

Economic growth and its influence on environment sustainability A bibliometric analysis using VOSviewer application

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ECONOMIC GROWTH AND ITS INFLUENCE ON ENVIRONMENT SUSTAINABILITY: A BIBLIOMETRIC ANALYSIS USING VOSVIEWER APPLICATION

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ABSTRACT

This study aims to identify the research development on economic growth and its influence on environmental sustainability. The method used is descriptive analysis with a qualitative approach. To gather the data, we used Publish or Perish software using economic growth and its influence on environmental sustainability as the theme from 2012 to 2022. VOSviewer software was used to create the visualization of research distribution data. The results show that the research had become a trend in seven years, from 2012 to 2018, with the highest publication in 2016, 136 articles. However, from 2019 to 2022, the research trend began to decline. In conclusion, this study can be considered valuable as it can be combined with other parameters to provide novelty in future research.

Keywords: economics; environment sustainability; publish or perish; VOSviewer

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INTRODUCTION

Economic growth in an area can be influenced by many factors, including livelihood, education, social, and culture (Hanushek, 2020). For example, to measure the education effect on economic growth, it is

necessary to calculate the regression value of cross-country growth by analyzing the average annual growth of Gross Domestic Product (GDP). In addition, economic growth can have many impacts on life, especially on the environment (Umar et al., 2020). Investment, exports, and political power can

affect a country's economic growth. Realizing economic growth significantly impacts the environment, which is becoming increasingly polluted by its development (Fan & Hao, 2020). Therefore, research needs to be carried out in-depth to provide objective input on phenomena in a country. The amount of studies on economic growth and its impact on the environment needs to be examined to discover its relation to other terms. One of the tools to analyze the research topic is bibliometric analysis, which uses data from the Google Scholar website to be generated into mapping materials (Soegoto, E. S. et al. 2022). Bibliometric analysis is a method to obtain an overview of a research trend within a certain period of time to discover a new topic that can be studied more deeply (Soegoto, H. et al., 2022). Furthermore, a bibliometric analysis is important to visualize the distribution of research between terms, especially in the theme of economic growth and the environment (Luckyardi, S. et al. 2022).

Research conducted by M Ertz discusses sustainable economic analysis with data sources obtained from Scopus and the Web of Science (Ertz, M., & Leblanc-Proulx, S. 2018). These findings of this study reveal that earlier research is far more likely to be cited in current research. Furthermore, research regarding bibliometrics of economic research in the period 2007-2019 has been conducted by Wang et al. The findings indicate that this study may be used as a suggestion for researchers in the same field to be the focus of research considerations (Wang, X. et al. 2020). Another study discusses the welfare economy using the keywords of happiness, subjective well-being, life satisfaction, and positive influence (Dominko, M., & Verbič, M. 2019). Unfortunately, no study has been conducted on bibliometric analysis in economic growth and its impact on environmental sustainability. As a result, in this study, we analyzed research that has been published regarding this topic using bibliometric analysis.

This study aims to identify the research development on economic growth and its influence on environmental sustainability. The method used is descriptive analysis with a qualitative approach. To gather the data, we

used Publish or Perish software using economic growth and its influence to environmental sustainability as the theme from 2012 to 2022.

LITERATURE REVIEW

Economic Research / Growth

Economic development is an effort to improve people's living standards to a greater quality. To satisfy the demands, sustainable economic growth entails balancing the functioning of the economy, the environment, and society (Zhao et al., 2019; Yan et al., 2018). Economic expansion, on the other hand, has negative externalities. Natural resource exploitation impacts the environment's balance in the form of resource depletion, climate change, and pollution. Emissions from a variety of economic activities can contaminate the environment. Various studies have examined the relationship between economic growth and environmental quality, and various results have been obtained, including, in some cases, a concept developed by Kuznets known as the Environmental Kuznet Curve (EKC) (Noor, 2020).

To meet these challenges, the United Nations Framework Convention on Climate Change (UNFCCC) has established the basic framework for global cooperation on this issue. Energy consumption is a necessity for economic growth and is seen as a critical component of economic growth (Shah et al., 2020). Anthropogenic greenhouse gas emissions must be reduced in the approaching era of economic and environmental compatibility to address and prevent catastrophic environmental deterioration and climate change (Brown et al., 2018). As a result, the transition to cleaner energy is a significant economic issue to provide energy security, prevent environmental degradation, and stimulate economic growth (Bhattacharya, 2017; Husain, 2018; Ahmad, 2020; Eren, 2019).

Bibliometric Analysis

A quantitative approach for analyzing bibliographic data in articles/journals is bibliometric analysis (Donthu, et al., 2021). This technique is often used to analyze references to scientific publications cited in a journal, to map a journal's scientific fields, and

to categorize scientific articles according to a research area (Luckyardi, S., 2022; Soegoto, E. S. et al., 2022). Bibliometrics was utilized to categorize certain themes in the form of a bibliography and generate a representative overview of the selected topics (Luckyardi et al., 2022). The citation analysis approach is used in bibliometric analysis to locate one article cited by another, while the co-citation analysis technique is used to find two or more publications cited by one article.

We need software that may be utilized as an analytical tool for examining bibliometric data. The VOSviewer Software is one of the tools that may help with bibliometric data analysis (Kurniati et al., 2022). VOSviewer is software that can generate, visualize, and analyze bibliometric maps. VVOSviewer can evaluate a wide variety of bibliometric network data, including connections between journal publications or citations, associations between scientific terminology, and collaborative relationships between researchers (Saputra et al., 2022). With the benefits provided, the studied data may be utilized as a basis for conducting research in certain science fields, particularly those understudied.

METHODOLOGY

This study used a qualitative analysis

method by observing the visualization of the mapping of research terms contained in the keyword's economic growth and environmental sustainability. Publish or Perish software was used to collect data from articles indexed on Google Scholar between 2012 and 2022. A total of 982 articles were gathered from the search results. The VOSviewer program is then used to map the data collection. The VOSviewer program will generate three forms of mapping visualizations of research terms: Network, Overlay, and Density Visualizations. The VOSviewer program is extremely useful for researchers in determining which topics should be investigated further to create research diversity (Soegoto. et al., 2022).

RESULTS AND DISCUSSION

Research developments on the Economic Growth scope

982 articles published on Google Scholar were gathered from the data obtained using Publish or Perish software from 2012-2022. The data is then filtered based on the most citations and sources. As a result, 15 relevant articles were obtained. As for the most cited article, it was published in 2017 and had 4064 citations. Aside from that, there is the article with the fewest citations, which was published in 2016 and had 945 citations.

Table 1. Article Data in the field of Economic Growth and Sustainable Environment

No	Cites	Title	Year	Source
1	4064	The Circular Economy–A new sustainability paradigm? (Geissdoerfer, M. et al. 2017)	2017	Journal of cleaner
2	3224	Intergenerational Equity and Exhaustible Resources 1, 2 (Solow, R. M. 2017)	2017	The Economics of Sustainability
3	2277	Measuring economic growth from outer space (Henderson, J. V. et al. 2012)	2012	American economic review
4	2144	From millennium development goals to sustainable development goals (Sachs, J. D. 2012)	2012	The lancet
5	2134	Premature deindustrialization (Rodrik, D. 2016)	2016	Journal of economic growth
6	1666	What is protective space? Reconsidering niches in transitions to sustainability (Smith, A., & Raven, R. 2012)	2012	Research policy
7	1410	A review of renewable energy sources, sustainability issues and climate change	2016	Cogent Engineering

Table 1. Continued

No	Cites	Title	Year	Source
		mitigation (Owusu, P. A., & Asumadu-Sarkodie, S. 2016)		
8	1366	An almost practical step toward sustainability (Solow, R. 2014)	2014	An Almost Practical Step Toward Sustainability
9	1142	How to understand and measure environmental sustainability: Indicators and targets (Moldan, B. et al. 2012)	2012	Ecological Indicators
10	1098	Three pillars of sustainability: in search of conceptual origins (Purvis, B. et al. 2019)	2019	Sustainability science
11	1086	Economic growth, energy consumption, financial development, international trade and CO2 emissions in Indonesia (Shahbaz, et al. 2013)	2013	Renewable and Sustainable ...
12	1055	The effect of renewable energy consumption on economic growth: Evidence from top 38 countries (Bhattacharya, M. et al. 2016)	2016	Applied Energy
13	1006	CO2 emissions, economic growth, energy consumption, trade and urbanization in new EU member and candidate countries: a panel data analysis (Kasman, A., & Duman, Y. S. 2015)	2015	Economic modeling
14	965	Sustainability-oriented innovation: A systematic review (Adams, R. et al. 2016)	2016	International Journal
15	945	Economic growth and the environment (Panayotou, T. 2016)	2016	The environment in anthropology

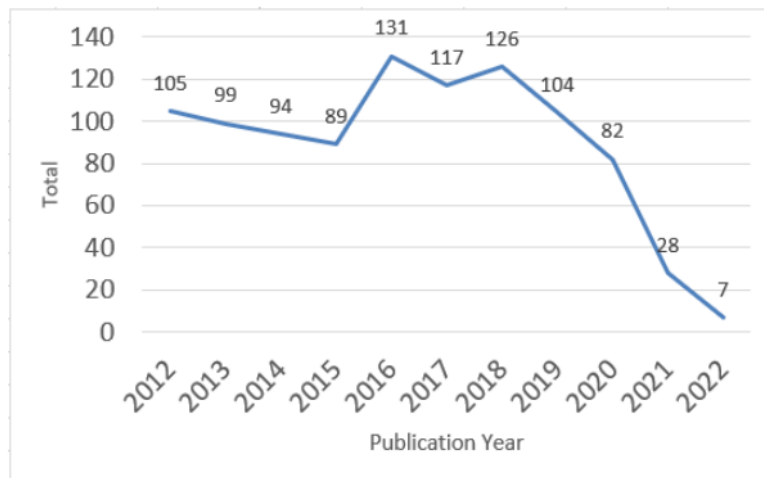


Figure 1: Total Publication from 2012-2022

According to Figure 1, a study on economic growth from 2012 to 2022 has not been thoroughly examined. Figure 1 shows that the topic has decreased from year to year.

Only seven articles were published in 2022. However, there was a significant rise in 2016, with 131 data articles published.

Mapping research in the Economic Growth field using VOSviewer

Conducting bibliometric analysis requires mapping out interrelated terms in the form of visualization. Providing this visualization requires an application that can provide the appropriate output, one of which is the VOSviewer application. The VOSviewer application is used because it can provide complete and comprehensive visualization from a network, overlay, and density mappings. One of the data that can be processed in VOSviewer is data with .ris format, which contains a collection of studies. Therefore, the terms obtained will show the relationship between one study and another.

The data that has been processed in VOSviewer will then produce terms that are divided into several clusters. This study contained four clusters containing a total of 46 items. The following lists are the terms of each cluster:

Cluster 1 (23 items): Business, challenge,

company, concept, corporate sustainability, ecological sustainability, economic, employment green growth, human capital, income, limit, natural resource, need, practice, problem, progress, social sustainability, strategy, sustainability assessment, sustainable development goal, sustainable economic growth, and theory.

Cluster 2 (9 items): Carbon dioxide, carbon emission, co2 emission, determinant, energy consumption, financial development, rapid economic growth, and rise.

Cluster 3 (8 items): Ecological footprint, empirical evidence, environmental degradation, environmental kuznets curve, evidence, relationship, renewable energy, and renewable energy consumption.

Cluster 4 (6 items): Circular economy, context, quality, resource, urban sustainability, and urbanization.

Network visualization of each cluster is shown in Figures 2-5.

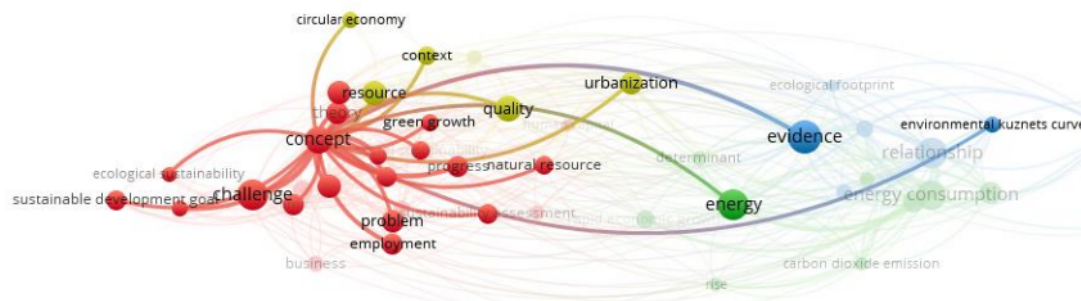


Figure 2: Cluster 1

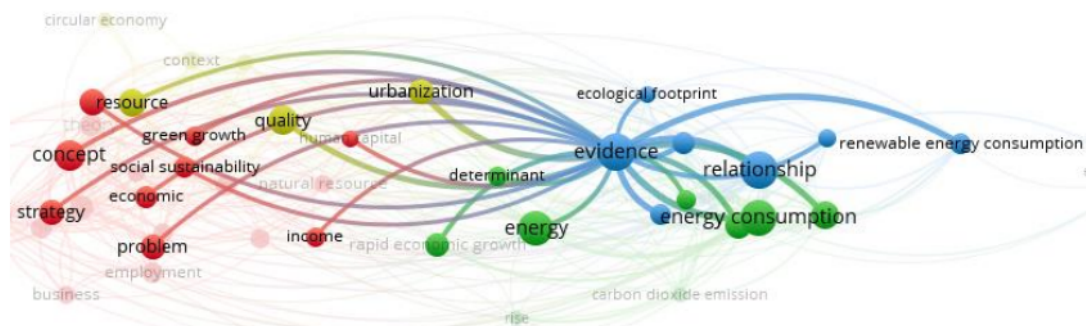


Figure 3: Cluster 2

colors, from lighter to darker colors. The lighter color indicates that the term is the latest article, while the darker indicates that the term was

published earlier (Maulidah, G. S., & Nandiyanto, A. B. D. 2021). Figure 8 shows that there are four colors, namely yellow, green, blue, and purple.

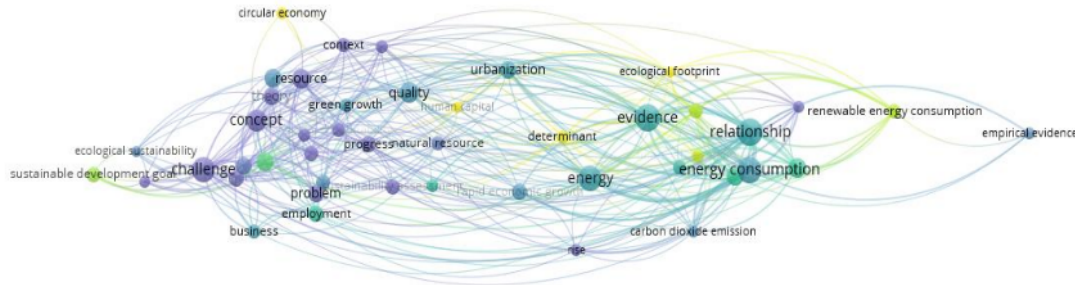


Figure 7: Overlay Visualization

Figure 7 shows an overlay visualization of economic growth keywords and found the term challenge, which was discovered with numerous links to other concepts. Meanwhile, the most recent term is renewable consumption. The term challenge is equivalent to the trend with a concept, theory resource, problem, context, research, and progress. Meanwhile, the term renewable consumption is equivalent to the trend in terms of ecological footprint, determinant, human capital, circular economy, and sustainable development

Density Visualization using the VOSviewer application

In contrast to the previous two visualizations, which describe the relationship between terms, density visualization is only in the form of color radiance from light to dark colors. The lighter color represents the research quantity discussed in the term. Therefore, it can help researchers explore future research represented in a darker color (Finandhita et al., 2022). The density visualization of this topic is shown in Figure 8.

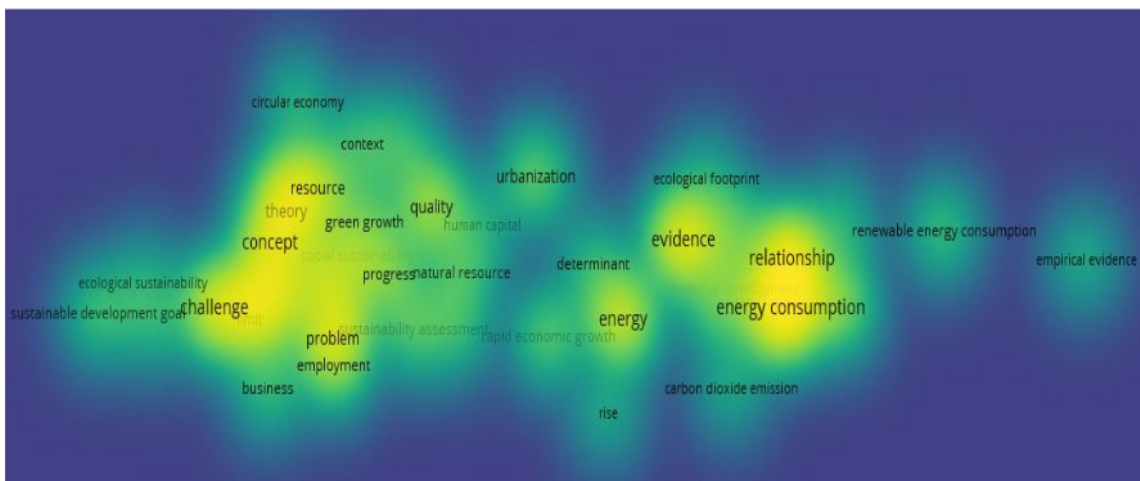


Figure 8: Density Visualization

Figure 8 shows that energy consumption is the most popular research on economic growth. The term is bright yellow, indicating that it has been widely studied. As a result, it is best to explore terms with faint or fading colors, such as rise, for

future research.

CONCLUSION

This research aimed to see how e-learning implementation, electronic service quality, and

e-information quality affect students' e-learning experiences at a computer-based private university in Bandung, Indonesia. Seven hypotheses based on prior research on the deployment of e-learning and its link to student satisfaction were offered to fulfill the study's goals. The direct hypothesis underpins four of the seven hypotheses, whereas the indirect hypothesis underpins three. The data was obtained from conducting a questionnaire-based survey of 220 students. Respondents were limited to sophomore students in computer-related study programs, namely Informatics Engineering and Information Systems, which most frequently used ICT facilities in various practicum courses. Final-year students are considered to meet the criteria as respondents because they have gained one year of experience in using ICT. However, apart from this, level 2 students are still possible to transfer to other universities, and in future research, it will be very interesting if the model is continued by adding student retention or student loyalty and positive intention behavior such as e-WOM. Finally, the data were examined using statistical methods to accomplish the current study's aims. The findings partially meet the aims and give significant insights for colleges about e-learning. The study's results and the application of this model provide input for private universities to implement the e-learning model by taking into account its antecedents and an opportunity to use it as a marketing tool.

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