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Renewable Energy Mix Enhancement: The Power of Foreign Investment and Green Policies

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ABSTRACT

The objective of this study is to examine and assess the viewpoint of population and economic expansion, as well as foreign investment in the renewable energy sector, by examining the influence of green investment on indexed listed businesses in Indonesia's Sri-Kehati. The dataset utilised in this study include macroeconomic time series data from Indonesia spanning the years 2015-2021, as well as issuers indexed under the SRI-KEHATI framework. The data underwent analysis using the multiple regression approach. The study employed an associative research technique and utilised the Eviews 10 programme tool for data analysis. The findings of the study demonstrate a noteworthy positive impact of economic growth on the composition of renewable energy sources. The impact of population growth on the composition of renewable energy sources is shown to be insignificant, but foreign investment is observed to have a notable and adverse influence on the renewable energy mix. The impact of foreign investment on the Renewable Energy Mix is found to be both statistically significant and unfavourable. The variable of economic growth exhibits a noteworthy and favourable impact when moderated by green investment in Sri-Kehati indexed issuers, specifically in relation to the composition of renewable energy sources. The variable of population growth exhibits a noteworthy and favourable impact by means of moderating green investment in the perspective of Sri-Kehati indexed issuer companies regarding the composition of renewable energy sources. The variable of economic growth demonstrates a statistically significant and favourable impact when moderated by green investment in the Sri-Kehati Indexed Issuer Company, specifically in relation to the renewable energy mix. The impact of population growth on the renewable energy mix in the perspective of Sri-Kehati indexed issuer companies is found to be positive and statistically significant when considering the moderation effect of green investment. The variable representing economic growth demonstrates a notable and favourable impact when moderated by green investment in the Sri-Kehati Indexed Issuer Company, particularly in relation to the composition of renewable energy sources. The impact of population growth on the renewable energy mix in the perspective of Sri-Kehati indexed issuer companies is found to be positive and statistically significant when considering the moderation effect of green investment.

Keywords: Population, Economy, Renewable Energy Mix, SRI-KEHATI Index, Foreign Investment

JEL Classifications: B22, F38, H21, G21, G32, G33

1. INTRODUCTION

Natural resources drive economic growth in resource-rich countries by increasing trade and production, while many experts argue that abundance of natural resources reduces long-term growth because of depletion of natural resources (Ahmed et al., 2020). The main consumption of energy worldwide is related to human activities.

However, it may be important to measure the consumption of renewable energy affecting the human development process. The higher the state income, the lower the level of human development (Wang et al., 2018). Long-term relationship between energy consumption, economic growth in eight Asian countries despite the fact that energy efficiency of energy use in developing countries is much lower than developed countries (Al-mulali and Binti Che

Sab, 2012). The application of dynamic models and controlling for endogeneity, renewable energy consumption and expenditure on research and development has a statistically significant negative relationship with carbon emissions. The number of triadic patent families depicts a positive and significant relationship with carbon emissions, but in terms of the number of researchers, the relationship is positive but not significant (Gast et al., 2017). Projects and investments that promote the role of renewable energy by providing incentives to renewable plants and promoting new research in renewable energy technologies (Al-Mulali et al., 2015). Energy supply to sectors that drive economic growth will be an important issue for New Emerging Market economies in the long term. Energy conservation policies such as reducing the use of non-renewable resources to save resources for the future and reducing environmental pollution or increasing fuel efficiency for vehicles and heating at home will not prevent economic growth. Energy simulations that focus on future energy consumption must consider urbanization in addition to income and other factors (Bakirtas and Akpolat, 2018).

The role of non-renewable energy consumption in depleting environmental quality while renewable energy consumption is found to increase environmental sustainability (Alola et al., 2019). Economic growth affects energy efficiency and shifts from non-renewable energy to renewable energy (Aye and Edoja, 2017). Consumption of renewable energy, natural resources, and energy innovation improves environmental quality, and the interaction between economic growth and consumption of renewable energy has a positive impact. This study is new because it presents the interaction between economic growth and consumption of renewable energy. There needs to be a regulation on renewable energy related to increasing renewable sources and encouraging energy innovation to reduce the negative impact of energy and fossil energy sources on environmental degradation (Balsalobre-Lorente et al., 2018). (Sinaga and Sitorus, 2023) Economic growth does not lead to energy consumption and energy consumption does not cause carbon emissions because the Asia-Pacific region has made large investments in renewable energy as a result of increasing regional economic growth.

Energy consumption is driving economic growth in Asia. At the global level, the shock to economic growth accounts for 0.001% of the energy consumption variance while it accounts for 0.009% of the variation in carbon emissions for the next 10 years. In Asia-Pacific, economic growth accounts for 0.033% of the energy consumption variance while it accounts for 0.005% of the variation in carbon emissions in the 10-year horizon (Acheampong, 2018). Energy use and economic growth over the long term indicate that at higher levels of economic development there is less intensification of energy consumption, therefore, signaling a decrease in energy intensity while validating energy efficiency (Bekun et al., 2019). (Kasayanond et al., 2019) The economic and formal dimensions of sustainability practice positively affect competitive advantage, mediated by company reputation, customer satisfaction and organizational commitment (Cantele and Zardini, 2018). The impact of economic growth, energy consumption, trade openness, financial developments show that the implications for policy makers to create green investment (Antonakakis et al., 2017).

Indonesia’s economic growth can certainly experience significant changes see Table 1, namely:

Indonesia’s economic growth has undergone significant changes, so that sustainable economic growth requires green innovation to boost productivity, so it is one of the central issues in improving living standards (Du and Li, 2019). Energy security and environmental sustainability have become integral policy agendas throughout the world where global economic growth policies are being restructured to ensure reliable energy supply and also safeguard environmental welfare (Murshed, 2020). Renewable energy consumption and financial development have little effect on economic growth (Charfeddine and Mrabet, 2017). More efficient resource management of renewable resources by integrating circular economy principles to drive cost reduction, innovation and competitiveness of sustainable transitions to reflect economic viability and growth (D’Amato et al., 2020). Economic growth increases the ecological footprint that contributes to environmental degradation (Danish et al., 2019).

Economic cooperation on development that increasing consumption of renewable energy reduces the ecological footprint and increasing consumption of non-renewable energy increases environmental degradation (Destek and Sinha, 2020). Innovation and governance systems are proving to be critical to economic development (Fagerberg and Srholec, 2018). Significant impact of renewable energy consumption on economic growth in the Balkans and Black Sea countries (Koçak and Şarkgüneşi, 2017). Economic complexity and consumption of non-renewable and renewable energy are positively associated with higher rates of economic growth (Gozgor et al., 2018). Reducing fuel consumption and promoting environmentally friendly economic growth strategies in these developing countries will prove to be helpful for the well-being of this part of the developing world (Hanif et al., 2019). Economic growth across geographic areas and income groups. The positive relationship between financial development and economic growth in developing countries yielded mixed results: a two-way causality relationship between finance and growth for most regions and a one-way causality from growth to finance for the two poorest regions (Hassan et al., 2011). Developing country policymakers should focus on investing in the development of the renewable energy sector, thereby increasing energy independence and generating sustainable economic growth and employment. To achieve this goal, it is very necessary for these countries to receive financial and technological assistance from developed countries. At the same time, given that emission mitigation at the global level can only be achieved through international companies, this development assistance project is also very important for developed countries (Ito, 2017). Policy makers to design comprehensive

Table 1: Indonesia’s economic growth

Year	Percentage
2015	4.87
2016	5.03
2017	5.07
2018	5.17
2019	5.02
2020	-2.067
2021	3.69

energy conservation policies to minimize the consequences of massive energy consumption on economic growth by adding financial development (Kahouli, 2017). Primary energy needs have a close interaction with resources, technology, environment, infrastructure, as well as socio-economic developments. More appropriate policies on the benefits of technological efficiency, improvement of the energy mix, adjustment of the economic structure and green consumption are worth considering taking into account the upstream and downstream responsibilities of systematic point of view (Zhang et al., 2017).

The pursuit of excellence in economic development, amidst the destruction of the natural environment, is a shameless growth. The economic impact on environmental degradation is quite visible in industrialized economies where human health is compromised by rapid economic growth and energy-induced emissions. Key socio-economic and environmental issues in a large number of world economies to understand the need for a development policy agenda for sustainable growth (Zaman and Moemen, 2017). (Husnaini and Tjahjadi, 2021) There is a link between gross domestic product per capita, greenhouse gas emissions, renewable energy in total final energy consumption and green investment green investment (PICE) can trigger GDP per capita growth of 6.4%, GHG reduction of 3.08%, and renewable energy increase in total final energy consumption by 5.6% (Lyeonov et al., 2019). Indonesia is a country that has the potential for renewable energy sources in very large numbers due to the astronomical and geographical influence of the Indonesian state. Renewable energy and green ideology to solve macro-level social and environmental problems, and this study will help policy makers and researchers to understand the importance of green concepts in improving a country’s social, economic, and environmental performance (Khan et al., 2019). The expansion of green economy awareness among companies will encourage an increase in the level of environmental sustainability, in this way improving the current state of the green economy (Kasayanond et al., 2019). The potential for renewable energy that can be utilized in Indonesia is very large. But not yet optimally developed. Geographical disparities between locations of energy supply and demand, relatively low technological efficiency, high technology investment, and social factors as energy users are challenges for the government to develop renewable energy-based technologies (Afriyanti et al., 2018). Based on the data obtained (Badan Pusat Statistik, 2021) the results are presented in Table 2.

(Sinaga and Sitorus, 2023) The renewable energy mix in Indonesia can be seen that there is an increase from 2015 to 2021, namely in 2015 only getting a value of 4.90% and continuously increasing until 2021 to 12.16%. increasing investment in the renewable

energy sector and planning developments in renewable energy for sustainable energy growth (Zafar et al., 2019). The importance of appropriate policies for more inclusive economic and financial development and sustainable foreign direct investment that does not hamper the environment (Nasir et al., 2019). Energy consumption can encourage economic growth through increased productivity and can also increase environmental damage through increased emissions (Tiba and Omri, 2017).

The soaring process of urbanization and rapid economic growth in the service industry in the end, causing a large population increase in Indonesia which is still a problem, especially in urban areas, because the greater the number and population growth, the more problems faced by a region.(Kuncoro, 2013). Population growth in an area occurs due to several population factors, including births (fertility), death (mortality) and also population migration (Kuncoro, 2010; Nadia Ika Purnama, 2017). The following is the number of population growth and population density from 2015 to 2021 which has decreased in a period of 5 years, the results are presented in Table 3, namely.

Population growth is a dynamic balance between forces that increase and forces that reduce population(Mulyadi, 2015). The percentage of the population in Indonesia in 2016 and 2015 has decreased, in 2021 the percentage of the population will be 1.0322%. (Camenia Jamil and Restu Hayati, 2020)Todaro revealed that investment can drive the economic life of a country, because capital formation can increase production capacity, increase national income and create new jobs, which will expand job opportunities. Investment in resource management has the potential to be developed in Indonesia, so the need for funds will increase the productivity of overall economic activity (Camenia Jamil and Restu Hayati, 2020). (Hieu, 2022) Foreign investment in Indonesia can be used as a result of investor interest in the future development of Indonesia. Investors invest in Indonesia with hopes and expectations that Indonesia’s future development potential will be very good. The positive attitude of these investors towards Indonesia is manifested by investing in sectors that are considered productive and this will certainly increase the overall cycle of economic activity. Based on observations of foreign investment entering Indonesia from 2015 to 2021, during that period Indonesia’s economic conditions were quite volatile where it was known that several times there had been an economic slowdown due to the global economic crisis and other social, political and cultural related events, as shown the results are presented in Table 4.

Based on Table 4, the Growth of Foreign Investment in the Last 7 Years to Indonesia increased year-on-year to Rp31093.10 billion.

Table 2: Renewable energy mix (percent)

Year	Percentage
2015	4.90
2016	6.27
2017	6.66
2018	8.60
2019	9.19
2020	11.27
2021	12.16

Source: Central Bureau of Statistics (2021)

Table 3: Population growth

Year	Percentage
2015	1.267829703
2016	1.220591058
2017	1.176197424
2018	1.13450698
2019	1.097926437
2020	1.065178986
2021	1.032284966

Source: World Development Indicators, 2021

Table 4: Foreign investment in Indonesia

Year	Amount
2015	29275.94
2016	28964.10
2017	32239.80
2018	29307.91
2019	28208.76
2020	28666.30
2021	31093.10

According to this figure, foreign investment in Indonesia is a form of interest and hope from investors for the growth and development of Indonesia in the future. The positive view of these investors towards Indonesia is manifested by investing in sectors that are considered productive and this will certainly increase the overall cycle of economic activity.

Along with foreign investment, the regulation has realized that green investment is another word used to refer to green financing or sustainable investment. In essence, green investment has the aim of maintaining economic sustainability and life on earth by focusing on social aspects., environment and governance (Berliandika et al., 2021; Khansa and Widiastuti, 2022). Based on (Law of the Republic of Indonesia Number 20 of the Year, nd) Article 3 paragraph (1) letter h of Law No. 25 of 2007 concerning investment explains that investment is carried out based on environmental principles (investment with attention to environmental protection and maintenance) and also in Presidential Decree no. 16 of 2012 states that one direction of investment policy includes investment that is environmentally sound (Green Investment). (President of the Republic of Indonesia, 2012). Currently, green investment is growing very rapidly in many countries. For example, Germany and China. Strict regulations related to economic development as well as nature conservation are called the Green Financing System, realizing China’s ideals as a major country in the world’s ecological civilization (Dewi and Ma’ruf, 2017; Supar and Suasana, 2017). Indonesia is one of the countries that is trying to increase public interest in green investment, this is done as an effort to create environmentally friendly industries and businesses (Awatara and Hamdani, 2019; Yasa, 2010). The concept of Green Innovation and Organizational Agility was revealed that both can mediate the concepts of Innovation Drivers and Internal Alignment to encourage the improvement of Business Strategy, and are very relevant in being a key factor in improving Business Strategy (Adi and Wardi, 2022). Along with green investment, on June 8, 2009, the Indonesia Stock Exchange released a stock index that measures the stock price movements of 25 companies with sustainable business performance and good corporate governance and social and environmental awareness, namely the SRI-KEHATI index and since launched, the SRI-KEHATI index shows consistent performance compared to the performance of other indices with an average value of 10% higher (CRMS Indonesia) (Adi Cakranegara, 2021; Dewi and Oriana, 2014). This shows that investors are willing to invest in companies that are registered as SRIKEHATI’s constituent issuers (Dewi and Oriana, 2014; Wibawa et al., 2016). It is recorded that currently the SRI KEHATI index are presented in Table 5

In Indonesia, investment by paying attention to ESG values has begun to be noticed with the establishment of the SRI Kehati

Table 5: List of shares of SRI-KEHATI member issuers

No.	Code	Stock Name	Free Float Ratio (Free Float+70% NonFree Float)
1	ASII	Astra International Tbk.	83.52%
2	AUTO	Astra Otoparts Tbk.	75.99%
3	BBCA	Bank Central Asia Tbk.	82.82%
4	BBNI	Bank Negara Indonesia (Persero) Tbk.	81.97%
5	BBRI	Bank Rakyat Indonesia (Persero) Tbk.	82.91%
6	BBTN	State Savings Bank (Persero) Tbk.	82.00%
7	BMRI	Bank Mandiri (Persero) Tbk.	81.97%
8	BSDE	Bumi Serpong Damai Tbk.	80.30%
9	DSNG	Dharma Satya Nusantara Tbk.	79.56%
10	INCO	Vale Indonesia Tbk.	76.08%
11	INDF	Indofood Sukses Makmur Tbk.	84.84%
12	JSMR	Jasa Marga (Persero) Tbk.	78.99%
13	KLBF	Kalbe Farma Tbk.	82.84%
14	LSIP	PP London Sumatra Indonesia Tbk.	82.13%
15	NISP	Bank OCBC NISP Tbk.	74.16%
16	PGAS	Perusahaan Gas Negara Tbk.	82.91%
17	POWR	Cikarang Listrindo Tbk.	73.86%
18	PTPP	PP (Persero) Tbk.	84.70%
19	SIDO	Sido Muncul Herbal and Pharmaceutical Industry Tbk.	75.46%
20	SMGR	Semen Indonesia (Persero) Tbk.	84.69%
21	TINS	Timah Tbk.	80.49%
22	TLKM	Telkom Indonesia (Persero) Tbk.	84.36%
23	UNTR	United Tractors Tbk.	82.13%
24	UNVR	Unilever Indonesia Tbk.	74.33%
25	WIKA	Wijaya Karya (Persero) Tbk.	80.48%

Source: <https://kehati.or.id>, 2021

index. The SRI Kehati Index is an index that was developed jointly with the Kehati Foundation, which includes companies that meet environmental governance criteria. This index has proven to be one of the indexes that provides high returns (Adi Cakranegara, 2021). The company’s entry into the SRIKEHATI index allows it to increase market or public reaction in buying products from the company because the company also pays attention to the surrounding environment and social conditions so that it can attract people to buy products from the company (Dewi and Oriana, 2014). With the potential for the development of the renewable energy mix, it will certainly be a breath of fresh air for Indonesian foreign investment. The higher the economic growth and the decreasing percentage of Indonesia’s population (Badan Pusat Statistik, 2021; Banks, 2021) is one of the great potentials of Indonesia today. To answer the existing problems, the authors are interested in conducting research with the aim of looking at the perspective of population growth, economy and foreign investment on the renewable energy mix in Indonesia with the renewal of research, namely using the green investment variable in the sri-kehati indexed issuer company as a moderator

2. LITERATURE REVIEW

(Arsyad, 2012; Kuncoro, 2010; Pateda et al., 2019) Uncontrolled population growth will cause various problems and obstacles for

the efforts made, because the high population growth will cause a rapid increase in the number of workers, while the ability of the region to create new job opportunities is very limited (Arsyad, 2012; 267). There are several things that can be an obstacle to the rate of population growth. This can be divided into 2, namely: 1. Positive checks or events that are beyond human control such as natural disasters, famine, infectious diseases, war and murder. 2. Presentive checks or things that can be done by yourself, such as delaying marriage or marriage and permanent celibacy by Malthus (Kumon and Saleh, 2023). (Masi et al., 2018) Economic growth is the process of changing the economic conditions of a country on an ongoing basis towards a better state over a certain period. Economic growth can also be interpreted as a process of increasing the product capacity of an economy which is manifested in the form of an increase in national income (Arsyad, 2012). Economic growth is a condition where there is an increase in the gross domestic product of a country or region. Another understanding of economic growth is the process of changing the economic conditions of a country on an ongoing basis towards a better state over a certain period (Kuncoro, 2010). Economic growth can also be interpreted as a process of increasing the production capacity of an economy which is manifested in the form of an increase in national income (Kuncoro, 2013). Economic growth is an indication of the success of economic development. The economic growth of a country can be measured by comparing, for example, the national size, gross national product (GNP), the current year with the previous year.

(Awatara and Hamdani, 2019) Understanding Investment In carrying out national development, a country needs capital funds to be able to catch up with the development of its country from other countries. The capital of these funds can be met through various sources, one of which is through investment. In simple terms, investment can be interpreted as an activity of placing funds in one or more of an asset during a certain period in the hope of earning income or increasing the value of the investment (Demena and Afesorgbor, 2020). In economic growth and development, investment becomes an absolute necessity (Awatara and Hamdani, 2019). If a country is unable to foster investment from within its own country, then the path taken is by borrowing, either domestic loans or foreign loans and attracting foreign investment to enter the country (Hanif et al., 2019). (Wikipedia, 2021) The term foreign investment comes from English, namely investment and translated into Indonesian, namely investment. Foreign investment or investment is often used in different meanings. The difference in the use of the term investment lies in the scope of its intended meaning. Investment can be explained in three terms, namely an action to buy shares, bonds or other participation letters. An act of buying capital goods. Utilization of funds that (Al-Mulali et al., 2015; Balsalobre-Lorente et al., 2018) available for future revenue production. (Pandji Anoraga, 2014 in Suhendro, 2005) (Wikipedia, 2021). Meanwhile, investment from abroad can be divided into two forms, namely Foreign Direct Investment (FDI), namely capital investment owned and operated by foreign entities. Foreign Portfolio Investment is an investment that is financed abroad but operated by domestic residents.

Renewable energy sources are environmentally friendly energy sources, because they do not produce environmental pollution

and do not include the causes of climate change and global warming, because the energy produced comes from sustainable natural processes such as wind, water, sunlight, geothermal, and biofuels (Khansa and Widiastuti, 2022). Potential renewable energy sources contained in Indonesia such as geothermal energy, solar, water, marine, and bioenergy (Afriyanti et al., 2018). Renewable energy is an energy source that comes from nature that can be used freely, can be renewed continuously and is unlimited. Every activity carried out certainly requires resources, both renewable and non-renewable. However, the use of energy sources that are too massive have succeeded in making the natural environment chaotic and damaged (Khansa and Widiastuti, 2022). Finally, the result of the disposal of these energy sources is pollution that is harmful to health (Ganda, 2019). Realizing that non-renewable energy sources are running low, scientists from various countries have begun to develop renewable energy sources. Renewable energy is a source of energy that comes from nature that can be renewed freely, and can be renewed continuously and unlimitedly (Al-Mulali et al., 2015; Al-mulali and Binti Che Sab, 2012). Renewable energy can be created by utilizing increasingly sophisticated technological developments, so that it can become an alternative energy source (Gozgor et al., 2018). The use of renewable energy is able to absorb resources and investments whose benefits can be felt in the future (Afriyanti et al., 2018). The benefits of renewable energy are minimizing the effects of global warming, unlimited energy sources, improving public health, saving resources and money, creating jobs and opportunities.

(Dewi and Oriana, 2014) stated that SRI-Kehati which is the joint name of Sustainable and Responsible Investment (SRI) and the Indonesian Biodiversity Foundation (KEHATI) is a collection of various shares of companies that do not only focus on obtaining profits but also pay attention to environmental sustainability. The index, which was launched on June 8, 2009 by the Indonesian Biodiversity Foundation (KEHATI) in collaboration with PT BEI, can be a benchmark for investors or investment managers in determining which public companies have good performance in carrying out their business in terms of financial, social, and at the same time governance. environment in a sustainable manner. SRI acts as a reference used in the company's management procedures and KEHATI acts as the publisher of the SRI-Kehati Index (Adi Cakranegara, 2021; Dewi and Oriana, 2014). (KEHATI, 2021) The SRI-Kehati Index is an indicator or reflection of stock price movements that serves as a guide for investors to share in issuers that have excellent performance in a sustainable manner in carrying out good corporate governance and have awareness of environmental sustainability (Planet), empowering the surrounding community and continue to practice ethics in business. The principles used by the SRI-Kehati index as a benchmark are concern for the environment, community involvement, corporate governance, human resources, human rights and ethical business behavior (Dan, 2009). Based on Exchange and Sustainable Investment data, the Sri-Kehati index is the first green investment index in ASEAN and the second in Asia. The Sustainable and Responsible Investment (SRI)-KEHATI stock index is an index that is an indicator of stock price movements on the Indonesia Stock Exchange

(IDX). This index uses the principles of sustainability, finance, and good governance, as well as concern for the environment as a benchmark (Dewi and Oriana, 2014). (KEHATI, 2021) The SRI-Kehati Index consists of 25 issuers which for a year undergo a selection process every two periods, namely in April and October which will then be published through the IDX website and the KEHATI website (Adi Cakranegara, 2021; Adi and Wardi, 2022). There are 3 aspects that become the focus in selecting the constituents of the SRI-Kehati index, namely, the company’s fundamental aspects, financial aspects and aspects of the company’s business influence on the environment. This index is also included in the category of socially responsible investing (SRI) or ethical investing, namely an investment strategy that considers both financial and social benefits that bring about change (Syabilla et al., 2021; Yasa, 2010). Green investment also means investment that does not cause negative impacts on environmental sustainability and social life of the community, and is able to create positive impacts on environmental sustainability and socio-economic welfare for the local community in a sustainable manner.

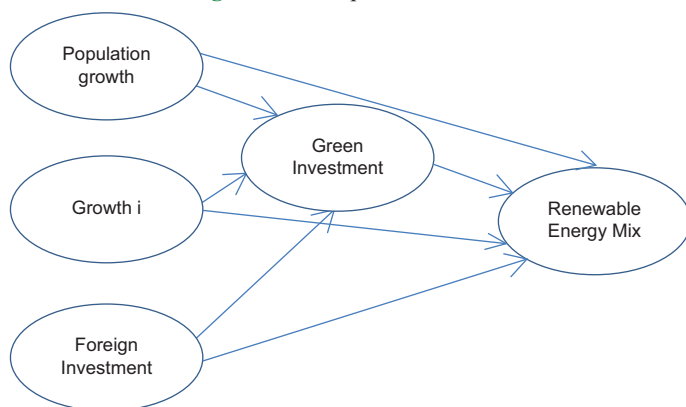
2.1. Conceptual Framework and Hypothesis Development

Conceptual Framework Based on the objectives to be achieved from this research and supported by theories and previous research, the conceptual framework regarding the perspective of population and economic growth, foreign investment in the renewable energy mix through moderation of green investment in Sri-Kehati indexed issuers in Indonesia is presented in Figure 1.

The hypotheses in this study are:

- Ho₁: Population Growth Perspective has a significant effect on the Energy Mix Renewable
- Ho₂: Economic Growth Perspective has a significant effect on the Energy Mix Renewable
- Ho₃: Foreign Investment Perspective has a significant effect on the Renewable Energy Mix
- Ho₄: The Green Investment Perspective has a significant effect on the Sri-Kehati Indexed Issuer Company on the Renewable Energy Mix
- Ho₅: Economic Growth Perspective has a significant effect on the Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuers

Figure 1: Conceptual framework



Source: The Process Data, 2023

- Ho₆: Population Growth Perspective has a significant effect on the Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuers
- Ho₇: Foreign Investment Perspective has a significant effect on the Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuers

3. RESEARCH METHODS

This research was carried out by taking population and economic growth data, renewable energy using data on a national scale, namely Indonesia, which was obtained from the Central Statistics Agency (BPS) and the World Development Indicators (World Bank). Investment data obtained from the Investment Coordinating Board (BKPM). Green Investment Data indexed by SRI KEHATI from BEI AND KEHATI). The data used are annual data for the period 2015-2021, The time of this research starts from 2015 to 2021 because in that period the condition of the Indonesian economy fluctuated due to the global crisis, the inflation rate was fluctuating, the policy of increasing fuel prices and increasing renewable energy and the SRI KEHATI index. The type of research used was quantitative. The data analysis technique used in this study is a time series data regression analysis model. Using Microsoft Excel data processing software and the EvIEWS 10 program (Sugiyono, 2017). Analysis of research data there are several stages in explaining the results of the study, to describe each variable will be explained in descriptive analysis.

4. RESEARCH RESULTS

4.1. Normality test

Based on the results are presented in Table 6, the normality test in the table above, the Jarque-Bera value is smaller, namely 0.484370 from the value of Chi-square (df) 2 which is 5,991 while the value of Probability 0.784911 which shows a number ≥0.05. With the results above, it can be concluded that the data is normally distributed

4.2. Multicollinearity Test

Based on the results are presented in Table 7, it can be seen that the correlation coefficient value of each independent variable shows <0.80. So it can be concluded that there is no multicollinearity problem in this study.

Table 6: Normality test results

Jarque-Bera	0.484370
Probability	0.784911

Source: E-Views data results (2022)

Table 7: Multicollinearity test results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	50.84680	98822.77	NA
Economic growth	0.021115	89.65252	4.020528
Population growth	0.712385	30.07168	6.494154
Green Investment	0.181386	24293.07	4.222500
Foreign Investment	0.290844	59937.79	1.109202

Source: E-Views data results (2022)

4.3. Heteroscedasticity Test

Based on the results are presented in Table 8, the results of the heteroscedasticity test show that all variables show a probability value ≥ 0.05 so it can be concluded that H_0 is accepted, which means that there is no heteroscedasticity problem in this study.

4.4. Autocorrelation Test

Based on the results are presented in Table 9, show that the Autocorrelation Test using the Breusch-Godfrey LM Test shows that the value of Prob. Chi-square (2) is >0.05 (0.0617 >0.05), so it does not occur Autocorrelation.

4.5. Regression model feasibility test (Goodness of Fit)

4.5.1. Coefficient of determination analysis (R Squared)

Based on the results are presented in Table 10, it shows that there is a very high regression value in the Adjusted R2 value of 0.9932 explaining that the Renewable Energy Mix variable is influenced by Economic Growth, Population Growth, Foreign Investment and Green Investment and the remaining 0.0001% is influenced by other factors not examined in this research

4.6. Hypothesis Testing

4.6.1. Simultaneous model regression coefficient test (F test)

Based on the results are presented in Table 11, the F test, there is an F table value of 3.59 for the calculated F value of 9.067884. It can be concluded that F count 44.62280, greater than F table so reject H_0 and accept H_a . Meanwhile, according to the probability value of the regression results, the probability F is 0.022039 smaller than $= 5\%$, so rejecting H_a and accepting H_0 . meaning that together the independent variables are able to have a significant effect on the dependent variable.

4.6.2. Partial independent variable regression coefficient test (T Test)

Based on the results are presented in Table 12 the time series data regression analysis above, it can be seen that the t-count value of the independent variable is partially the time series data regression equation, namely: The constant of 1.204605 states that if the value of Economic Growth, Population Growth, Foreign Investment and Green Investment Moderation is zero then the size of the renewable Energy Mix is 1.204605. The T value for Economic Growth has a positive relationship 0.004113 to the Renewable Energy Mix, and the t table value is 2.36, the t-count value is $<$ from t table, which is 0.004113 <2.36 , but the probability value is 0.9971 >0.05 so that partially the Economic Growth Perspective has a significant positive effect on the Renewable Energy Mix. The value of T count for Population Growth has a negative value relationship of -5.408678 to the Renewable Energy Mix, and the value of t table is 2.36, the value of t count is $<$ from t table, which is $-5.408678 <2.36$, and the probability value is 0.0325 >0.05 so that partially the Population Growth Perspective is not significant effect on the Renewable Energy Mix. The calculated T value of foreign investment has a negative value relationship of -0.856688 to the Renewable Energy Mix, and the value of t table is 2.36, where the value of t count is $<$ from t table, which is $-0.856688 <2.36$, but the probability value is 0.4819 >0.05 so that partially the Foreign Investment Perspective has a negative and significant effect on the renewable energy mix. The calculated T value for green investment

has a negative value relationship of -0.325319 to the Renewable Energy Mix, and the t table value is 2.36, where the t count value is $<$ from t table, which is -0 .

4.6.3. Test of foreign investment variables in Sri-Kehati indexed issuers on the renewable energy mix

From the results are presented in Table 13, the t test of the variable coefficients of foreign investment have a probability level of t of 0.1556 >0.05 and the T value of foreign investment has a value relationship 1.670734 to the Renewable Energy Mix, and the value of t table is 2.36, where the value of t count is $<$ from t table, namely $-1.670734 <2.36$, but the probability value is 0.7758 >0.05 so it can be said to reject H_0 , namely the Foreign Inventory Variable has no significant effect on the Renewable Energy Mix

4.6.4. Testing economic growth variables through moderation of green investment in Sri-Kehati indexed issuers on the renewable energy mix

The results are presented in Table 14 of the t-test, it is obtained that the coefficient of economic growth variable has a probability

Table 8: Heteroscedasticity test results

Heteroskedasticity Test: White			
F-statistics	1.380627	Prob. F (4,2)	0.4611
Obs*R-squared	5.138919	Prob. Chi-square (4)	0.2733
Scaled explained SS	0.164731	Prob. Chi-square (4)	0.9968

Source: E-Views data results (2022)

Table 9: Autocorrelation test results

F-statistics	1.298024	Prob. F (4,2)	0.4788
Obs*R-squared	5.053418	Prob. Chi-Square (4)	0.2819
Scaled explained SS	0.161991	Prob. Chi-Square (4)	0.9969

Source: E-Views data results (2022)

Table 10: Coefficient of determination test results

R-squared	0.998879
Adjusted R-squared	0.993273

Source: E-Views data results (2022)

Table 11: Coefficient of determination test results

F-statistics	44.62280
Prob (F-statistic)	0.022039

Source: E-Views data results (2022)

Table 12: Partial test results

Variable	t-Statistic	Prob.
C	1.204605	0.3516
Economic growth	0.004113	0.9971
Population growth	-5.408678	0.0325
Foreign Investment	-0.856688	0.4819
Green Investment	-0.325319	0.7758

Source: E-Views data results (2022)

Table 13: T-test of foreign investment variables

Variable	Coefficient	SE	t-Statistic	Prob.
C	-11.74677	8.280971	-1.418526	0.2152
Green Investment	1.666657	0.997560	1.670734	0.1556

Source: E-Views data results (2022)

level of t of 0.0002 which is smaller than 0.05 so it can be said to accept Ho, namely the Economic Growth Variable has a positive and significant effect through Green Investment Moderation in Sri Indexed Issuers Companies. -Careful Perspective on Renewable Energy Mix

4.6.5. *Test of population growth variables through moderation of green investment in Sri-Kehati indexed issuers on the renewable energy mix*

The results are presented in Table 15 of the t test, the results of the population growth variable coefficient have a probability level of t of 0.0002 which is smaller than 0.05 so it can be said to accept Ho, namely the Population Growth Variable has a positive and significant effect through Green Investment Moderation in Sri Indexed Issuers Companies. -Careful Perspective on Renewable Energy Mix

4.6.6. *Testing foreign investment variables through moderation of green investment in Sri-Kehati indexed issuers on the renewable energy mix*

The results are presented in Table 16, the t-test results of the variable coefficient of Foreign Investment have a probability level t of 0.2064 > 0.05 so it can be said to reject Ho, namely the Foreign Investment Variable has no significant effect through Green Investment Moderation in Sri-Kehati Indexed Issuers Perspective on the Renewable Energy Mix

4.7. **Regression Model**

Based on the results are presented in Table 17, the time series data regression analysis in Table 17, it can be formulated the time series data regression equation as follows:

$$BET = 8.589668 + 0.000598(PE) - 4.565080(PP) - 0.462011(IA) - 0.138552(IH) + e$$

Note: BET = Renewable Energy Mix, PE = Economic Growth, PP = Population Growth, IA = Foreign Investment, IH = Green Investment e = Error is normally distributed with an average of 0, the purpose of the calculation of e is assumed to be zero. Based on the multiple linear regression equation above, it can be analyzed the influence of each independent variable on the dependent variable as follows:

1. The constant is equal to 8.589668 states that if the value of PE, PP, IA and IH is zero then the BET is 0.644895.
2. Regression coefficient value Economic growth, has a positive relationship 0.000598 for the Renewable Energy Mix, it means that for every 1 change in the value of Economic Growth, the size of the Renewable Energy Mix will increase by 0.000112 units, other factors are considered constant.
3. Population Growth regression coefficient value has a negative relationship 4.565080 for the Renewable Energy Mix, meaning that for every 1 change in the value of Population Growth, the size of the Renewable Energy Mix will decrease by 4.565080 units, other factors are held constant.
4. The regression coefficient value for Foreign Investment has a negative relationship 0.462011 for the Renewable Energy Mix, meaning that for every 1 change in the value of Foreign

Table 14: Moderation test of economic growth partial moderation variables

Variable	Coefficient	SE	t-Statistic	Prob.
C	3.910171	1.897836	2.060331	0.1084
Green Investment	-0.147895	0.224995	-0.657329	0.5469
Economic growth	-4.561342	0.359543	-12.68650	0.0002

Source: E-Views data results (2022)

Table 15: Moderation test for partial moderation of population growth variables

Variable	Coefficient	SE	t-Statistic	Prob.
C	3.910171	1.897836	2.060331	0.1084
Green Investment	-0.147895	0.224995	-0.657329	0.5469
Population growth	-4.561342	0.359543	-12.68650	0.0002

Source: E-Views data results (2022)

Table 16: Moderation test of foreign investment partial moderation variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.194501	29.27621	-0.245746	0.8180
Green Investment	-0.450751	2.751082	-0.163845	0.8778
Foreign Investment	1.677405	1.113516	1.506405	0.2064

Source: E-Views data results (2022)

Table 17: Regression test results

Variable	Coefficient	SE	t-Statistic	Prob.
C	8.589668	7.130694	1.204605	0.3516
Economic growth	0.000598	0.145308	0.004113	0.9971
Population growth	-4.565080	0.844029	-5.408678	0.0325
Foreign Investment	-0.462011	0.539299	-0.856688	0.4819
Green Investment	-0.138552	0.425895	-0.325319	0.7758

Source: E-Views data results (2022)

Investment, the Renewable Energy Mix will decrease by 0.462011 units, other factors are considered constant.

5. The value of the green investment regression coefficient has a negative relationship of 0.138552 for the Renewable Energy Mix s, meaning that for every 1 change in the value of green investment, the Renewable Energy Mix will decrease by 0.138552 units, other factors are held constant

5. DISCUSSION

5.1. Economic Growth Perspective Affects the Renewable Energy Mix

The price variable in the OLS test above, the coefficient value is 0.004113 with a probability of 0.9971. It can be stated that the variable Economic Growth has a significant positive effect on the Renewable Energy Mix, meaning that when economic growth increases by 1%, the value of the renewable energy mix will increase by 99.71%, and Conversely, when a country’s economic growth decreases by 1%, the value of the renewable energy mix will decrease by 0.94%. The increase in economic growth illustrates that Indonesia’s economic performance is very good, so this makes the creation of a renewable energy mix, which can increase income for the country and have a very good impact on citizens.

5.2. Population Growth Perspective Affects Renewable Energy Mix

The Population Growth Variable in the OLS test results in the T-value of Population Growth, having a negative value relationship of -5.408678 to the Renewable Energy Mix, and the t-table value is 2.36, where the t-count value is $<$ from t table, namely $-5.408678 < 2.36$, and the probability value is $0.0325 > 0.05$ so that partially Population Growth has no significant effect on the Renewable Energy Mix, meaning that when population growth increases or decreases, it does not directly affect the creation of the renewable energy mix.

5.3. Foreign Investment Perspective Affects Renewable Energy Mix

The Foreign Investment Variable in the OLS test results in the calculated T value of foreign investment, having a negative value relationship of -0.856688 to the Renewable Energy Mix, and the t table value is 2.36, which the t-count value is $<$ from t table, namely $-0.856688 < 2.36$, but the probability value is $0.4819 > 0.05$ so that partially foreign investment has a negative and significant effect on the renewable energy mix. This means that even though foreign investment has increased by 1%, the utilization and interest in the renewable energy mix has decreased by 85.6%, even though the probability level is high. This is due to the tendency of investors to be more interested in things that have small risks and large profits. If you look at the situation and challenges of developing renewable energy, one example is related to the issue of equipment prices.

5.4. Green Investment Perspective Affects Sri-Kehati Indexed Issuers on Renewable Energy Mix

The Green Investment Variable has an effect on the Sri-Kehati Indexed Issuer Company on the Renewable Energy Mix in the OLS test, the result is that the T value for green investment has a negative value relationship of -0.325319 to the Renewable Energy Mix, and the t table value is 2.36, the t value is calculated $<$ from t table, which is $-0.325319 < 2.36$, but the probability value is $0.7758 > 0.05$ so that partially the green investment perspective has a negative and significant effect on the Renewable Energy Mix. This means that even though green investment has increased by 1%, issuers listed on the Sri Kehati Index have not been able to contribute to the renewable energy mix so that it has decreased by 32.5% even though the probability level is high.

5.5. Economic Growth Perspective Affects Renewable Energy Mix Through Moderation of Green Investment in Sri-Kehati Indexed Issuers

Economic Growth Variables have a significant effect on the Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuers Companies in the OLS test above, the results of the t test are obtained that the coefficient of economic growth variable has a probability level of t of 0.0002 which is smaller than 0.05 so that it can be said to accept Ho, namely the Economic Growth Variable has a positive and significant effect through Green Investment Moderation in Sri-Kehati Indexed Issuers on the Renewable Energy Mix. This means that through the moderation of green investment in Sri-Kehati indexed issuers, economic growth greatly influences the renewable energy mix. This is because, that with increasing economic growth and

being followed by listed companies with the Sri Kehati index, it indicates that the tendency of these issuers has made changes to provide alternative renewable energy in Indonesia. This shows that economic growth is strongly influenced by the relationship between green investment in listed companies with the Sri-Kehati index to create a renewable energy mix. With significant growth it can encourage green investment and get the support of a good investment climate to create a renewable energy mix.

5.6. Population Growth Perspective Has a Significant Effect on the Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuers

Population Growth Variables have a significant effect on the Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuers Companies in the OLS test, the results of the t test are obtained that the coefficient of population growth variable has a probability level t of $0.0002 < 0.05$ so it can be said to accept Ho namely the Population Growth Variable has a positive and significant effect through the Moderation of Green Investment in the Sri-Kehati Indexed Issuer Company on the Renewable Energy Mix. This shows that the Moderation of Green Investment in the Sri-Kehati Indexed Issuer Companies is very influential on Indonesia's Population Growth to create a renewable energy mix.

5.7. Foreign Investment Perspective Affects Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuers

Foreign Investment Variables have no significant effect on the Renewable Energy Mix through Moderation of Green Investment in Sri-Kehati Indexed Issuer Companies in the OLS test, the results of the t test are obtained that the coefficient of the Foreign Investment variable has a probability level t of $0.2064 > 0.05$ so it can be said to reject Ho, namely Foreign Investment Variable has no significant effect through Green Investment Moderation in Sri-Kehati Indexed Issuer Companies on the Renewable Energy Mix. This proves that foreign investment tends to be hesitant about the new renewable energy mix in Indonesia. Indonesia has some limited risks of unattractive returns on renewable energy projects, high capital requirements, limited financial products that match the characteristics of Renewable Energy Mix projects, the scale of the Renewable Energy Mix project offered is less attractive, as well as the lack of interest from local financial institutions. The unattractive risk of return on the Renewable Energy Mix project is supported by the low Return on Investment (ROI) of the Renewable Energy Mix compared to other investments. Although some listed companies are indexed by SRI Kehati.

6. CONCLUSION

Based on the results of these studies, it can be concluded that Economic Growth has a significant positive effect on the Renewable Energy Mix. Population growth has no significant effect on the renewable energy mix, foreign investment has a negative and significant effect on the renewable energy mix. The foreign investment perspective has a negative and significant effect on the Renewable Energy Mix. The Economic Growth Variable

has a positive and significant effect through the Moderation of Green Investment in Sri-Kehati Indexed Issuers on the Renewable Energy Mix. The Population Growth Variable has a positive and significant effect through the Moderation of Green Investment in Sri-Kehati Indexed Issuers with Perspectives on the Renewable Energy Mix. The Foreign Investment Variable has no significant effect through the Moderation of Green Investment in the Sri-Kehati Indexed Issuer Company on the Renewable Energy Mix. In the end, the government must give full attention to foreign investment, because the increase in investment has a very broad and positive impact on the economy of the Indonesian population, especially to create a renewable energy mix.

When the global economy is not growing positively, the government should make regulations or facilities for domestic entrepreneurs so that they are willing to invest in the country, in order to improve the Indonesian economy. The improvement of the Indonesian economy is strongly influenced by foreign investment and the performance of companies that have good performance, especially those indexed by SRI KEHATI.

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