types of visualization's have been chosen for this analysis: a network visualizations (Figure 8) and

a density visualization (Figure 9). In the density visualization, the concepts are represented by labels and their environment is marked by an increasing number of elements with an increasing number of hot colors. Related concepts are placed close together, forming groups or clusters based on relatedness or similarity. In order to obtain accurate and meaningful visualizations, various parameters can be modified in VOSviewerTM. For example, users can adjust the minimum number of co-citations or documents required for a relationship to be considered significant. The use of keyword occurrences also helps to cleanse the visualization map of irrelevant information or noise in the analysis, resulting in a more structured and informative map to explain the relationships between the concepts examined in this literature review.

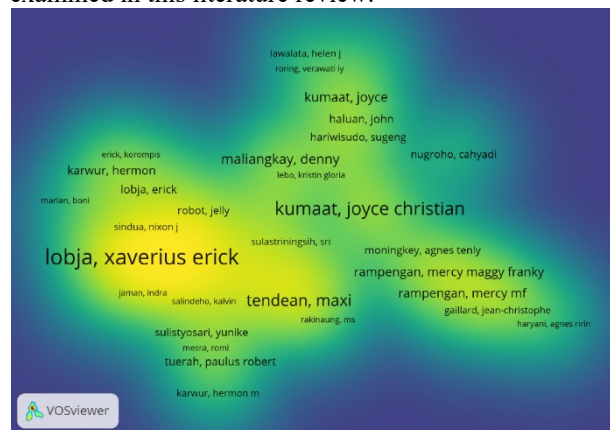


Figure 9 Network Density

4. DISCUSSION

The research results presented provide a rich picture of geography research activities at Universitas Negeri Manado (Unima), as well as publication trends and contributions of leading researchers in the field. The data show that there has been a significant increase in geography research publications at Unima since 2020, reflecting the growing interest of lecturers and researchers in the field. Although the majority of articles are published in a few key journals, such as Geographia and Jurnal Episentrum, this is in line with the principle of Bradford's Law, which states that most of the academic literature in a subject tends to come from a few main sources of information.

Geographia Journal and Episentrum Journal seem to be important platforms for geography research at Unima, with many articles published in them. The contributions of prominent researchers such as Xaverius Erick Lobja (XEL) and Hermon Maurits Karwur (HMK) show consistency and significant impact on the development of geography literature at the university. In addition, the research of Maxi Tendean (MT), Joyce Christian Kumaat (JCK), and Mercy Mf Rampengan (MMFR) demonstrates a long-term commitment to the

development of geographical knowledge and makes ongoing contributions to the field.

There are a number of ways in which understanding the implications of the results of this study can be helpful. **Firstly**, in identifying trends and research interests at Unima, and in understanding the role of researchers in developing the geography literature. **Second**, to appreciate the importance of key journals such as *Geographia* and the *Episentrum Journal* in supporting and disseminating research in geography. **Third**, to identify prominent and productive researchers who may be potential mentors or collaborators in future research projects. **Fourth**, to understand the distribution patterns of authors and articles in the context of Lotka's Law, which provides insight into the dynamics of author productivity in an academic discipline. With this understanding, the next steps could include collaboration between researchers, the development of more specific research topics, and the development of academic policies that encourage scholarly growth in geography at Unima.

5. CONCLUSION

The results showed an increase in interest and research activity in geography at Universitas Negeri Manado (Unima) since 2020. *Geographia Journal: Journal of Geography Education and Research* and *Episentrum Journal* became the main platforms for publishing geography articles at Unima, reflecting the uneven distribution in academic literature according to Bradford's Law. Prominent researchers such as Xaverius Erick Lobja (XEL), Hermon Maurits Karwur (HMK), Maxi Tendean (MT) and others made significant contributions to the development of geography literature at Unima, as indicated by the number of articles and the impact of their work. The distribution pattern of authors and articles follows Lotka's law, where a few authors are highly productive while the majority publish few articles. This conclusion reflects Unima's significant academic development in geography, supported by the contributions of leading researchers and focused publishing in key journals. The increased interest and research in geography at Unima provides a clear picture of the commitment to the development of geography in the academic environment.

AUTHORS' CONTRIBUTIONS

In this study, Prof. Dr Maxi Tendean and Dra. [T0] Tewel provided invaluable assistance in the correction of the data collected during the study. Aghata Tumengkol, M.Pd participated in the field survey and data analysis. The lead author was responsible [11] for conducting the survey, analysing the data, and writing the manuscript. Collectively, these contributions

ensured that the study was conducted with high accuracy and scientific integrity. Each author played an important role in various stages of the research, from data collection to the preparation of the final report.

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