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Review Article

Biofuel Successful Strategies towards Sustainable Development: A Bibliometrics Analysis

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Abstract
This study aims to analyze biofuel use from oil palm as an alternative source of sustainable development. Data were obtained from the Scopus database with the last five years of publication. This research method uses a qualitative approach to the study of literature. Data analysis used bibliometric analysis with Vosviewer and NVIVO 12 plus software. The findings of this study indicate that several countries have used palm oil-based biodiesel as a transportation fuel, one of which is that Indonesia is the leading country in taking advantage of this opportunity. This can be seen from the development of the B30 from government and biodiesel programs which have become triggers for rising CPO prices worldwide and have impacted Fresh Fruit Bunches at the farm level. The study also found fluctuations in the publication of scientific research on biofuels. The most significant contribution to research articles comes from Malaysia. The university with the most number is University Malaya. The following research areas have the potential for further study: production of biofuels, vegetable oils, renewable diesel, and bio. Production energy, biodiesel, biomass, and biofuels are narratives of scientific research papers related to biofuels.

Keywords: Palm oil; biofuel; sustainable; biodiesel

1. Introduction
This study aims to discover the opportunities for biofuels made from palm oil as a renewable alternative energy source considering the energy needs in the world are very large while energy is currently minimal. Biofuel is a renewable energy source that provides clean alternative energy to fossil fuels made from palm oil (Limenta, 2020). Biofuel is divided into several types: bioethanol, biodiesel, and biogas (Sharma et al., 2020). According to estimates, replacing fossil fuels with biofuels and bioenergy from biomass would enable the creation of fine, specialty, platform chemicals, foodstuffs, medicines, and polymers made from bio-based materials (Sadhukhan et al., 2018). To meet global demand, palm oil-producing countries, especially Indonesia as, the world's largest palm oil producer, have encouraged the growth of plantations (Communities, 2019). Indonesia is one of the leading palm oil producers, and the demand for palm oil products in the international market is increasing yearly (Purnomo et al., 2019). Oil palm is a remarkable land-based commodity that supports Indonesia's regional and national economy (Purnomo et al., 2018).

In recent years, the production and trade of biofuels have increased to meet the global demand for renewable fuels because, in the future, there may be no more fossil fuels, and we can use biofuels as a safe and renewable alternative energy source (Moioli et al., 2018). Moreover, the scientific community has shown that higher productivity levels of vegetable crops can address some of the deforestation

problems closely related to biofuels (Yu et al., 2022). Top ten countries with the highest biofuel production rates in 2021 (in unit Petajoules).

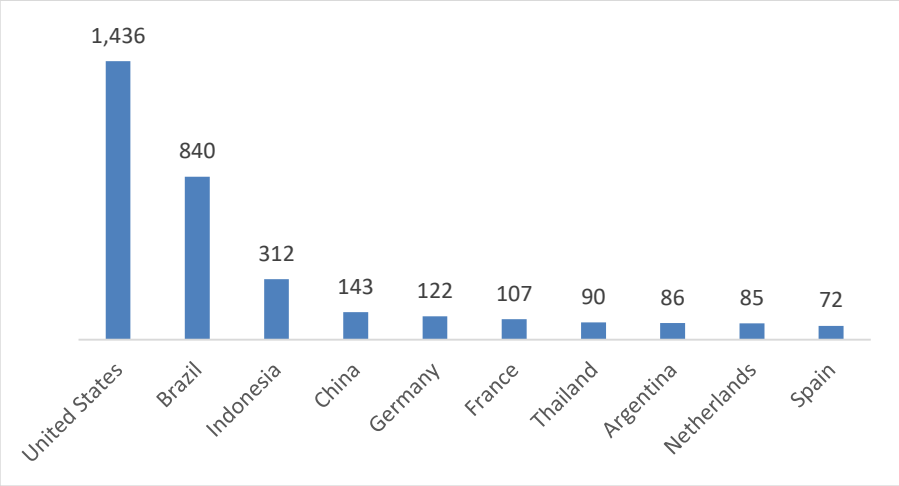

Figure 1. Largest biofuels producing country in the world

The United States is the highest biofuels-producing country in the world, with 1,436 Petajoules, followed by Brazil with 840 Petajoules, Indonesia with 312 Petajoules, China with 143 Petajoules, Germany with 122 Petajoules, France with 107 Petajoules, Thailand with 90 Petajoules, Argentina with 86 Petajoules, Netherland with 85 Petajoules and Spain with 72 Petajoules. The output of biofuels will treble by 2030, forecasts the international energy council, with Brazil, the United States, and Indonesia accounting for 80% of the total production. While the second biofuel plant employs raw cellulose mass from non-food crops, the first biofuel producer is linked to growing food costs and poverty (Joshi et al., 2020). Therefore, palm oil, with the highest yield among other vegetable crops, is believed to be the most economical feedstock for biodiesel. In particular, the palm oil sector is crucial in reducing poverty and fostering other enterprises that may assist the industry in Indonesia's economic growth. Operations in the palm oil sector are intimately linked to social unrest and environmental problems, including deforestation and air pollution. The palm oil sector is attempting to achieve sustainable development through this certification program (Suroso et al., 2021). With a high conservation value, sustainable development promotes ecological, economic, and social balance (Syahza et al., 2021). Governments and companies often believe that oil palm extraction creates jobs, produces foreign money, and enhances the standard of living for poor farmers (Delabre and Okereke, 2020).

Research on biofuel success strategies in sustainable development: bibliometrics analysis still needs to be improved. To fill this gap, studies on biofuel research trends are studied through bibliometric analysis using qualitative methods with a literature study approach. With the help of the Vosviewers application, it is used to visualize bibliometric networks, and also the Word Frequency feature on the NVIVO 12 Plus application functions to display narration in scientific research publications related to research. Oil palm smallholders in Indonesia are divided into 3 clusters: state-owned, privately owned, and smallholders (Byerlee et al., 2014). Businesses typically manage a few thousand hectares, or around 55.9% of Indonesia's palm oil-producing area, to feed their mills. The state manages only 3.9% of the oil palm-producing area. The largest oil palm plantation area in Indonesia is on the islands of Sumatra and Kalimantan (Jelsma et al., 2019). Small farmers farm the remaining 40.2% of the oil palm area. Other challenges that oil palm expansion must deal with include a scarcity of sufficient land and assertions made by the majority of environmental activists that significant land clearing for oil palm plantations has hurt the ecosystem (Umayah et al., 2022). Oil palm plantations are crucial to economic growth and sustainable village development, especially in alleviating poverty in villages since it has extended to 26 provinces from 34 provinces (Sukiyono et al., 2022).

2. Literature Review

2.1. Biofuel Sustainability

Sustainability seeks to balance the economic, social, and environmental facets simultaneously. Sustainable production entails preserving the environment without causing it to degrade, and it must be both commercially viable and morally acceptable (Kadarusman, 2019). Plantation items with sustainable standards include palm oil products and their derivatives (Nasution and Karim, 2021). There is still much discussion about the increase in oil palm cultivation in developing nations, especially Indonesia (Hidayat et al., 2018). This significantly influences the plantation industry, both positively and negatively. The plantation industry may boost local revenue (PAD), provide jobs for the community, strengthen the economy, and support regional development. Meanwhile, this industrial sector has a wide range of detrimental effects on social, environmental, political, and cultural elements. Land clearance for oil palm is done using the land clearing method, which harms the ecology from a social and environmental standpoint (Maya et al., 2022). The palm oil industry can produce three biofuels, the first generation of biofuels, namely biodiesel and green fuel/green diesel. Green gasoline, green avtur from palm oil processing (CPO/CPKO), the second generation of biofuels, namely biopremium/biogasoline/bioethanol, biopellets, biogas/bioelectricity. Biodiesel from oil palm biomass (empty marks, shells, fruit fiber, stems, and midribs), while the third-generation biofuels are biogas, bioelectricity, and algae biodiesel from POME (Palm Oil Mill Efficient) liquid waste.

Research by Varkkey et al. (2018) discovered that increasing oil palm prices in the 1980s caused a switch in Southeast Asia from other crops to oil palm. The ensuing profits have been a primary driver of deforestation. Indonesia is the world's largest producer of CPO, which inevitably has adverse effects, including massive deforestation rates and loss of biodiversity (Limaho and Pramono, 2022). Deforestation is humans' conversion of forest land into alternative uses for agricultural land (Cisneros et al., 2021). The distribution of oil palm plantations in Indonesia from 37 provinces. Only 26 provinces have oil palm plantations, while Riau province has the largest oil palm area on the island of Sumatra and Indonesia, with a land area of 2.86 million hectares. In contrast, West Kalimantan has the highest land area on the island. Kalimantan with an area of 2.11 million hectares (Source. Statistical Of National Leading Estate Crops Commodity 2019-2021).

2.2. Government Policy on Biofuel Sustainability

The first and most significant country in the world for all industries utilizing diesel fuel is Indonesia, a pioneer in mixing biodiesel by 30% in diesel oil. Of course, sustainable biofuels, strategies, and challenges are needed in this regard. In the future, the Government will develop biofuels with strategies not limited to biodiesel, including the development of bioethanol, bioavtur, and HVO, which are not limited to large-scale business (McCaffery et al., 2022). Furthermore, the development of advanced-generation biofuels, the use of non-CPO palm products, the use of biodiesel by-products, and populist standards based on customer wants are all encouraged. Farmers are involved in the execution of these methods by sustainability principles to improve the application of quality standards, increase the efficiency of operations, and stabilize and regulate price levels. The Indonesian state has mandated the ISPO (Indonesia Sustainable Palm Oil) certificate as a minimum palm oil standard since 2009. The government's goal is to adopt it to enhance the ecosystem and expand the market for sustainable palm oil products in Indonesia (Pramudya et al., 2018). Some believe this endeavor is a response to foreign meddling and a plan to cast doubt on the RSPO's authority. Many producer nations contend that global programs like the RSPO are incompatible with national economic and rural development (Brandão et al., 2021). This standard's primary goal is to produce sustainable palm oil products to provide businesses with a competitive edge. The Roundtable Sustainable Palm Oil (RSPO) is a global standard for sustainable palm oil, developed a set of objectives for sustainable development known as the Sustainable Development Goals (SDGs) (Widiati et al., 2020). The government has plans to improve ISPO and change the organization's legal classification from a Minister of Agriculture Regulation to a Presidential

Regulation in 2016. This strengthening process intends to improve Indonesia's sustainable palm oil governance, broaden the market's acceptance of Indonesian palm oil, and support conservation efforts and the preservation of high carbon reserves (Joviani and Lovett, 2019). Due to its fungibility, palm oil is in higher demand globally. The culinary, chemical, pharmaceutical, and cosmetic sectors use it extensively (Pacheco et al., 2020).

ISPO is targeted at producers of oil palm plantations, including state-owned, private, and community plantations (Aisyah and Mulyo, 2021). The ISPO is crucial in creating a substitute framework for smallholders who lack the money or competence to engage in the RSPO. More significantly, ISPO offers a mechanism to redefine sustainable palm oil so that the Indonesian palm oil industry may avoid the difficulties of RSPO certification and balance the current price-based demand from crucial export markets in India and China. Due to business needs for sustainability in the future (Higgins and Richards, 2019). Less than 1% of independent Indonesian smallholders as of 2017 were. However, RPSO or ISPO certified, demonstrating a need for more legislation for sustainable palm oil management in Indonesia (Journal et al., 2020). According to research by Al et al. (2021) ISPO is an ambivalent strategy that seeks to internalize the norms supported by transnational private governance while restoring the significance of the national governance domain and expanding the local palm oil business. Meanwhile, research by Dharmawan et al. (2021) Several implementation problems with the ISPO was classed as structural and sociocultural hurdles that made farmers less willing to follow this critical policy. This paper advises tackling these concerns by scaling up training and education measures to improve smallholders' knowledge and capacity to abide by sustainability norms and speeding up land and business law programs to enhance property rights.

There needs to be financial assistance to ensure field implementation in managing legal compliance and capacity building, which is a requirement for the implementation of ISPO (Indonesian Sustainable Palm Oil). Only a few groups of farmers receive help, which limits the ability of local governments to provide funds. However, increasing funding to support ISPO completion takes work (Pramudya et al., 2022). Various repercussions result from the Indonesian government's response to an ISPO policy that requests global sustainability criteria. First, theories must be put into practice while taking some risks. Second, it encourages local governments to establish laws and guidelines to supplement challenging ISPO measures (Intan et al., 2022).

3. Methods

This research method uses qualitative research methods with a literature study approach. Data were obtained using the keywords "Biofuel," "Palm Oil," and "Sustainability" from the Scopus database by considering publications within the last five years. Analysis of the research data used bibliometric analysis, using this analysis as the primary source of study in mapping findings processed from the Scopus database (Farhan HR and Nurmandi, 2022; Subekti et al., 2022). Scopus was chosen because it has one of the world's largest databases, has a high scientific reputation, can index scientific literature accurately, and offers statistics on each article's metadata, including publication information, abstracts, references, and other specifications (Valderrama-Zurián et al., 2015). Research using bibliometric analysis can also be processed with Vosviewers software for data visualization in order to make it possible to build and display bibliometric networks between findings (van Eck and Waltman, 2017). For more details it can be seen in Figure 2 below, the stages in the research flow.

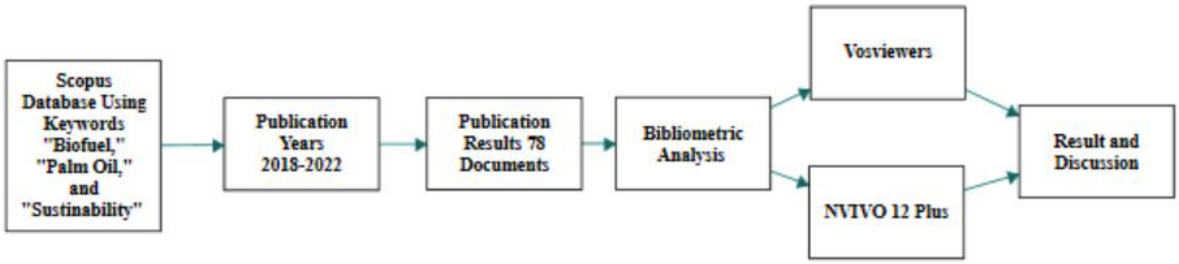

Figure 2. The flow of data retrieval and processing stages

Figure 2 shows the flow of the stages of the researcher in collecting and processing data. First, look for data with the keywords "Biofuel," "Palm Oil," and "Sustinability" in the Scopus database. Then a selection was carried out from 2018 to 2022, and the results obtained were 78 documents from the database Scopus. After that, download the output data file type RIS. Then, enter the analysis option to extract bibliometric information from the Scopus chart. Then, RIS file types are imported into the VOSviewer program to evaluate the data. Finally, download data for VOSviewer coverage and findings from the analysis menu. In addition, it is coupled with using the NVIVO 12 Plus software to analyze research trend findings in the form of image visualization so that it is easy for researchers to understand. The introduction of the Vosviewers function helps present large bibliometric maps in an understandable way (van Eck and Waltman, 2010). The Word frequency function of the NVIVO 12 plus application is also used in this study to present narratives from scientific research articles related to research. It is simple to gather, categorize, map, analyze, and display qualitative data using the NVIVO 12 Plus application, such as information compiled from interviews and textual materials (memos, reports, statutes, and picture documents) (Salahudin et al., 2020).

4. Result and Discussion

4.1 Biodiesel-based Biofuel Production from Palm Oil for Sustainable Development

Many Indonesian people are unfamiliar with biodiesel because it still sounds foreign to the ear, and it is a reasonably new invention. The government also does not often campaign for the benefits and uses of biodiesel. Because the properties of biodiesel are similar to diesel, biodiesel-fueled products can be used in diesel-engined vehicles. Currently, the use of biodiesel in Indonesia is widely used in the fields of transportation, electricity, and transportation. Since 2006, Indonesia has carried out various biofuel policy efforts to encourage using renewable energy to reduce fossil fuel consumption. This policy is manifested in the mandatory biodiesel program. This program began to be implemented in 2008 with a mixture of 2.5% biodiesel. Gradually the biodiesel blend content increased in 2010 to 7.5%. From 2011 to 2015, the percentage of biodiesel continued to increase from 10% to 15%. Furthermore, at the beginning of January 1, 2016, B20 was implemented for all sectors. Previously, the 20% Biodiesel (B20) program was supported by sufficient production capacity so that the program ran well.

Until 2019, there has been an increase in road testing to B30 for vehicles with a weight capacity of fewer than 3.5 tons and vehicles weighing more than 3.5 tons. This program was implemented for seven months in 2019, from May to November, involving various related institutions, namely the Ministry of Energy and Mineral Resources, BPPT, BPDPKS, PT Pertamina (Persero), GAIKINDO, APROBI, and IKAB. The mandatory B30 policy is designed as an economic policy instrument aiming to generate various social, environmental, and economic benefits for all Indonesian people. With the B30 policy from 2019, Indonesia has experienced the absorption of a large number of workers, especially in oil palm plantations.

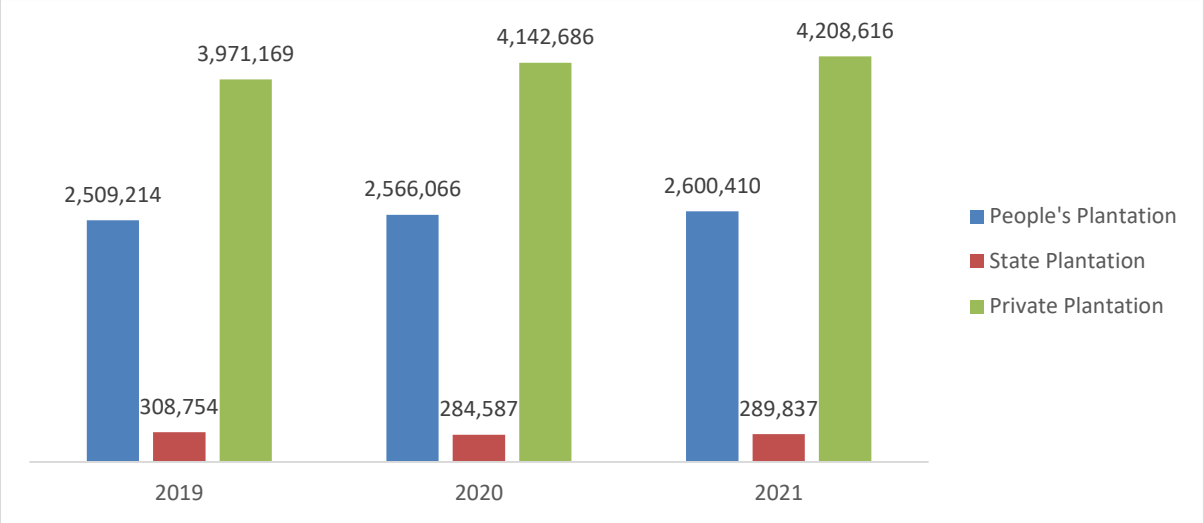

Figure 3. Number of workers in oil palm plantation

The image demonstrates that over the past three years, Indonesian oil palm farms have created a significant number of employees in various smallholder and private plantation sectors, whereas this number has varied in state plantations. 2,509,214 individuals were employed on people's plantations in 2019. In the meanwhile, there are up to 3,971,169 employees in private plantations and up to 308,754 people in state-run plantations. In contrast, the labor in state oil palm plantations has declined to 284,587, the workforce in private plantations has climbed to 4,142,686, and the workforce in smallholder oil palm farms has expanded to 2,566,066 in 2020. Each sector's oil palm plantation workforce will grow in 2021, with the smallholder plantation sector seeing a rise of up to 2,600,410. There are as many as 289,837 workers in the state-run plantations and 4,208,616 in the private plantations.

Several countries in the world also use palm oil-based biofuel biodiesel as an alternative energy source in the type of diesel/diesel as a substitute for fuel oil, including the following.

Table 1. Countries that use palm oil-based biodiesel

Country	Palm Biodiesel Stages
Indonesia	B30, a combination of 30% palm biodiesel and 70% solar oil
Malaysia	B20, a combination of 20% palm biodiesel and 80% solar oil
Minnesota State	B20, a combination of 20% palm biodiesel and 80% solar oil
Brazil	B12, a combination of 12% palm biodiesel and 88% solar oil
Argentina	B10, a combination of 10% palm biodiesel and 90% solar oil
Thailand	B10, a combination of 10% palm biodiesel and 90% solar oil
Uruguay	B6, a combination of 6% palm biodiesel and 94% solar oil
Norwegia	B3,5, a combination of 3,5% palm biodiesel and 96,5% solar oil
Korea Selatan	B2,5, a combination of 2,5% palm biodiesel and 97,5% solar oil
Queensland State	B0,5, a combination of 0,5% palm biodiesel and 99,5% solar oil

The table above shows that Indonesia is the first country in the world that has done the mix stage of Biodiesel through palm oil by 30% with 70% diesel oil. This is because Indonesia has the most extensive oil palm plantations in the world, so that it can conduct experiments at the B100 stage in the future. Malaysia and Minnesota State through palm oil in the biodiesel blending stage by 20%, followed by Brazil at the biodiesel stage at 12%, and Argentina and Thailand at 20%. 10% at the biodiesel stage, Uruguay at 6% at the biodiesel stage, Norway at 3.5% at the biodiesel stage, South Korea reaching 2.5% at the biodiesel stage, and Queensland State is only getting 0.5% at the biodiesel stage.

4.2. Trends in Global Publication

It should be noted that the world's fossil fuels are continuously being exploited, but the amount is minimal. Therefore, to overcome these problems, we must prepare other alternative energy sources, one of which is biofuels. Palm oil is the first generation of biofuel in the form of biodiesel and green fuel. Palm oil can be used as a transportation fuel and alternative energy source other than fossil fuels. The total number of research publications related to biofuels in the last five years from 2018 to 2022 reached 78 documents that met the search criteria in the Scopus database with three keywords at once, namely "Biofuel, "Palm Oil, and "Sustainability" (Figure 4.).

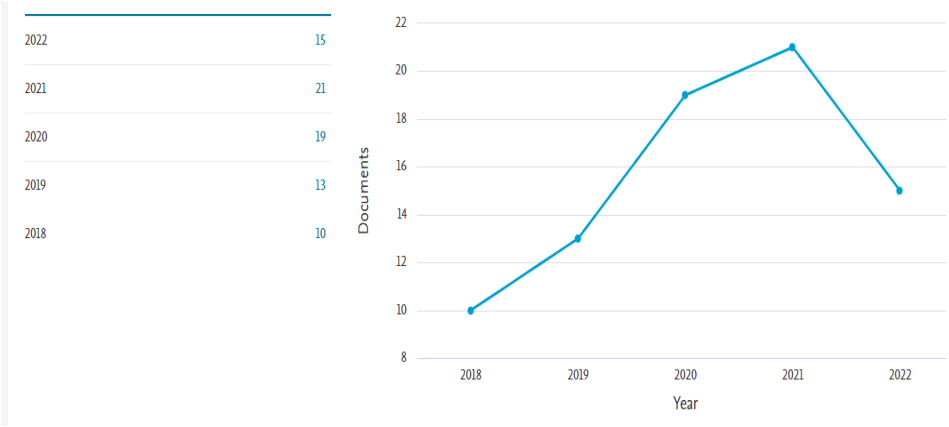

Figure 4. Number of biofuel research publication documents

The data above shows that most research was published in 2021, with 21 documents. Research on biofuels experiences a fluctuating trend from 2018 to 2022 in global publications yearly. This is inseparable from the role of the government of each country that has the most significant level of palm oil production, which has worked to encourage the production of biodiesel made from palm oil in order to capitalize on the growing demand for biofuels globally, which are viewed as a replacement for fossil fuels in the middle of the world due to worries about rising fuel prices, greenhouse gas emissions, and energy security. Indonesia and Malaysia are the biggest producers and exporters of crude palm oil in Asia and the entire globe.

4.3. Contributions of Countries and Institution

A total of 33 countries and territories contributed from 2018 to 2022 to the publication of global biofuels research. There are 10 countries with the highest contribution related to research publications (Figure 5).

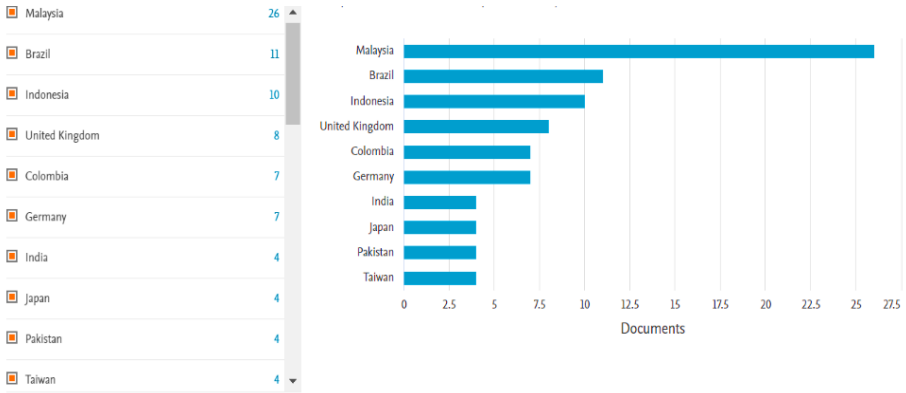

Figure 5. Publication data by country

The data shows that Malaysia publishes the most research publications among countries that contribute to biofuel research publications, with 26 documents, followed by Brazil, with 11 papers

publishing research publications. Meanwhile, Indonesia publishes research publications with ten copies, the United Kingdom with eight research publications, Colombia and Germany have the same number of research publications, seven documents, and four other countries, India, Japan, Pakistan, and Taiwan. The exact number of research publications is four documents. Research publications originating from Indonesia regarding Biofuels are still few compared to Malaysia. Whereas in terms of palm oil producers, Indonesia is the country with the largest palm oil producer in the world and has the largest oil palm plantation area. However, Indonesia's biodiesel usage is anticipated to be sustainable up to the B100 stage by the Government's mandate that biodiesel is used as a replacement for mixed fuels at a minimum of 30% of the B30 stage by 2019 (Yasinta and Karuniasa, 2021).

Another study identified the best environmentally friendly method for creating hydrogen for biofuel blending and hydrogenated vegetable oil (HVO). It evaluates the viability of combining biodiesel (FAME), high-velocity octane (HVO), and diesel with palm oil (Syauqi et al., 2022). Therefore, biodiesel is increasingly recognized as an excellent alternative energy source to replace petroleum-based fuels, including transportation. Until now, the biodiesel market has continued to increase because biofuels have been introduced to more than 60 countries around the world (Yusoff et al., 2021). The products of a number of institutions that support the dissemination of scientific research originate from throughout the globe. Figure 6 displays a number of organizations from various regions of the world that support biofuels research.

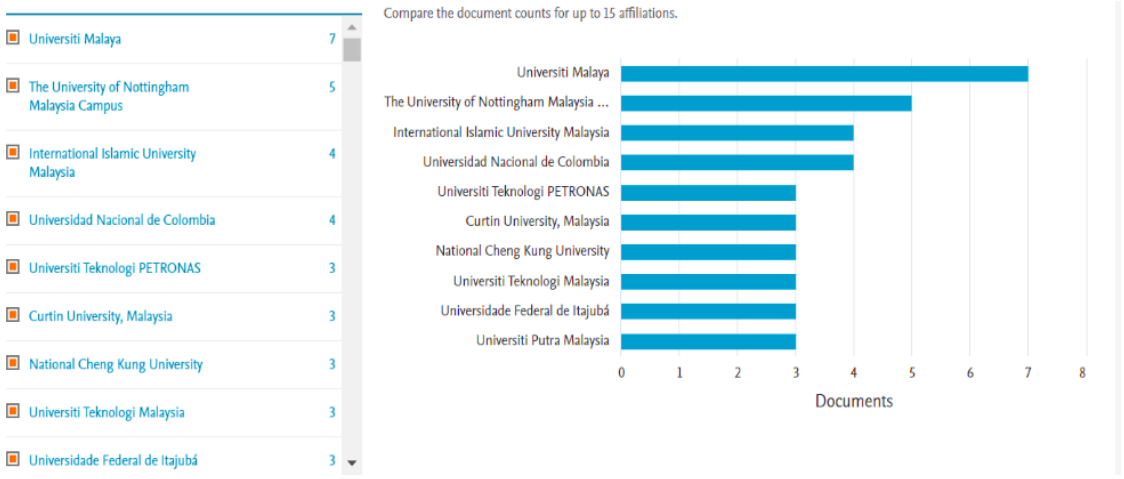

Figure 6. Number of research documents by institution

The data shows that ten institutions contribute the most to scientific research related to biofuels. Universiti Malaya was the one who contributed the most to the analysis of Biofuel research with seven documents, then The University Of Nottingham Malaysia Campus with five documents, International Islamic University Malaysia and Universidad Nacional de Colombia with four papers, and Universiti Teknologi PETRONAS, Curtin University Malaysia, National Cheng Kung University, Universiti Teknologi Malaysia, Universidade Federal de Itajubá and Universiti Putra Malaysia as many as three documents.

4.4. Co-occurrences and Narrative Analysis in Mapping

Co-occurrence analysis has been found to assist in monitoring the development of research and scientific programs and is used o discover research orientations and popular topics connected to research (Gao et al., 2017). The keyword was used at least five times in each of the included studies for this analysis.

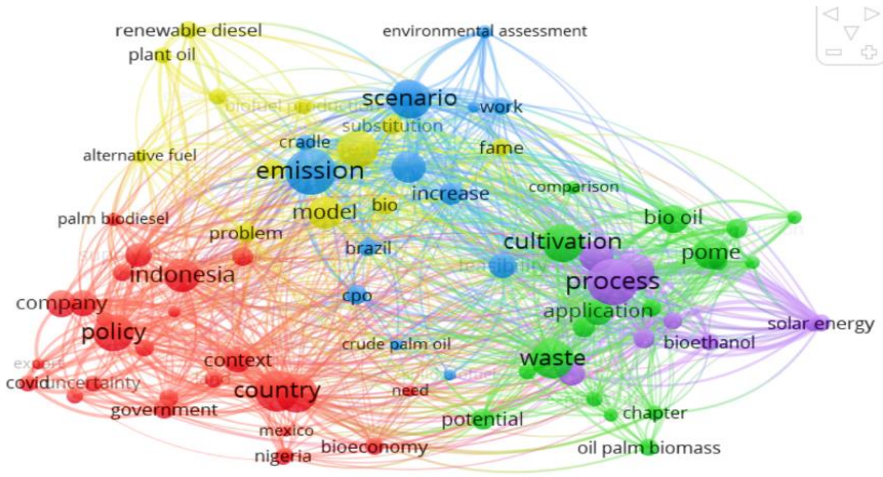

Figure 7. The emergence of keywords

Colours indicate groups, while image labels indicate frequently occurring terms or keywords. Clustering is used to get an overview of bibliometric grouping, while image mapping is used to get a comprehensive picture of a bibliometric network. There are 5 clusters of a bibliometric network. Cluster 1: Article, Bioeconomy, Colombia, Campany, Context, Country, Covid, Discourse, Effect, European Union, Export, Government, Indonesia, Jatropha, Land, Mexico, Need, Nigeria, Palm Biodiesel, Policy, Sector, Supply Chain, Transportation, Transportation Sector, Uncertainty, Vegetable Oil. Cluster 2: Application, Bio Oil, Carbon, Chapter, Comparison, Crude Glycerol, Cultivation, Environmental Sustainability, Exploitation, Lipid, Lipid Production, Oil Palm Biomass, Palm Oil Mill Effluent, Pks, Pome, Potential, State, Waste. Cluster 3: Brazil, Cpo, Cradle, Crude Palm Oil, Efficiency, Emission, Environmental Assessment, Feasibility, Increase, Reduction, Scenario, Solid Biofuel, Soybean Oil, Work. Cluster 4: Alternative Fuel, Bio, Biofuel Production, Density, Diesel, Diesel Engine, Fame, Model, Plant Oil, Problem, Renewable Diesel, Substitution. Cluster 5: Bioenergy, Bioethanol, Catalyst, Electricity, Integration, Microalgae, Process, Solar energygym Technology.

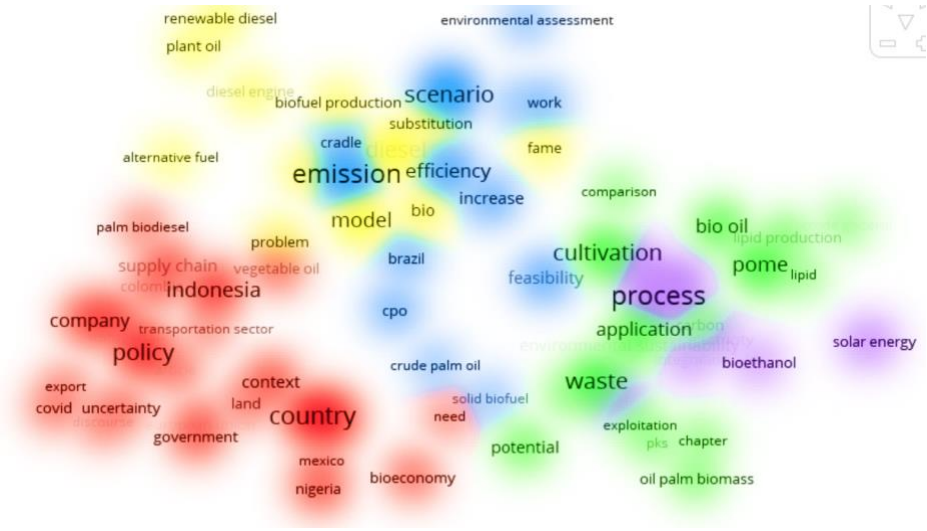

Figure 8. Visualization by density

The image shows the saturation level with frequent keywords—orange colours like Company, Cotext, and Uncertainty. Then the blue paint covers the label Scenario, Efficiency, and Emission. On the label is a topic often researched in contrast to the yellow topics such as Biofuel Production, Plant Oil, Renewable Diesel and Bio. The title indicates this last topic has not been widely researched. Therefore, the opportunity is still wide open to explore this topic.

NVIVO 12 Plus software was also employed in the analysis of 78 document articles in addition to Vosviewer. The global frequency analysis capability is used to examine the NVIVO 12 Plus software. It intends to present a built-in narrative of recent scientific research articles on palm oil-based biofuel prospects, from 2018 to 2022. Figure 10 displays narratives often appearing in 78 research publications on biofuel opportunities originating from palm oil. Palm oil as a renewable alternative energy.

Figure 9. Narrative of global research on biofuels

Figure 9 demonstrates that Production and Energy are discussed in 78 scientific research papers about biofuels. The words production, energy, biodiesel, biomass, and biofuel are examples of this. Addressing environmental criteria and energy footprint in selecting feedstocks for bioenergy production is one of the studies addressing production and energy. Salim et al. (2019) explain that increasingly more environmental studies are being conducted on the raw materials used to make biofuels, such as algae and jatropha for biodiesel, poplar, beech, and black grasshopper for bioethanol, and macroalgae for biogas. Because they are crucial to replacing fossil fuels, the procedures involved in generating raw materials must be appropriately calculated for an accurate estimate. Ocampo Batlle et al. (2021) explain that Integration is also economically feasible in their research entitled "Energy, Economic, and Environmental Assessment of the Integrated Production of Palm Oil Biodiesel and Sugarcane Ethanol". However, it can be significantly increased through fiscal incentives based on reducing fossil energy use, increasing conversion yields, and improving conversion technologies.

5. Conclusions

This The study concludes that there has been a change in the trend of biofuel research around the world over the last five years, from 2018 to 2022. Where fossil fuels have been used to solve energy problems globally. Malaysia is the country that has contributed the most to studies on the topic of biofuels. This explains the finding that other countries contribute more to scientific publications than countries of origin with the most significant production of biofuels and palm oil. Likewise, the institution with the highest contribution to a scientific journal, Universiti Malaya, is the largest in Malaysia. Furthermore, mapping was carried out related to the research theme concerning opportunities for biofuel made from palm oil as a renewable alternative energy source which needs to be separated from the discussion of Processes, Technology, Emissions, and Scenarios.

It is hoped that there will be further research to be able to research and analyze further in the study of Biofuel, Plant Oil, Renewable Diesel, and Bio Production. This is because only some researchers still need to take the theme of the discussion. So using biofuel as alternative energy in sustainable development can answer global challenges, especially in developing countries.

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