

Research Paper

**MAPPING OF GREEN SUKUK RESEARCH: WITH VOSVIEWER
BIBLIOMETRIC AND LITERATURE REVIEW**

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ABSTRACT

This study aims to determine the mapping of research around Green Sukuk. The approach used is a mix-method approach, namely VOSviewer bibliometric studies and literature review. Data analysis techniques include: (1) mapping the number of journal publications distributed around green sukuk using Microsoft Excel and Mendeley Desktop based on the year of publication; (2) mapping the results of bibliometric network visualization and journal publication trends around green sukuk using VOSviewer (Visualization of Similarities) algorithm software based on the number of clusters and their items; and (3) mapping research topics around green sukuk using literature studies. The results showed that: (1) based on mapping the number of journal publications, there were 168 journal publications about green sukuk; (2) based on the mapping of VOSviewer bibliometric studies, the results of network visualization around green sukuk are divided into 5 clusters and 24 topic items (3) based on the mapping of the literature review study, there are 2 topics about green sukuk that often appear, first green sukuk and second Indonesia. The implication and contribution of this research is to map research topics around green sukuk in the world that are often or rarely researched by researchers, so that they can be a reference for researchers afterwards.

Keywords: Green Sukuk, Bibliometrik, VOSviewer, Literature Review

JEL code: G21, M41.

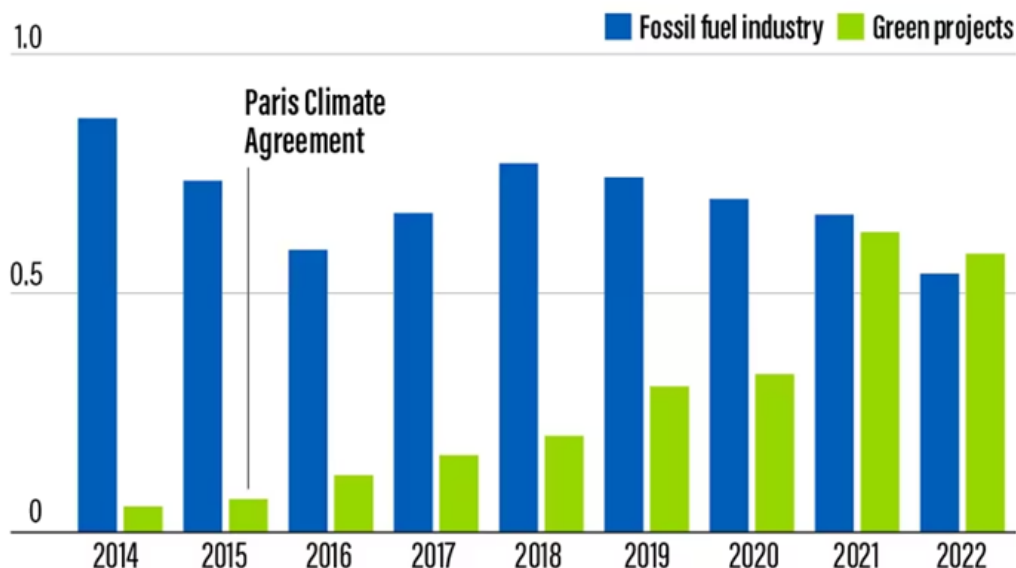
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INTRODUCTION

World climate change has an impact on humans on the importance of infrastructure built by editing environmentally friendly factors. Countries around the world have directed their focus on environmentally-based economic growth, known as the green economy. “This commitment is contained in the 2015 Paris Agreement, which aims to protect and conserve natural resources and reduce the negative impacts of climate change (Ulfah et al., 2023). In realizing a green economy, relatively large funding is needed, especially for renewable energy projects. This encourages stakeholders to develop financial instruments specifically used to support projects in accordance with the principles of Environment, Social, and Governance (ESG) and the achievement of Sustainable Development Goals (SDGs) (Naeem et al., 2023). Some examples of projects that use blasphemous economics such as renewable energy, energy efficiency, sustainable transportation, waste management, and climate resilience. The trend of funding green economy projects in accordance with the principles of Islamic shari'ah is known as green sukuk (Anggraini, 2018).

Many countries are starting to develop sukuk investment instruments, this is because the majority of the population in the world is diverse in Islam, especially on the Asian continent (Billah et al., 2023). Sukuk ownership is different from bonds in that there is usury, sukuk profits are obtained through rent or ujah. Sukuk issuance is carried out by the government in a country so that asset ownership becomes safe and reliable (Abdullah & Nayan, 2020). Commitment to reduce the impact of climate change that occurs can be done with green economy projects that are in accordance with the principles of shari'ah, namely green sukuk. Countries such as Indonesia, Malaysia, Saudi Arabia, Bahrain, UAE began to develop shari'ah finance on green sukuk instruments as a response to Environmental, Social, Government (ESG) policies.

Figure 1. Green Project



Source: Bloombreg, 2023

Globally, sales of new environmentally friendly and sustainable bonds and sukuk declined by about 14 percent to \$635 billion in 2022 compared to the previous year, partly due to rising economic uncertainty and rising interest rates (Aloui et al., 2018). Through the Gulf Cooperation Council (GCC), Saudi Arabia became the leading issuer in the region, accounting for more than half of the total volume, and the UAE accounted for the remaining issuance volume. In 2021, all GCC issuances were generated by the UAE. In addition to countries in

the middle east, the Southeast Asian region is the second producer of green sukuk issuance (Hendra et al., 2023).

The potential for Green Sukuk can overcome environmental problems such as reducing greenhouse gas emissions, sustainable development and increasing sharia economic stability. However, green sukuk is still common among the public because there is still little literacy. The urgency of this research was to analyze in depth the mapping of green sukuk in the world using the Vosviewer tool. Vosviewer can help map research by seeing the relationships between frequently discussed topics.

There are several studies that discuss Green Sukuk analysis, including research (Ulfah et al., 2023) which states that research mapping that discusses green sukuk is about Sustainable Development Goals (SDGs) or environmental issues, especially climate change, the issue of COVID-19 and Environmentally friendly financial reporting is still relatively little done. Then research (Grahesti et al., 2022) states that green sukuk has the potential to be further developed in Indonesia and green sukuk has played a major role in realizing resilience to climate change. The difference in previous research is in the focus of the research both in terms of potential analysis and topic mapping, so it needs to be packaged more deeply regarding the mapping of all existing types of green sukuk.

In this research, researchers created a novelty by mapping literacy towards green sukuk in the world using Vosviewer tools and a literature review. This novelty will produce broader and deeper research results from different points of view. By utilizing Vosviewer features, this research will analyze the relationship between topics from various relevant literature sources, including related journals and other publications related to green sukuk (Budianto, 2023). Additionally, the literature review helps outline the understanding of green sukuk.

Through the Vosviewer tool and literature review, this research is expected to produce valuable findings in understanding current conditions such as challenges and opportunities related to green sukuk. It is hoped that the findings of this research will provide useful insights for practitioners, academics and relevant stakeholders in deepening knowledge of green sukuk for greater sustainability and progress as well as increasing sharia economic development. The implication of this research is to produce a topic mapping and literature review, the results of which become recommendations for increasing the potential of green sukuk in the future. Based on the explanation above, researchers are interested in conducting research on "Mapping of Green Sukuk Research: with Vosviewer Bibliometric and Literature Review"

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

According to (Munir et al., 2020) green sukuk is an innovative sharia-based financial instrument to support Indonesia's commitment to combat climate change. Meanwhile, according to (Abdullah & Nayan, 2020) green sukuk is a State Sharia Securities (SBSN) issued in order to fund projects that provide benefits to the environment and support efforts to mitigate the impact of climate change. Like sukuk, green sukuk in practice holds sharia compliance, which does not contain elements of maysir (gambling), gharar (obscurity) and riba (usury). It can be interpreted that green sukuk is ownership of green economy assets or projects that are in accordance with sharia principles with the aim of reducing the impact of climate change.

The Green Bond Principles detail ten sectors that can be funded (eligible) by green bonds as well as green sukuk (Ali et al., 2023). These sectors include: "renewable energy; energy efficiency; pollution prevention and control; environmentally sustainable management of biological natural resources and land use; conservation of terrestrial and aquatic biodiversity; green transport; sustainable water and wastewater management; climate change adaptation; products, technologies and production processes adapted to the environment and/or circular economy; green buildings that meet regionally, nationally or internationally

recognized standards or certifications”. In the midst of climate turmoil, green sukuk exists as a diversification of financing instruments to secure investment in sustainable projects in each country. Basically, sukuk, green sukuk, and green bonds are bonds. The difference between the three lies in the principle of finance and its designation. Sukuk is a type of Islamic bond whose purpose is to finance the state budget deficit and infrastructure development. Meanwhile, green bonds are conventional bonds with the designation to finance environmentally friendly projects, investments, and expenses. Meanwhile, green sukuk acts to combine these two aspects, namely combining Islamic finance and allotment for green projects (Aisya Sekar Gading Pujiantoro, Deariztria Dindalila, 2021).

In Indonesia, the issuance of Green Sukuk can be a solution to reduce climate risks and support sustainable development in the country. Green Sukuk can also encourage investment in sectors related to the Green Economy, such as renewable energy, energy efficiency, waste management and natural resource management (Risanti et al., 2020). The impact of green sukuk can encourage sustainable development as a government effort to prioritize financing for government projects that contribute to achieving the SDGs.

Bibliometric studies are research methods that use quantitative data to analyze published literature, usually in the form of journal articles, books, or other publications. Bibliometric studies include quantitative measurements such as number of publications, frequency of citations, author collaboration, as well as network analysis and scientific visualization, to understand patterns and trends in knowledge production and scientific communication. Bibliometric studies can be helpful in identifying trends in a particular study, gauging the influence of authors or journals, as well as helpful in identifying collaborations between authors or institutions. Bibliometric studies can also provide insight into how knowledge in a particular field develops over time. Bibliometric studies are generally conducted using specialized bibliometric software that can process and analyze data automatically from academic databases such as Scopus, Web of Science, or Google Scholar. Results from bibliometric studies can provide valuable insights for researchers, companies, and academic institutions in understanding trends in knowledge production and influence in the field (Habibi, F., Fitriana, A., Sulityowati, 2022).

VOSviewer is one of the software used in bibliometric studies. The software is used to visualize and analyze the bibliometric data. such as journals, articles, and citations related to a particular topic or field. VOSviewer can generate network and cluster maps from bibliometric data, and can be used to identify research trends, author collaborations, and the most frequently emerging topics and concepts. VOSviewer can be used to analyze bibliometric data from various sources such as Scopus, Web of Science, and Google Scholar. The software uses clustering and cluster analysis techniques to visualize the linkages between articles and research topics in the form of network maps that can be easily understood. In addition, VOSviewer can also be used to visualize data in the form of graphs, histograms, and pie charts. In academic, VOSviewer is often used to perform bibliometric analysis to identify research trends and author collaborations in a particular field. The software can also be helpful in identifying topics and concepts that most often come up in a particular research, as well as providing insight into how knowledge in a particular field develops over time (Delle Foglie & Keshminder, 2022).

Literature review study is a method or process carried out in research or academic studies to collect, evaluate, and synthesize information or knowledge that has been published in various sources such as books, scientific journals, conferences, and online sources related to certain topics or problems Literature review studies are generally carried out to provide a better understanding of the topic being studied, See the history and development of related research, evaluate the weaknesses and strengths of research methods that have been used, and identify gaps or opportunities for future research. In academic research, literature review

studies are usually used as one part of the introductory chapter or literature review, and are an important first step before research is conducted or the results are analysed (Mohamad Shafi & Tan, 2023).

RESEARCH METHODOLOGY

This research uses research methods with a mix-method approach, namely quantitative methods in bibliometric studies and qualitative methods in literature review studies. The object of his research is Green Sukuk. The type of data used is secondary data. The scope of data used is research journal articles about Green Sukuk in the world. The source of the data collection came from journal searches on Google Scholar and Perish/Harzing software. Data analysis tools use Microsoft Excel, Mendeley Desktop and VOSviewer software.

Data collection techniques include: (1) opening the Perish/Harzing software, then searching for journals based on the title category of keywords saying "Green Sukuk" in the period 2014 - 2023; (2) collect journal title data in Microsoft Excel, and identify duplicate journal titles; (3) download RIS (Research Information Systems) format files from all journals for which data has been collected; and (4) insert RIS data files into the Mendeley Desktop software.

Data analysis techniques include: (1) mapping the number of journal publications distributed around Green Sukuk using Microsoft Excel and Mendeley Desktop based on the year of publication; (2) mapping the results of bibliometric network visualization and journal publication trends around Green Sukuk using VOSviewer (Visualization of Similarities) algorithm software based on the number of clusters and their items; and (3) mapping research topics around Green Sukuk using literature review studies (Suntoro & Setyaningsih, 2022).

RESULTS AND DISCUSSION

Mapping the Distribution of Publications about Green Sukuk during 2014 – 2023 in the World

There are 168 national and international journals based on the results of data collection using Microsoft Excel and Mendeley Desktop from the Google Scholar website and Perish/Harzing software during the period 2014 to 2023. The result is as follows:

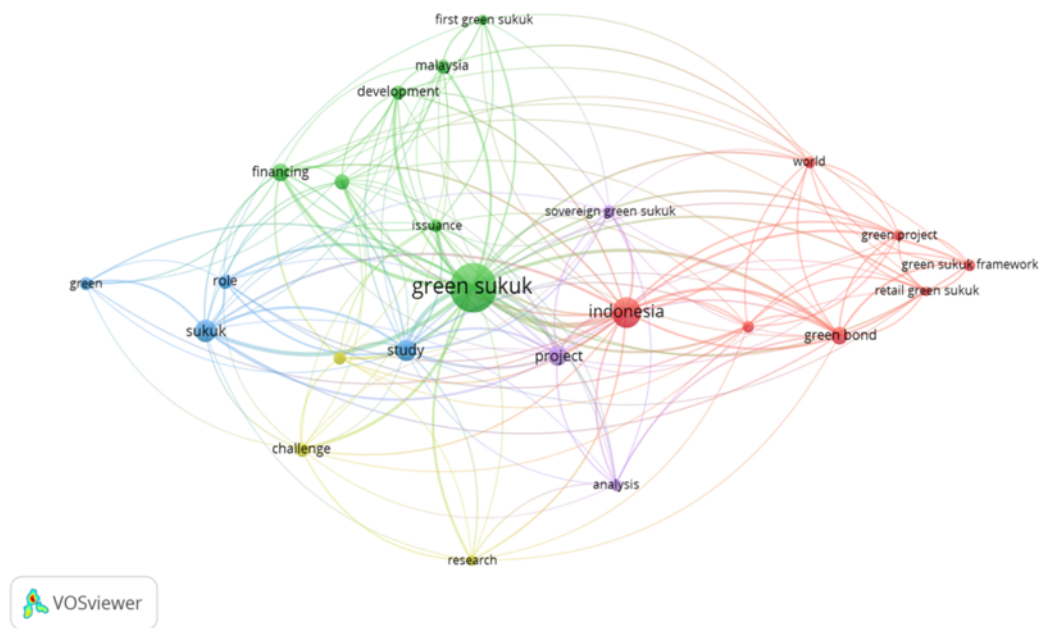
Table 1. Journal Publication Data About Green Sukuk by Year

Year	Number of Publications	Year	Number of Publications
2014	2	2019	23
2015	-	2020	18
2016	5	2021	17
2017	7	2022	30
2018	5	2023	61

Source: In the Process of Researchers, 2024

Based on the search results of articles on Perish/Harzing software exported in RIS (Research Information Systems) format, then inputted and analyzed using VOSviewer software. The result is as follows:

Figure 2. Network Visualization of Research Development Map Around Green Sukuk



Source: VOSViewer Software 1.6.18

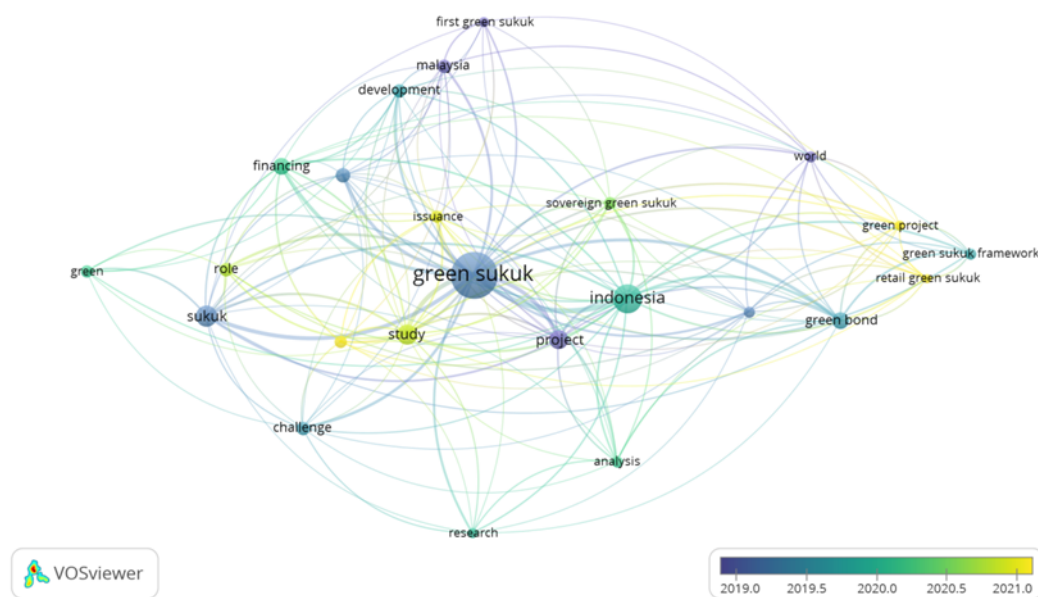
This mapping has a function to find out the publication network by looking at the colors (Kumar et al., 2023). In figure 2 the network visualization map above shows the state of art based on a Google Scholar search with the keyword Investment Portfolio. The network visualization map of research development regarding the optimal portfolio is divided into 5 clusters with 24 topics. The following are the results of the analysis of the distribution of bibliometric mapping:

1. Cluster Cluster 1, red color consists of 7 topics: green bond, green sukuk framework, Indonesia, retail green sukuk, sustainable development, world.
2. Cluster Cluster 2, green color consists of 7 topics: climate change, development, financing, firsts green sukuk, green sukuk, issuance, Malaysia.
3. Cluster Cluster 3, dark blue color consists of 4 topics: green, role study, sukuk.
4. Cluster Cluster 4, yellow color consists of 3 topics: challenge, green sukuk issuance, research.
5. Cluster Cluster 5, purple color consists of 6 topics: analysis, project, sovereign green sukuk.

Overlay Visualization Mapping on Vosviewer

The overlay visualization map illustrates when research with related themes was published. The color of each overlay circle depicts the average year of publication of the related theme. The older the color of the overlay circle, the longer the publication year and the brighter the overlay circle, the newer the publication year.

Figure 3. Map Overlay Visualization Green Sukuk



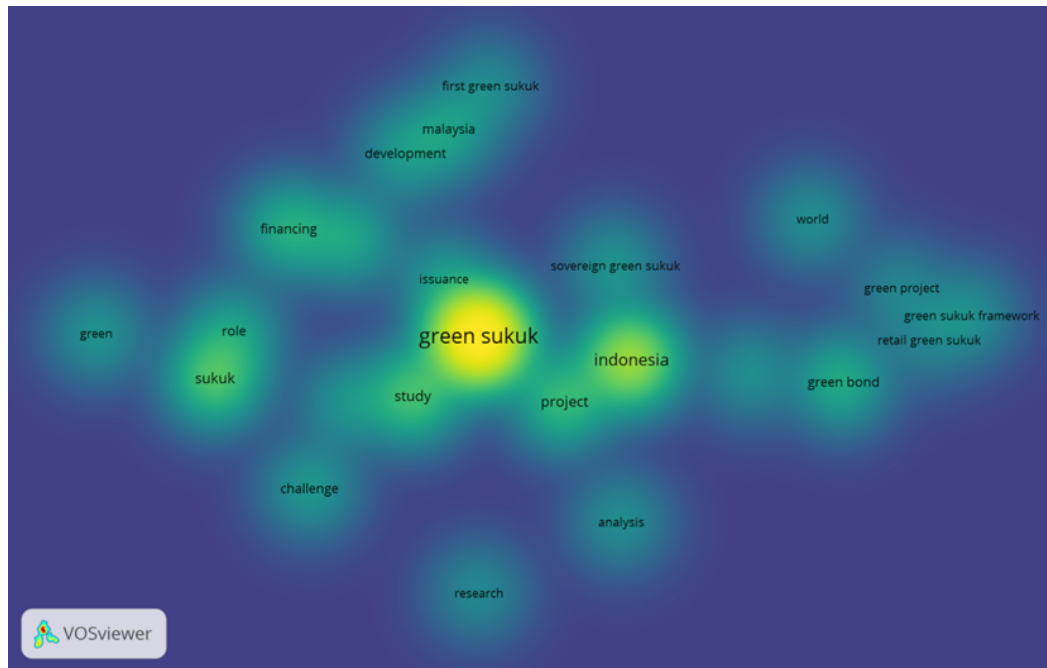
Source: VOSViewer Software 1.6.18

The overlay map visualization in figure 3 above illustrates that the circle with the darkest color is dominated by the topic of Green Sukuk. This indicates that the topic of Green Sukuk has been a topic that has been published for a long time. Furthermore, for the publication year, followed by the topic of first green sukuk and sovereign green sukuk with research and sub-research that is quite interesting to discuss. For a recently published study, the topic of Retail Green Sukuk and Green Project is seen in bright yellow circles.

Density Visualization Mapping on Vosviewer

The density visualization map depicts many and few theme objects discussed (Donthu et al., 2021). The brighter the colors produced on an object, the more themes have been discussed. Meanwhile, the darker and more transmaran an object tends to be, the fewer themes with related titles have been discussed. This mapping is assisted by the Vosviewer application tool to see many research objects that can be found from green sukuk research in the world with the period 2014 – 2023.

Figure 4. Density Visualization Green Sukuk



Source: VOSViewer Software 1.6.18

Based on the density visualization data in figure 4. Optimal is a theme that is very often discussed, this can be seen from the density visualization which shows bright yellow then followed by the topic of stocks, management and wealth management products. As for the topic of single index model, capital asset pricing model and, return and risk portfolio, show transparent colors that tend to darken, meaning that research discussing this theme is still very little. Therefore, this theme has a very large opportunity to be researched and developed to be used as a novelty in research.

Discussion

Bibliometric Analysis of Green Sukuk

Based on the above findings, it can illustrate the research that is widely used in the topic of green sukuk in the world for the last ten years, in Network visualization various colors produced in VOSviewer software explain the network between relationships on green sukuk topics such as research in Indonesia, sovereign green sukuk, retail green sukuk and Green Project (Kumar et al., 2023).

The Overlay Visualization Mapping on Vosviewer image explains the description of the research period in terms of color from the color color to light colors which means the latest research topic, while the Density Visualization Mapping on VOSviewer image shows a lot of research on the topic under study. These various mappings, many describe the latest research topics that can be used as novelty (Christiyanto et al., 2022).

Literatur Review Green Sukuk

In this review literature review, Green Sukuk is a financial instrument that funds projects focused on sustainable development and environmental protection. Green Sukuk is a bond issued by the government to finance green projects that have a positive impact on the environment. The government uses this financial instrument to raise funds from the capital market to support environmentally friendly projects (Hendra et al., 2023).

The development of Green Sukuk in countries has great potential in combining financial and environmental aspects. However, there are still several challenges that need to be overcome in the development of Green Sukuk. One of the key challenges is the establishment

of a clear and consistent regulatory framework governing Green Sukuk. In addition, strong transparency and oversight are needed to ensure funds raised through Green Sukuk are used appropriately for sustainable projects (Risanti et al., 2020).

The development of Green Sukuk by the government is a positive step in realizing an environmentally friendly environment. With the right support from regulators, investors, and governments, Green Sukuk has the potential to contribute to the transformation towards a more sustainable and environmentally friendly economy. Some of the advantages of Green Sukuk include reducing dependence on fossil energy sources that damage the environment and contribute to greenhouse gas emissions. Green Sukuk can also encourage the private sector to move towards greener business practices, create new jobs, and encourage innovation in sustainable technologies (Billah et al., 2023).

In the development of Green Sukuk, the government needs to take steps to encourage environmental sustainability and address climate change. This includes the development of regulations that focus on climate change mitigation, the development of sustainable projects such as solar power plants, the development of renewable energy, and the improvement of energy efficiency (Abdullah & Nayan, 2020).

Overall, Green Sukuk has a significant role in the government's efforts to create an environmentally friendly and sustainable environment. With proper development and strong support, Green Sukuk can be a powerful financial instrument in achieving sustainable development goals and environmental protection (Suherman et al., 2019). Several countries have successfully implemented Green Sukuk in their efforts to support sustainable development and environmental protection. Some examples of countries that have succeeded in issuing Green Sukuk include:

1. Malaysia: Malaysia is one of the pioneers in Green Sukuk issuance. In 2017, Malaysia issued \$250 million worth of Green Sukuk to finance renewable energy and energy efficiency projects. This publication became the first in the world on a national scale.
2. Indonesia: Indonesia has also been active in the issuance of Green Sukuk. In 2018, Indonesia issued \$1.25 billion worth of Green Sukuk, the first of its kind in a developing country. The funds raised from Green Sukuk are used for projects that contribute to the reduction of greenhouse gas emissions and the development of renewable energy.
3. United Arab Emirates: The United Arab Emirates (UAE) is one of the countries that has adopted Green Sukuk as part of their sustainable development strategy. In 2017, the UAE issued \$1.25 billion worth of Green Sukuk to finance projects related to renewable energy, energy saving, and water management.
4. Luxembourg: Luxembourg became the first European country to issue Green Sukuk in 2017. They issued €200 million worth of Green Sukuk to support sustainable projects such as renewable energy and energy efficiency.

In addition to the above countries, several other countries such as Nigeria, Morocco, and the United Kingdom have also launched Green Sukuk as part of their efforts in achieving sustainable development goals (Keshminder et al., 2022). The successful implementation of Green Sukuk in these countries shows that this financial instrument can be an effective tool in supporting the transition to a greener and more sustainable economy.

The projects funded by Green Sukuk in those countries vary depending on each country's sustainable development goals and environmental needs. Here are some examples of projects that are generally funded by Green Sukuk in these countries:

1. Renewable Energy Projects: Funds raised through Green Sukuk are often used to support renewable energy projects, such as solar, wind, hydro, and biomass power plants. These projects aim to reduce dependence on fossil fuels that contribute to greenhouse gas emissions.

2. Energy Efficiency Projects: Green Sukuk is also used to fund energy efficiency projects, for example in the building, transportation, and industrial sectors. These projects aim to reduce excessive energy consumption and carbon emissions.
3. Water and Waste Management: In some countries, Green Sukuk is used to support water and waste management projects. This includes investments in wastewater treatment infrastructure, waste management, and water pollution reduction.
4. Sustainable Transport: Funds from Green Sukuk can also be allocated to sustainable transport projects, such as the construction of railway networks, the development of environmentally friendly public transport, and emission reduction initiatives within the transport sector.
5. Environmental Recovery and Conservation Projects: Some countries use funds from Green Sukuk to support environmental restoration projects, ecosystem restoration, and biodiversity conservation. These include forest restoration, rehabilitation of degraded lands, and wildlife protection projects (Naeem et al., 2023).

CONCLUSION AND SUGGESTION

Based on the results of the discussion above, it can be concluded as follows: First, based on mapping the number of research publications about Green Sukuk from 2014 to 2023 from national and international journals contained in Google Scholar, there are 168 publication journals. Second, based on the mapping of VOSviewer bibliometric studies, around optimal portfolios divided into 5 clusters and 163 topic items, there are 24 topics around Green Sukuk that often appear first Green Sukuk and second Indonesia.

The limitation of this study is that the scope of research only covers green sukuk during the period of 2014 to 2023. The publications studied only come from national and international journals contained in Google Scholar. These limitations make this study has not described thoroughly about green sukuk by mapping other indices such as Scopus, Garuda or others. In addition, there are several journals that in the following year have not been published that have not been included in this study, while these journals are needed to compare between the many studies studied from year to year and look at new topics.

Based on review literature analysis, Green Sukuk is a financial instrument that aims to fund projects focused on sustainable development and environmental protection. Issued by the government or related entities, Green Sukuk collects funds from the capital market for use in projects that contribute to greenhouse gas emission reduction, renewable energy development, energy efficiency, water management, environmental conservation, and other projects that have a positive impact on the environment. By blending the principles of Islamic finance and sustainable development goals, Green Sukuk becomes an effective tool in achieving the transition to a green and sustainable economy.

The relationship between Green Sukuk and the Green Economy is as a tool to support sustainable development and reduce negative impacts on the environment based on sharia. Meanwhile, the Green Economy is an economic model that uses principles related to sustainable development, reducing carbon emissions, and reducing the use of natural resources to overcome existing climate change. Through this research mapping, it is hoped that it will help academics and practitioners to deepen their knowledge and development about Green Sukuk. Suggestions for further research include the addition of longer research periods and other international journals.

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