THE NEXUS BETWEEN A GREEN ECONOMY AND ISLAMIC FINANCE: INSIGHTS FROM A BIBLIOMETRIC ANALYSIS

*Aam Slamet Rusydiana**
*Raditya Sukmana***
*Nisful Laila****
*Muhammad Syamsul Bahri*****

Abstract: A green economy is expected to solve the failure of the conventional economy to address climate change. It would do this by emphasising the balance between economic and environmental factors – an approach that is in line with the existing concept of Islamic finance. As a new field, research related to the green economy is still developing. This study attempts to provide quantitative information on this development. In total, Scopus lists 1183 papers, including journal articles, book chapters, and conference papers, on this subject, all produced between 1961 and 2021. This study employed the Biblioshiny package from R-studio and Excel software to synthesise and analyse this data. In addition, we identified relevancies between the green economy and Islamic finance using existing research. Regarding the results obtained, the natural fit between Islamic finance and a green economy would naturally support the implementation of the latter. Furthermore, the results show that *sukuk*, in particular, is a potential instrument in Islamic finance for promoting a green economy.

Keywords: Green economy, Islamic Finance, Sustainable Development, Bibliometric, *Sukuk*.

Introduction

In the last two decades, environmental damage, global warming, and climate change have had a tremendously negative impact on human life, becoming frightening spectres for the international community.[1,2] Several analyses show that environmental damage is increasing massively in various countries, including Indonesia. However, global surveys agree that the most concerning risk is climate action failure. According to the Global Risk Report 2021, although extreme weather events rank first as a risk in terms of likelihood, climate action failure is top by impact. This risk would create a domino effect

in several ways: environmental, social, economic, and in terms of energy and resources.

Various parties have argued that the leading cause of environmental damage and socio-environmental crises are development strategies and policies that are not environmentally friendly.[3] National development strategies and policies tend to prioritise economic achievement without balancing environmental and community factors. According to conventional economic theory, material prosperity and human pleasure are inextricably linked; it was assumed that the more we had in terms of material possessions, the happier we would be.[4] As a result, this theory leads to an economic paradox: although a country's economic growth and corporate profits continue to increase, social and environmental crises are escalating.

This problem brings all countries to one agreement: the need to create a more environmentally friendly and sustainable economic concept, the green economy. A green economy is defined broadly, but the United Nations Environmental Programme (UNEP)[5] describes it as something that improves human and societal well-being. The term "green growth" jointly proposed by the Organisation for Economic Cooperation and Development (OECD) and the World Bank is sometimes used interchangeably with it.[6] Pearce first introduced the concept of a green economy in 1989, although as an idea it only received attention after the 2008 economic crisis, since which it has become an international discussion point and consideration within policy frameworks, such as during COP26, the most recent annual UN climate change conference. COP stands for Conference of the Parties, and the summit was attended by all the countries that signed the United Nations Framework Convention on Climate Change (UNFCCC) – a treaty that came into force in 1994. It was also promoted at the United Nations Conference on Sustainable Development in Rio De Janeiro (Rio+20) in 2012.[7,8,9]

The concept of a green economy becomes a point of consideration and guiding logic in overcoming economic, social, and environmental challenges,[10] indicating a balance between each dimension. Unsurprisingly, the green economy has similarities with Islamic finance. This study attempts to synthesise and analyse the development of literature on the green economy. First, the study provides quantitative information on the development of green economy literature using a bibliometric research method. Second, the study observes the nexus between the green economy and Islamic finance. The structure of the study is as follows: literature review, methodology, results and discussion, and conclusion.

Literature Review

The green economy's origins are rooted in a fear of economic recession, inequality, and climate change. These factors peaked during the financial crisis of 2008, prompting countries and international organisations around the world to develop a new economic paradigm capable of addressing the crisis. Hence, the development of the green economy emerged through the contribution of international organisations, civil society actors, and academics.[11] A critique of the capitalist economic system as a leading cause of inequity and ecological destruction also played a role in the background of green economy discourse.[12] The green economy advocates a radical transformation of economic norms, to produce a more balanced approach which attempts to build complete climate change prevention while still considering economic factors.[13] The concept of a green economy highlights sustainability to ensure that future generations are left no worse off than the present one. Consequently, the green economy should maintain and compensate the utilisation of natural resources; the development of economic well-being today should not interfere with the well-being of the future.[14]

UNEP provides a broader definition of the green economy, as follows:

> A green economy is defined as low carbon, resource-efficient, and socially inclusive. In a green economy, growth in employment and income is driven by public and private investment into such economic activities, infrastructure, and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services.[15]

After the concept of a green economy was introduced in Rio+20, policy makers tried to 'green' their policies. For example, the UNEP promoted the "Global new green policy and green economic plan" in December 2008, followed by the Global Green New Policy Synopsis Report in 2009.[16] Although there is much research on this theme, few studies have employed the bibliometric approach. Only Loiseau et al.[17] has used bibliometrics to identify keywords related to the green economy and Scopus as a database. However, they only presented the relevant keywords as their bibliometric results, without focusing on spatial scope.

Research Methodology

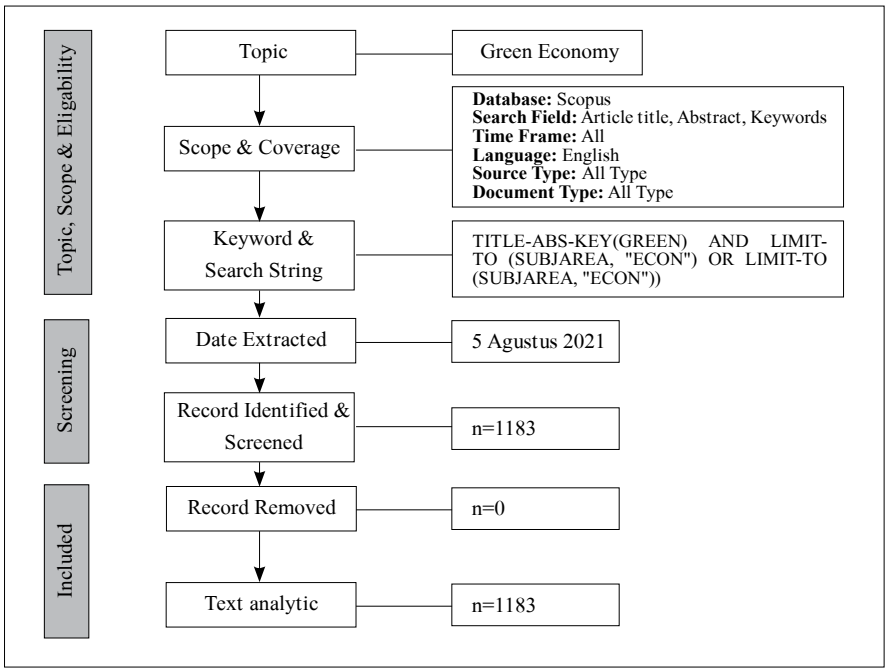

Figure 1: Flow Diagram of the Search Strategy

This study uses publication data sourced from various journals from 1899 onwards related to the theme of the green economy. For data collection, we explored Scopus-indexed papers. Scopus was used because it is one of the most widely utilised databases by researchers. We found there were 1183 works on the green economy written between 1961 and 2021. Using R-studio software, we analysed the trends in publication development over this period.

Bibliometric studies in information science can reveal document use patterns, literature development, and sources of information in a subject area.[18] Bibliometrics include two types of studies: descriptive and evaluative. Descriptive studies analyse articles, books, and other publication formats by looking at authorship patterns, such as the gender of the author, the type of work, level of collaboration, the productivity of the author, the institution where the author worked, and the subject of the article. Evaluative studies analyse the impact of a document, made by counting references or citations.[19]

The review process was carried out on 5 August 2021. Figure 1 illustrates the three steps used to identify the research documents. The keywords used by this study tried to answer the latter's research questions. Some general

statistics from the data set are presented to provide an idea of how literature on the green economy has developed. The research documents were analysed using Bibioshiny, a free software programme supported by the R-studio environment (CRAN, The Comprehensive R Archive Network, https://cran.r-project.org/). This programme provides a set of tools for bibliometric and scientometrics research.[20] Its focal point lies in the construction of bibliometric maps for bibliometric literature. Finally, a text analysis was carried out on the bibliometric mapping.

Results and Discussion

Source

The below table lists the types of documents that emerged from Scopus with the keyword 'Green Economy'. The number of documents found and analysed was 1183, which were divided into three types: journal articles (796), book chapters (168), and conferences papers (219).

No	Document type	Total	Percentage
1	Journal Article	796	67.28%
2	Book Chapter	168	14.20%
3	Conference Paper	219	18.52%
Total		**1183**	

Table 1: Document Type

Based on a classification of document type, the most widely used form of document in green economics is the journal article, with 67.28 per cent of all documents conforming to this type. The lowest percentage was book chapter, on 14.2 per cent.

Text Analysis

Mapping is a process that enables one to recognise elements of knowledge and their configuration, dynamics, interdependencies, and interactions. Text analysis was performed using R-studio and Biblioshiny software. The initial stage in this process was a deep analysis of other search words (keywords) that often appear alongside 'green economy'. To explore these results, this section visually maps the 1183 documents related to the green economy. The results of this keyword mapping analysis become the basis for joining together important or unique terms contained in certain documents.

Most Relevant Words

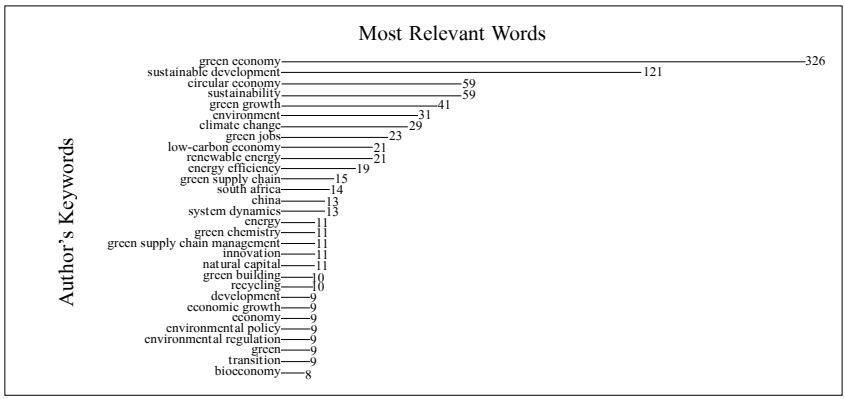

Figure 2: Most Relevant Words

An analysis of keywords from each document was carried out, with several words emerging with occurrences between 1 and 326. Figure 2 shows the 30 most relevant terms used in green economy research. The top keyword was 'green economy' itself, with 326 occurrences. The second was 'sustainable development', with 121 occurrences, and then 'circular economy' and 'sustainability', each with 59 occurances.

Word Cloud

This section displays in the form of a word cloud those words that appear alongside 'green economy' in the abstract and title of the identified documents. The word cloud displays words in various sizes according to the number of times they appear. In terms of placement, word clouds tend to be random, but the dominant words are placed in the middle. In this study, the word cloud results were obtained based on an analysis of document titles. Based on Figure 3, the most dominant words related to green economy were 'economy', 'green', 'sustainable', and 'development'.

Figure 3: Word Cloud

Word Tree Map

In this section, words associated with 'green economy' as found in the abstracts of each document are presented in the form of a word tree map. Word tree maps show words in squares; the more significant the word, the bigger the square it appears in.

Figure 4: Word Tree Map

Based on Figure 4, the most dominant words related to 'green economy' were 'green', 'economy', 'development', 'environmental', and 'economic'. These results indicate that the development of literature on the green economy tends to focus on these five dimensions.

Word Dynamic

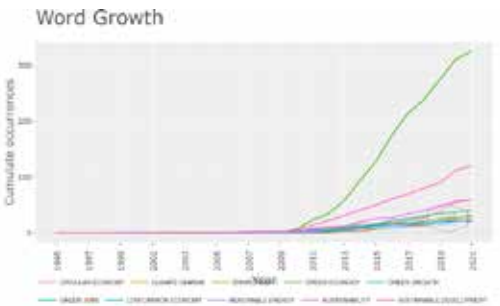

Figure 5: Word Dynamic

Based on Figure 5, keyword development is described in the form of an annual growth curve and occurrence value. The Figure shows that the most frequently occurring words began to develop in 2009, and have continued to rise until 2021. From this it can be concluded that the research with the most significant growth is related to 'green economy' itself.

Trend Topics

Figure 6: Trend Topics

The green economy as a research topic began to experience significant growth in 2001. Figure 6 shows the development of green economy research topics over time. These results can identify what topics have been used long-term, and which are more recent. They also consider the frequency of each word, indicated by the log axis. A higher pattern indicates high use and the further an axis is to the right, the more recent the word has been used.

Based on the above data, the topics that have been most used since 2001 in green economy research are 'taxation' and 'corporate'. Furthermore, in 2006, 'political' emerged with a fairly high frequency, while topics used widely since 2020 include 'corporate', 'evolution', 'efficiency', 'sustainable', 'environmental', 'economies', 'development', 'financial', 'perspective', 'emerging', 'circular', 'entrepreneurship', 'regulation', 'technologies', and 'digital'.

Co-occurrence Network

Figure 7: Co-occurrence Network

A co-occurrence network displays words related to 'green economy' in the form of coloured clusters defined by relationship. Based on Figure 7, there are six clusters with related keywords. These keywords are described in detail in Table 2.

Cluster	Keywords
Cluster 1 (Red)	Green economy, sustainable, development, environmental policy, green energy, energy efficiency, governance, ecosystem services, economic development, energy, green jobs, innovation, employment, green growth, economic development, China, Africa, low carbon economy, green building, and Russia.
Cluster 2 (Green)	Sustainability, transition, corporate social responsible, green chemistry, bioeconomy, industrial ecology, circular economy, emerging economies, recycling, green supply chain management, and green supply chain.
Cluster 3 (Brown)	Development, climate change, tourism, green finance, policy
Cluster 4 (Orange)	Economy, ecology, and green
Cluster 5 (Purple)	Economic growth, and CO_2 emissions
Cluster 6 (Blue)	South Africa and system dynamics

Table 2: Co-occurrence Network Keywords

Thematic Map

Figure 8: Thematic Map

The above thematic map is based on density and centrality in relation to 'green economy' and is divided into four quadrants. The upper left quadrant shows highly developed and isolated themes. This quadrant indicates a specific theme that is rarely explored but experiences high development. It is therefore characterised by high density but low centrality. The themes in this quadrant include 'challenges', 'policies', and 'European'. The lower left quadrant shows emerging or declining themes. This quadrant indicates green economy research themes that have been used for a long time but have experienced fluctuation, as indicated by the low level of density and centrality. The themes in this quadrant include 'carbon', 'low', 'investment', 'climate', 'impact', and 'change'. The upper right quadrant shows the motor or main themes, characterised by a high level of density and centrality. These therefore need to be developed and are important for further study. The words that appear in this quadrant are 'green', 'economy', and 'development'. Finally, the lower right quadrant shows the basic themes used in green economy research. This category has a high level of centrality but tends to have a low density level. These general topics are commonly used and important. The themes that appear in this quadrant are 'circular', 'economies', and 'management'.

Thematic Evolution

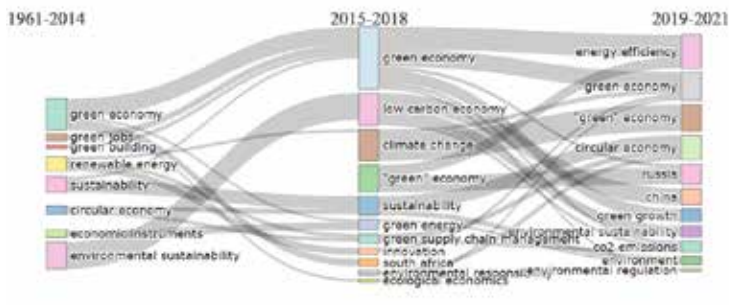

Figure 9: Thematic Evolution

To explore the evolution of green economy research, we analysed the results of a thematic evolution generated by scientometric results. Figure 9 shows this evolution based on keywords related to 'green economy'. As shown, there is a dynamic trend in each period. Thematic evolution is depicted as a rectangle; the larger the rectangle, the more often the theme is used.

The thematic evolution is divided into three parts. First, the period 1961-2014 shows eight themes: 'green economy', 'green jobs', 'green building', 'renewable energy', 'sustainability', 'circular economy', 'economic instruments', and 'environmental sustainability'. The theme 'green economy' ranks first, followed by 'environmental sustainability'. The second part shows the most frequently used themes in 2015-2018, with 11 over this period, showing a development since the previous period. These themes are: 'green economy', 'low carbon economy', 'climate change', 'green economy', 'sustainability', 'green energy', 'green supply chain management', 'innovation', 'South Africa', 'environmental responsibility', and 'ecological economy'. Finally, in the 2019-2021 period, there were again 11 themes, of which 3 originated from the previous period: 'green economy', 'sustainability', and '"green" economy.'

The Green Economy and Its Relevance to Islamic Finance

Islamic finance views the green economy as a concept that can create ethical responsibility. A green economy would respect the environment by considering the impact thereon of economic activities.[21] Islamic economics considers humans to be stewards (*khalifah*) responsible for the welfare of the Earth, including its environment. Moreover, some Qur'anic verses support both the green economy and sustainable development (Q.54:49) via the principle *al-mizan* (balance). *Mizan* is a reference principle in Islamic finance that requires the maintenance of an ecosystem's equilibrium and balance.[22]

Furthermore, *maqasid al-shari'ah*, as the fundamental framework of Islamic finance, aims to achieve *maslahah* (public interest), defined as the securing of benefit and prevention of harm.[23] A green economy would share the same goals: to prevent environmental damage by having a sustainable economy that considers the environmental and societal good. Natural resources must be managed not just to safeguard the environment, but also to promote human survival. From an Islamic perspective, nature is a trust that should not be mistreated or over-consumed. Additionally, Islamic teachings argue that resources must benefit all, rather than just the wealthy and influential.

With the above in mind, Islamic finance has several financial instruments relevant to supporting a green economy, notably *sukuk* (Islamic bonds). Thus, when investment in renewable energy declined in Italy due to reduced government incentives, Campisi et al.[24] investigated the potential for issuing green *sukuk* as a financing model for the wind energy sector. The results showed that green *sukuk* could be used as an alternative instrument with better profitability and bankability than conventional products.

In contrast to Campisi et al., Hamid et al.[25] suggested *zakat* as a means of supporting green economic growth in Malaysia. Using Autoregressive Distributed Lag (ARDL) and the Vector Error Correction Model (VECM) Granger Causality test, Hamid et al. revealed that, although in the short term *zakat* has a weak impact on green economic growth, this is not so longer term.

Al-Roubaie and Sarea[26] suggested that to achieve green economic goals which focus on the balance between economic activities and the sustainability of natural resources, green investments like *sukuk* should be used to generate a green economy. Their study stated that green *sukuk* could serve as a financing tool for green projects to combat climate change. Khan[27] addressed the role of Islamic finance in achieving Sustainable Development Goals (SDGs). Since Islamic finance relies on *maqasid al-shari'ah* as its practical and theoretical guide, he promoted *sukuk* as a financial instrument capable of filling sustainability gaps. Hariyani and Kusuma[28] investigated the potential of green *sukuk* for financing sustainable waste management projects in Indonesia. Using an Analytical Network Process (ANP) with a Benefit, Opportunity, Cost, Risk (BOCR) framework, their study showed that green *sukuk* will be beneficial for reducing waste since the opportunities for alternative energy, increase in *sukuk* liquidity, and improvement in the role of Islamic finance will all greatly expand. However, participation and awareness became the highest risk to the implementation of green *sukuk*.

Julia et al. proposed an innovative model for implementing a green economy through Islamic green financing.[29] Since the concept of a green economy positively supports the circular economy and SDGs agenda, they encouraged green *sukuk* as a mitigation measure against climate change. Richardson[30] studied the development of responsible *sukuk* (including green *sukuk*) in the United Arab Emirates. His study found that the UAE struggled to promote green *sukuk* due to a lack of practical action, internal sustainability programme, and legal guidance. Aassouli et al.[31] provided the roadmap for Sub-Saharan Africa to mitigate climate change and achieve SDGs by using green *sukuk* as a tool for fill financing gaps for green projects. Lastly, Abdullahi[32] recommended Islamic finance products be considered by policymakers in OIC countries as solutions to deforestation issues. The result was a suggestion that green *sukuk* and cash *waqf* be used to finance afforestation programmes. Table 3 summarises the relevance of Islamic finance for the green economy.

No	Title	References	Relevance
1	Shariah Compliance Finance: A Possible Novel Paradigm for Green Economy Investment in Italy	Campisi et al. (2018)	Proposed the utiliasation of green *sukuk* as a financial instrument for facilitating a green economy in the Italian wind energy sector. Demonstrated that green *sukuk* creates better profitability and bankability than conventional finance.
2	Contribution of Islamic Social Capital to Green Economic Growth in Malaysia	Hamid et al. (2019)	Showed that *zakat* contributes to green economic growth in the short and long terms.
3	Green Investment and Sustainable Development: The Case of Islamic Finance	Al-Roubaie & Sarea (2019)	Demonstrated that Islamic finance provides an environmentally friendly financing system that endorses ethical investment activities supportive of the green economy. Mentioned green *sukuk* as capable of building a green economy.
4	Reforming Islamic Finance for Achieving Sustainable Development Goals	Khan (2019)	Presented *sukuk* as a solution to sustainability gaps. By designing a green project, *sukuk* can potentially help achieve SDGs.
5	Green *Sukuk*-Based Project on Sustainable Waste Management in Indonesia	Hariyani & Kusuma (2020)	Suggested that green *sukuk* be used to finance sustainable waste management in Indonesia.

6	Islamic Social Finance and Green Finance to Achieve SDGs through Minimizing Post Harvesting Losses in Bangladesh	Julia et al. (2020)	Suggested a green financing scheme through Islamic social finance as a financing vehicle.
7	The Role of Islamic Finance in Fostering Circular Business Investments: The Case of OIC Countries	Ibrahim & Shirazi (2020)	Argues that to create and support a circular economy, harmonisation is needed between the business model of a financial institution and sustainable development. Since Islamic finance aligns with sustainable finance, it can provide a varied set of instruments for climate finance. Debt-based, sale-based, partnership-based, and green *sukuk* can all be part of this financing infrastructure.
8	The UAE and Responsible Finance—Can Responsible Finance Sukuk Help the UAE in Fulfilling Its Sustainability Ambitions	Richardson (2020)	Argues that growth in the responsible finance sector, including green finance, prompted the UAE to promote responsible finance through Islamic finance instruments like green *sukuk*. However, many aspects need to be improved, especially legal guidance.
9	Green Sukuk, Energy Poverty, and Climate Change: A Roadmap for Sub-Saharan Africa	Aassouli et al. (2018)	Highlighted Islamic financial instruments like green *sukuk* as tools for financing sustainability projects (specifically renewable energy projects).

10	Financing Afforestation in the Organization of Islamic Cooperation Countries: What Role for Islamic Economics and Finance?	Abdullahi (2020)	Investigated how Islamic economics and finance can address deforestation in OIC member countries. Promoted the role of green *sukuk* and cash *waqf* as financing models for afforestation programmes.

Table 3: Green Economy Research in the Light of Islamic Finance

Conclusion

This study aimed to evaluate developments in literature related to the green economy from 1961 to 2021, using Biblioshiny. Over 1000 papers on the green economy were published over the stated period; the bibliometric results showed that this literature experienced changing trends over time. These results are detailed in Figures 5 and 6. Second, we identified two research networks in the green economy literature, presented as co-occurrence networks. These two networks were 'green economy' and 'sustainable development'. Based on the results of the co-occurrence networks, we found 43 keywords that are trending in green economy research. Furthermore, conceptually this research created thematic maps to place green economy themes and sub-themes on a chart divided into four clusters: basic themes, emerging or declining themes, highly developed and isolated themes, and motor themes.

This study is an initial endeavour designed to provide quantitative information on the development of green economy research. However, this study is limited to one indexing database, Scopus. In addition, we explored the nexus between the green economy and Islamic finance. This research aims to advance the progress of the green economy in both practice and academic contexts; it is worth noting that Islamic finance supports the same principle for environmental preservation and balancing as the green economy. However, few studies have discussed this relevancy. This is in line with the results of this study, which revealed no Islamic finance related words within the bibliometric results. Hence, further research should be undertaken to explore this issue at different levels of complexity. Future research can be developed by applying the bibliometric data from this study. Academics can also expand this review of green economy literature using other references, such as Web of Science, or additional software like VOSViewer to produce more diverse bibliometric mapping.

Recommendations

While the private sector is the primary driver of Islamic finance and the green economy, governments must play a role in ensuring sound policies, robust institutions, and efficient public goods and services exist for growth that is of benefit to all citizens. The government can employ a variety of initiatives to promote Islamic finance and a green economy, including resource efficiency, green purchasing, local manufacturing and utilisation, waste stream management, and green infrastructure. Developing a green economy using Islamic finance demonstrates that environmental stewardship takes precedence over financial activities. This demands dedication from all stakeholders, including government, community, and business, towards environmental sustainability and management.

Notes

* *Aam Slamet Rusydiana*, is a researcher at the Sharia Economic Applied Research and Training (SMART) Indonesia. His research projects cover topics on waqf and Islamic economics. Aam is currently completing his PhD in Islamic economics and finance at Universitas Airlangga, Indonesia. Aam is also a lecturer at the Tazkia Institute. Email: aamsmart@gmail.com.

** *Raditya Sukmana*, is a Professor in Islamic Economic at the Faculty of Economic and Business, Universitas Airlangga, Surabaya, Indonesia. His areas of expertise are waqf, Islamic Microfinance, Islamic Capital Market and Islamic Bank, and he has a Scopus H-index 7. Raditya is also a consultant in managing the Islamic endowment funds and a trainer in article writing workshop for reputable journals. Email: raditya-s@feb.unair.ac.id.

*** *Nisful Laila*, is a lecturer in Islamic Economic at the Faculty of Economic and Business, Universitas Airlangga, Surabaya. He is an expert in Islamic capital market, Islamic finance, Islamic banking, global business management, and Islamic risk management. Nisful is also a vice dean at the Faculty of Economic and Business, Universitas Airlangga. Email: a*nisful.laila@feb.unair.ac.id.

****Muhammad Syamsul Bahri*, is an undergraduate student in Islamic Accounting programme at the Faculty of Economic and Business, Tazkia Institute Bogor, Indonesia. He is also an internship graduate at the Sharia Economic Applied Research & Training (SMART) Indonesia. Email: syamsulbhrr@gmail.com.

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