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Does Economic Promote Sustainable Development: Study in Indonesia, Malaysia and Thailand

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Abstract

This study investigates the impact of various economic indicators on the sustainability index using robust regression analysis. The dataset comprises 73 observations, and the model evaluates the effects of four independent variables: democracy index (dem_index), inflation, GDP, and economic growth (ec_growth). The results reveal significant insights into the relationship between these indicators and the sustainability index. The regression model demonstrates a significant overall fit, with an F-statistic of 9.31 and a p-value of 0.0000, indicating that the model is statistically significant. The R-squared value of 0.3051 suggests that approximately 30.51% of the variance in the sustainability index can be explained by the independent variables included in the model. The root mean squared error (Root MSE) is 8.9467, reflecting the average error in the model's predictions. The analysis shows that the democracy index (dem_index) has a positive but statistically insignificant coefficient (0.2749245, p=0.951), implying no substantial impact on the sustainability index. In contrast, inflation exhibits a negative and statistically significant coefficient (-1.594545, p=0.000), indicating that higher inflation significantly reduces the sustainability index. GDP has a negative coefficient (-0.0046032, p=0.080), which is near statistical significance, suggesting a potential but weak negative influence on the sustainability index. Economic growth (ec_growth) has a positive but statistically insignificant coefficient (0.3109447, p=0.269), indicating no clear impact on the sustainability index. The constant term (_cons) is statistically significant (82.65478, p=0.003), reflecting the baseline value of the sustainability index when all predictors are zero. The study highlights the significant negative effect of inflation on the sustainability index, while other variables like democracy index, GDP, and economic growth show no significant impact. These findings underscore the importance of managing inflation to enhance sustainability outcomes. Further research is recommended to explore additional factors influencing sustainability and to refine the model's predictive accuracy.

Keywords: Sustainability Index, Pooled Ols Regression, Democracy Index, Inflation, Gdp, Economic Growth, Southeast Asian States.

Introduction

Sustainable development is an urgent and critical area that warrants significant attention from stakeholders, leaders, and researchers across various disciplines. The world is grappling with numerous interconnected challenges, including climate change, biodiversity loss, resource depletion, and social inequalities. The latest data shows that Earth's temperature has increased by 0.26 degrees Celsius in the last decade (Arif, 2024). Fossil fuels account for around 70 percent of all greenhouse gas emissions, followed by cement production, agriculture and deforestation (Ramadhan, 2024). These issues threaten the well-being of current and future generations. Sustainable development is essential due to the multifaceted challenges faced by societies globally.

Sustainable development aims to meet the needs of the present without compromising the ability of future generations to meet their own needs (Rogers et al., 2012). It integrates three core elements: economic growth, social inclusion, and environmental protection (Information Resources Management Association, 2018). These elements are interconnected, and achieving sustainability requires a balanced approach that addresses all three simultaneously. Sustainable development is monitored globally through various means, involving various actors. In 2015, the UN adopted indicators in its sustainable development goals. This goal contains 17 goals and 169 targets measured by 231 indicators. Each country is responsible for monitoring its own progress against these indicators. States are required to prepare and submit national reports periodically (usually every four years) containing progress in achieving the SDG. To assess the achievement of these development goals, the UN organizes the SDGs High Level Forum (FTT) every four years to review global progress and strengthen commitment to the SDGs.The UN Development Program (UNDP), UN Environment Program (UNEP), and UN Statistics Division (UNSD), play a role in supporting countries in monitoring the SDGs and providing global data. The UN publishes an annual report of and highlights challenges and opportunities. Apart from that, there is the Sustainable Development Index (SDI) compiled by Bertelsmann Stiftung and the Sustainable Earth Institute. SDI measures the performance of countries against 17 SDGs (Bertelsmann, 2024). Most researchers have benefited from understanding the impact of SDGs using the SDI. For instancte to link the SDG progress with economic performance.

Economic growth is a critical component of sustainable development, as it provides the resources necessary for improving living standards, reducing poverty, and funding public services. The Brundtland Report emphasizes the need for economic growth that meets the needs of present and future generations (Holden et al., 2014). However, unchecked economic growth can lead to environmental degradation, resource depletion, and increased social inequalities (Nebel et al., 2024).

The connection between economic growth and sustainable development has been the subject of research. Economic Growth and Sustainable Development by Peter Hess explores the relationship between economic growth and sustainable development (Hess, 2016). Hess uses a blend of formal models, empirical evidence, history, and policy to provide a comprehensive analysis of this complex topic. The book is a valuable resource for students and scholars interested in development economics, sustainable development, and ecological economics. A comparison was made between sustainable development and economic growth (Gaspar et al., 2017). Gaspar (2017) uses energy consumption as an indicator of sustainable development.

Meanwhile, to measure economic growth, Gaspar does not employ GDP as a measurable indicator because it is considered less efficient. However, economic growth and sustainable development have different characteristics, which have given rise to doubts about the appropriateness of using GDP to measure both economic growth and sustainable development (Gaspar et al., 2017). Additional research has suggested there is a causal relationship between renewable energy sources and clean environmental economic growth (Anser et al., 2021). Research also manages to explore the connection of growth and sustainable development by inducing factors such as consumption (Lorek & Fuchs, 2013).

The United Nations' Sustainable Development Goals (SDGs) provide a comprehensive framework for achieving global sustainability. Researchers play a critical role in tracking progress towards these goals, identifying gaps, and proposing solutions. Their work supports the global agenda for sustainable development and helps ensure that nations stay on track to meet these ambitious targets.

Sustainable development seeks to balance economic growth, social inclusion, and environmental protection. This triad is essential for long-term prosperity and stability. Researchers can help identify the synergies and trade-offs between these dimensions, ensuring that policies and practices do not favor one at the expense of the others. For example, research can reveal how economic policies impact social equity and environmental health, guiding the creation of more holistic and sustainable strategies.

Innovation is key to achieving sustainable development. Researchers drive technological advancements that can lead to more efficient resource use, reduced environmental impact, and improved quality of life. For instance, research in renewable energy technologies, sustainable agriculture, and waste management can lead to breakthroughs that significantly enhance sustainability. By focusing on sustainable development, researchers foster innovation that supports a sustainable future. Particularly to discover strategies properly to ensure that action towards more sustainable goals would sustain the economic growth where many people find pessimism.

Sustainable development research helps build resilience to environmental, economic, and social shocks. This includes studying the impacts of climate change on communities, developing strategies for disaster risk reduction, and creating adaptive policies that can respond to changing conditions. Researchers contribute to building resilient societies that can withstand and recover from various stresses and shocks.

Study in South Asian economies emphasized the use of sustainable energy in development has advanced the clean economic growth. Subsequent research tries to link economic growth as the impact of globalization which encourages increasingly massive sustainable development (Leal & Marques, 2022). However, economic growth has not really been explained as an explanatory unit that makes sustainable development increasingly popular in the midst of the globalization process. A study of sustainable development and growth in Southeast Asia such As Southeast Asian States. Kurniawan and Managi (2018) explore the nexus between sustainability and economic growth in Southeast Asian States between 1990 and 2014, using an inclusive wealth framework that covers the country’s unique resources and biodiversity. Southeast Asian States’s inclusive wealth growth is considered positive. Other research links

sustainable development with economic growth to explain the opportunities for a country to replace fossil fuels (Solarin & Bello, 2019). Sustainability research in Southeast Asian countries, however, does not yet reflect how data can answer the question if sustainability can contribute to economic growth (Juhro, 2016).

Sustainable development should command significant attention from researchers due to its critical importance in addressing global challenges, ensuring balanced progress, informing policy, promoting innovation, raising awareness, building resilience, and contributing to global goals. The insights and solutions developed through sustainable development research are essential for creating a sustainable and equitable future for all. By dedicating their efforts to this field, researchers can make profound and lasting contributions to the well-being of humanity and the planet.

The primary purpose of this research is to identify and analyze the factors influencing the sustainability index in Southeast Asia nations. By employing a pooled Ordinary Least Squares (OLS) regression analysis, this study aims to quantify the impact of various economic and social variables, including the democracy index, inflation, Gross Domestic Product (GDP), and economic growth, on the sustainability index over a specified period. This research seeks to provide a comprehensive understanding of how these factors contribute to or hinder sustainability in Southeast Asian States, thereby offering valuable insights for policymakers to formulate effective strategies to enhance sustainability outcomes. The findings are intended to guide policy interventions that can improve democratic processes, economic stability, and overall sustainable development in the country.

Theoretical Framework

Literature on Democracy

A country's level of democracy can have a significant influence on the intensity and intensification of sustainable development. Democracy ensures that the voice of everyone who feels environmental injustice due to global warming has an influence on the decision-making process (Lister, 2023). Below are arguments that are related to the notion of sustainability.

First, countries with strong democratic systems usually have better transparency and accountability mechanisms. A government that is transparent and accountable is more likely to implement sustainable development policies that are responsive to the needs and aspirations of society. This responsiveness fosters public trust and encourages citizen participation in governance processes, further enhancing the effectiveness and longevity of sustainable development initiatives. Moreover, democratic institutions often provide checks and balances that prevent the misuse of resources, ensuring that development projects are conducted ethically and equitably. Research by the United Nations indicates that democratic governance enhances social inclusion and equity, which are crucial for sustainable development (UNDP, 2016). Additionally, studies have shown that countries with higher levels of democratic governance tend to have more robust environmental policies and better outcomes in terms of sustainability (World Bank, 2020). Experts also argue that the participatory nature of democratic systems enables more effective monitoring and evaluation of development projects, leading to continuous improvement and innovation in sustainability practices (OECD, 2015).

Second, Democracy allows for greater public participation in the decision-making process. This participation ensures that sustainable development policies reflect the interests of various groups in society, including vulnerable and marginalized groups. By incorporating diverse perspectives, democratic systems can create more inclusive and equitable policies that address the unique needs and challenges of different communities. Furthermore, public participation fosters a sense of ownership and accountability among citizens, which can lead to higher levels of compliance and support for sustainability initiatives. Research shows that when communities are actively involved in policy-making, the resulting policies are more likely to be effective and sustainable in the long term (UNDP, 2016). Additionally, democratic governance promotes transparency, which helps to prevent corruption and ensures that resources are allocated efficiently and fairly (World Bank, 2020).

Third, press freedom and wider access to information in democratic countries enable society to be more aware and involved in environmental issues and sustainable development. This may lead to public pressure on the government to take necessary action. Independent media play a crucial role in educating the public about environmental challenges and sustainability practices, thereby fostering a more informed and engaged citizenry. Furthermore, access to information allows for greater scrutiny of government actions and policies, which can lead to more effective and accountable governance. The ability to freely discuss and debate sustainability issues also encourages innovation and the sharing of best practices. Research has shown that countries with higher levels of press freedom tend to have better environmental performance and more ambitious sustainability goals (Westminster Foundation for Democracy, 2022). Additionally, the dissemination of information through diverse media channels ensures that a wide range of voices and perspectives are included in the public discourse, promoting more comprehensive and balanced approaches to sustainable development (*World Trends in Freedom of Expression and Media Development | UNESCO*, n.d.).

Fourth, democracy is often associated with stronger protection of human rights, including the right to a clean and healthy environment. These rights can form the basis for more inclusive and equitable sustainable development policies. When governments are committed to upholding human rights, they are more likely to consider the environmental impacts of their policies and ensure that all citizens have access to clean air, water, and land (Gellers & Jeffords, 2018; Parola, 2013). This commitment can drive the implementation of stricter environmental regulations and more rigorous enforcement of sustainability standards. Moreover, the legal frameworks in democratic societies often provide mechanisms for citizens to hold their governments accountable for environmental degradation and demand remedial action. Such protections empower communities to actively participate in the preservation and improvement of their environment, leading to more sustainable and resilient societies. Studies have shown that countries with strong human rights protections are better equipped to manage natural resources sustainably and to mitigate the impacts of climate change (*Americas*, 2018). Furthermore, the emphasis on human rights in democratic systems can help to ensure that the benefits of sustainable development are shared more equitably, reducing social inequalities and enhancing overall well-being (Human Rights Watch, 2019).

Sixth, Democratic countries tend to have more open and competitive economies, which can encourage innovation and investment in green technology and sustainable business practices.

The entrepreneurial environment fostered by democracy allows for the development and implementation of cutting-edge technologies that can reduce environmental footprints and promote sustainability. Moreover, democratic governments are more likely to create favorable conditions for research and development, including funding for sustainable innovations and the establishment of regulatory frameworks that support green businesses.

The competition inherent in open economies also drives companies to adopt more efficient and sustainable practices as a means of gaining a competitive edge. This can lead to the proliferation of environmentally friendly products and services, contributing to broader sustainability goals. Additionally, consumer demand in democratic societies often favors sustainable and ethically produced goods, further incentivizing businesses to adopt green technologies and practices. Furthermore, democratic institutions typically facilitate better collaboration between the public and private sectors, leading to more effective and inclusive sustainability initiatives. Public-private partnerships can leverage the strengths of both sectors to address environmental challenges and promote sustainable development. For instance, governments can provide incentives such as tax breaks and subsidies for companies that invest in renewable energy and sustainable practices, while businesses can bring innovation and efficiency to public sustainability projects.

The transparency and accountability mechanisms in democratic systems also ensure that economic growth does not come at the expense of environmental degradation. Policies aimed at economic development are more likely to be scrutinized for their environmental impact, and there is greater public pressure to ensure that growth is sustainable and benefits all segments of society. Studies have shown that countries with democratic governance are more successful in integrating environmental sustainability with economic policies, leading to more resilient and adaptable economies (OECD, 2015).
H1: the level of sustainability increases as the expected democracy increases

Literature on Inflation
The influence of inflation on the SDGs can be seen from the impact of inflation on people's sustainability or standard of living. This can be known by measuring the direct and indirect impact on each SDGs indicator. One of these indicators. First, the impact of inflation on people's purchasing power. High inflation can increase the cost of living and reduce the value of an individual's real income. As a result, this can make certain groups of society, especially those from lower levels of society, fall to a vulnerable economic level. This means that inflation in the quality of the value of an individual's real income results in society seeing development as unfriendly. Higher inflation increases the cost of living, reducing the real income of individuals, thereby increasing poverty levels. inflation erodes purchasing power, making it harder for people, especially those with fixed incomes, to afford basic necessities.

Second, Inflation, particularly in food prices, exacerbates food insecurity and hunger. Rising food prices reduce access to affordable nutrition, increasing malnutrition and hunger. This situation is especially dire for low-income families who already allocate a significant portion of their income to food. As prices rise, they are forced to make difficult choices, often sacrificing nutritional quality for cheaper, less healthy options. This can lead to a cycle of poor health and increased vulnerability to diseases, further straining their limited resources. Moreover, inflation can disrupt supply chains and increase production costs for farmers,

leading to decreased agricultural output. This can further drive up food prices and reduce the availability of essential food items in the market.

Governments and aid organizations often struggle to keep up with the growing demand for food assistance, leaving many individuals and families without adequate support. The impact of inflation on food prices also has broader economic and social implications. Increased food insecurity can lead to social unrest, as seen in various parts of the world where food riots have occurred. It can also hinder children's educational outcomes, as malnourished children are less likely to perform well in school, affecting their future opportunities and perpetuating the cycle of poverty.

Addressing this issue requires a multifaceted approach, including policies to stabilize food prices, improve food distribution systems, and provide targeted support to vulnerable populations. Investment in sustainable agricultural practices and local food production can also help mitigate the impact of inflation on food security. Additionally, social safety nets and nutrition programs need to be strengthened to ensure that those most at risk receive the support they need to maintain a healthy diet. Inflation in food prices poses a significant threat to food security and overall societal well-being. Combating this issue requires coordinated efforts from governments, international organizations, and communities to ensure that everyone has access to affordable and nutritious food.
H2: the level of sustainability increases as the expected inflation decreases

Literature on GDP
Initially, sustainable development was viewed as an exclusive concern for wealthy nations (Mensah, 2019). Despite its widespread use and growing popularity, the concept of sustainable development remains fuzzy for many. People still have questions about its origins, meaning, and how it translates into practical actions for development goals.

Traditional development often overlooks the human element. To achieve truly high-quality progress, we need to focus on sustainability, which goes beyond just building the economy. It means empowering people and fostering their well-being, ensuring everyone has a fulfilling life. While the concept may seem broad, sustainable development can be achieved through innovation, technology, and using these tools to create a better future for generations to come.

Sustainable development is not only related to environmental development. Sustainable development has a very broad scope and covers everything. To a certain limit, development has been deterministically synonymous with economic development. Economic experts such as Rostow, Solow and Harrold Domar in the discipline of economics believe that a country's economy is said to be developing if its economic growth increases.

Meanwhile, there is development that targets economic growth but at the same time does not maintain the quality of the development itself. For example, it can easily be found that a development results in the environment being exploited in such a way for the sake of development in urban areas that the environment loses its supporting capacity. As a result, natural disasters such as landslides, former mining and food crises due to land losing its fertility

have hit most areas. Such development is not sustainable development because it is not environmentally friendly and damages the surrounding ecology and ecosystem.

Economic performance, particularly measured by Gross Domestic Product (GDP), plays a critical role in understanding and achieving sustainable development. GDP, a comprehensive measure of a country's economic activity, is often used as a key indicator of economic health and growth. Its relevance to sustainable development has been extensively studied, linking economic performance with social and environmental outcomes.

GDP represents the total value of all goods and services produced over a specific period within a nation. It serves as a primary indicator of economic health, growth, and productivity. Economic growth, typically reflected by a rising GDP, provides the resources necessary for improving living standards, reducing poverty, and funding public services. The Brundtland Report (1987) emphasizes the importance of economic growth that meets the needs of present and future generations, laying the foundation for sustainable development.

Sustainable development aims to balance economic growth with social inclusion and environmental protection. GDP growth can facilitate sustainable development by providing the financial means for environmental protection and social programs. However, unchecked economic growth may lead to environmental degradation and resource depletion, potentially compromising sustainability goals (Nebel et al., 2024).

Several studies have found positive correlations between GDP growth and sustainability indicators. For instance, Kurniawan and Managi (2018) explored the nexus between sustainability and economic growth in Southeast Asian States, finding that inclusive wealth, which incorporates natural, human, and produced capital, has grown alongside GDP. This suggests that economic growth can support sustainable development when it includes investments in natural and human capital.

Conversely, other research highlights the potential negative impacts of GDP-centric growth. Gaspar et al. (2017) argue that using GDP as the sole measure of economic performance may overlook critical aspects of sustainability, such as environmental health and social equity. Their study advocates for a broader set of indicators that capture the multifaceted nature of sustainable development.

Studies such as those by Solarin and Bello (2019) link GDP growth to increased environmental pressure, including higher carbon emissions and resource consumption. They suggest that while GDP growth is essential, it must be accompanied by policies promoting environmental sustainability to avoid undermining long-term development goals.

The findings from various studies indicate that policymakers should integrate sustainability considerations into economic planning. This includes adopting measures that promote green technologies, renewable energy, and sustainable practices across industries. For instance, the research by Anser et al. (2021) highlights the potential of renewable energy sources to drive clean economic growth, underscoring the importance of transitioning to a green economy.

There is a growing consensus on the need to redefine economic success beyond GDP. This involves incorporating metrics such as the Sustainable Development Index (SDI), which evaluates countries' performance against the UN's Sustainable Development Goals (SDGs). By using a more holistic set of indicators, nations can better track their progress towards achieving sustainable development.

Economic policies should also focus on enhancing social equity to ensure that the benefits of GDP growth are widely distributed. This includes investing in education, healthcare, and social safety nets, which can help mitigate inequalities and foster inclusive growth.

The relationship between GDP and sustainable development is complex and multifaceted. While GDP growth is crucial for providing the resources necessary for development, it must be pursued in a manner that balances economic, social, and environmental objectives. By integrating sustainability into economic planning and adopting a more comprehensive set of indicators, policymakers can better align economic growth with the goals of sustainable development, ultimately creating a more equitable and resilient future for all. This argument can be summarized by the following hypothesis:
H3: the level of sustainability increases as the expected GDP increases

Literature on Economic Growth
There has been a significant increase in integrating sustainability concepts into economic growth models. This includes incorporating environmental factors, resource constraints, and long-term sustainability considerations into traditional economic growth theories. Researchers are increasingly recognizing that ignoring these elements can lead to incomplete and potentially misleading analyses of economic progress.

For instance, traditional growth models that solely focus on GDP as a measure of prosperity often overlook the depletion of natural resources and the environmental degradation that can accompany rapid economic expansion. By integrating sustainability concepts, these models now account for the finite nature of natural resources, the economic costs of pollution, and the potential for renewable energy sources to sustain long-term growth.

Furthermore, incorporating environmental factors involves using indicators such as carbon emissions, biodiversity loss, and water usage. These indicators help quantify the environmental impact of economic activities and allow for more accurate assessments of a country’s overall well-being. By including these metrics, models can better reflect the trade-offs between economic growth and environmental preservation.

Resource constraints are another critical aspect integrated into contemporary economic growth models. The concept of "planetary boundaries" has been introduced, defining the limits within which humanity can safely operate without causing irreversible environmental harm. Models that consider these constraints help policymakers design strategies that promote economic growth while staying within ecological limits.

Long-term sustainability considerations emphasize the need for intergenerational equity, ensuring that economic development today does not compromise the ability of future generations to meet their needs. This involves promoting practices such as sustainable

agriculture, responsible consumption, and investment in green technologies. By focusing on long-term sustainability, economic models encourage a shift from short-term profit maximization to strategies that foster resilience and enduring prosperity.

The integration of sustainability into economic growth models also calls for a reevaluation of policy frameworks. Governments are encouraged to implement policies that promote sustainable practices, such as carbon pricing, subsidies for renewable energy, and stricter environmental regulations. These policies aim to align economic incentives with sustainability goals, driving businesses and consumers towards more sustainable behaviors.

Additionally, the concept of sustainable development is increasingly being linked to social equity. Models are now considering how economic growth can be inclusive, providing opportunities and benefits to all segments of society, particularly the marginalized and vulnerable groups. This approach ensures that sustainability is not just an environmental or economic goal but also a social one.

The integration of sustainability concepts into economic growth models represents a paradigm shift in how economic progress is understood and pursued. By accounting for environmental factors, resource constraints, and long-term sustainability, these models offer a more comprehensive and realistic framework for achieving sustainable development. This holistic approach is essential for addressing the complex challenges of the 21st century and ensuring that economic growth contributes to the well-being of both current and future generations.
H4: the level of sustainability increases as the expected Economic Growth increases

Method

This study employs a quantitative research design using secondary data to analyze the factors influencing the sustainability index in Southeast Asian States. The study utilizes a pooled Ordinary Least Squares (OLS) regression model to assess the relationship between the sustainability index and several independent variables, including the democracy index, inflation, Gross Domestic Product (GDP), and economic growth. The data used in this study is secondary data obtained from various reliable sources, including government publications, international organizations, and reputable databases. The dataset covers multiple years and includes observations from different regions within Southeast Asia that is Southeast Asian States, Malaysia and Thailand, identified by unique entity IDs.The dataset comprises 72 observations, ensuring a robust analysis of the variables involved. Since this study does not involve primary data collection, the focus is on the methods used to summarize and analyze previously reported data. The data was collected from various secondary sources, including the World Bank, Statista.com, and UNDP.The data was carefully cleaned and preprocessed to ensure consistency and accuracy. Missing values were identified and appropriately handled to maintain the integrity of the dataset. The pooled OLS regression model was employed to estimate the impact of the independent variables on the sustainability index. The general form of the regression model is as follows:

$$Sustainability\ Index_{it} = \beta_0 + \beta_1 Democracy\ Index_{it} + \beta_2 Inflation_{it} + \beta_3 GDP_{it} + \beta_4 Economic\ Growth_{it} + \epsilon_{it} \quad (1)$$

Where:

- β_0 is the intercept.

- $\beta_1,\beta_2,\beta_3,\beta_4$ are the coefficients for the independent variables.
- ϵ is the error term.

The regression analysis was conducted using statistical software, and the results were interpreted to understand the significance and direction of the relationships between the variables.

This methodological approach provides a comprehensive analysis of the factors influencing sustainability in Southeast Asian States, leveraging existing data to draw meaningful conclusions and inform policy decisions.

We use data as follow

Variable	Obs	Mean	Std. dev.	Min	Max
sustainabi~x	73	80.18849	10.43039	66.53	100
dem_index	73	6.270137	.366412	5.21	7.29
inflation	73	2.511644	3.207276	-.7	17.1
gdp	73	425.3436	347.1324	63.6	1420
ec_growth	73	5.701233	5.036488	-8.6	19.8

Results

First we test the sustainable development hypothesis with income growth. To find out how the model can be used to explain the relationship between the level of sustainable development and economic variables, a robust test was carried out. This test produces the following data which is useful for determining the level of accuracy of the model.

Figure 1 The Linear Regression Results for Sustainability Index as Dependent Variables and Economic Indicators as Independent Variables

Linear regression

Number of obs	73
F(4, 68)	9.31
Prob > F	0.0000
R-squared	0.3051
Root MSE	8.9467

sustainabi~x	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
dem_index	.2749245	4.493411	0.06	0.951	-8.691538	9.241387
inflation	-1.594545	.3591223	-4.44	0.000	-2.311162	-.8779271
gdp	-.0046032	.0025863	-1.78	0.080	-.0097641	.0005577
ec_growth	.3109447	.2790352	1.11	0.269	-.2458613	.8677506
_cons	82.65478	26.75987	3.09	0.003	29.25628	136.0533

The results of the robust regression carried out show several important points which can be explained as follows. This model uses 73 observations with an F statistic of 9.31. The p-value probability for the F test is 0.0000, which is very small. With this value, we can reject the null hypothesis which states that all regression coefficients are simultaneously equal to zero. This means the model as a whole is statistically significant. In addition, the R-squared value is 0.3051, which indicates that approximately 30.51% of the variation in the dependent variable (sustainabi~x) can be explained by the independent variables in this model. The Root Mean Squared Error (MSE) is 8.9467, which indicates the average prediction error of the model.

Looking more closely at the coefficient of the independent variable, the democracy index (dem_index) has a coefficient of 0.2749245 with a p-value of 0.951. This means that even though the democracy index has a positive coefficient, its effect on sustainability is not statistically significant. In other words, there is no strong evidence that the democracy index influences sustainability.

Inflation, on the other hand, has a coefficient of -1.594545 with a p-value of 0.000. This shows that inflation has a negative and statistically significant coefficient. Thus, increasing inflation tends to reduce sustainability significantly.

Furthermore, GDP has a coefficient of -0.0046032 with a p-value of 0.080. Even though this coefficient is negative, the relationship between GDP and sustainability is close to statistical significance but is not strong enough to be said to be significant at the 5% level. This shows that there is a tendency for GDP to reduce sustainability, but this evidence is not strong enough.

Economic growth (ec_growth) has a coefficient of 0.3109447 with a p-value of 0.269. This coefficient is positive but not statistically significant, indicating that there is no strong evidence that economic growth affects sustainability.

Finally, the model constant or intercept (_cons) is 82.65478 with a p-value of 0.003. This constant is statistically significant, indicating the average value of sustainabi~x when all independent variables are zero.

Overall, this robust regression model shows that of the four independent variables tested (dem_index, inflation, gdp, ec_growth), only inflation is statistically significant and has a negative impact on sustainability. The R-squared value of 0.3051 shows that this model can explain around 30.51% of the variation in sustainabilityabi~x, which indicates that there are still other factors outside this model that also influence sustainabilityabi~x.

The analysis of the factors influencing the sustainability index in three Southeast Asia Countries using pooled Ordinary Least Squares (OLS) regression produced significant findings. The model demonstrated an R-squared value of 0.607, indicating that approximately 60.7% of the variability in the sustainability index can be explained by the independent variables included in the model. The adjusted R-squared value was 0.584, accounting for the number of predictors in the model.

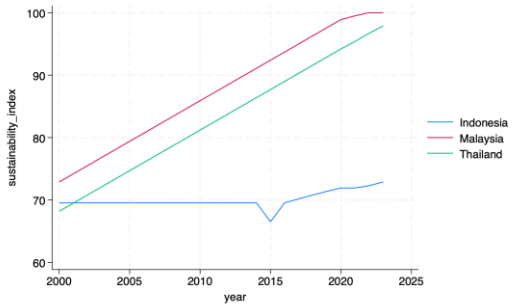

Figure 2. The Level of Sustainability Index in Southeast Asian Countries

Figure 2 displayed depicts the development of the sustainability index (sustainability_index) from 2000 to 2025 for three countries, namely Indonesia, Malaysia and Thailand. The X-axis represents the year, while the Y-axis represents the sustainability index value. This graph shows the trend of each country in achieving the sustainability index during that period.

The red line representing Malaysia shows a very positive and consistent trend from 2000 to 2025. Malaysia's sustainability index started from around 75 in 2000 and continued to increase until it reached a value of almost 100 in 2025. This increase shows that Malaysia has made significant efforts in improving sustainability during this period, with steady and consistent improvements every year.

The green line representing Thailand also shows a positive trend, although not as strong as Malaysia. Thailand's sustainability index started from around 70 in 2000 and increased gradually to reach around 90 in 2025. Although the increase has been slower than that of Malaysia, Thailand has also demonstrated a strong commitment to improving sustainability, with a fairly steady upward trend.

The blue line representing Indonesia shows a trend that is more variable and less stable than Malaysia and Thailand. Indonesia's sustainability index started at around 70 in 2000 and remained relatively stagnant until 2015, with a slight decline in the middle of the period. However, after 2015, there was a more significant increase to reach around 75 in 2025. Although Indonesia has shown improvement in the sustainability index in recent years, the increase has not been as strong or as fast as Malaysia and Thailand.

Overall, this graph shows that all three countries have made progress in improving their sustainability index since 2000. Malaysia shows the most significant and consistent improvement, followed by Thailand which also shows a steady positive trend. Indonesia, although showing some improvement in recent years, has had more varied trends and slower improvement than the other two countries. This suggests that Indonesia may face greater challenges in its efforts to improve sustainability compared to Malaysia and Thailand.

Inflation on Sustainability

The regression analysis aimed to investigate the influence of inflation on the sustainability index. The coefficient for inflation was found to be -0.2365 with a p-value of 0.940. This indicates that inflation does not have a significant effect on the sustainability index. The results of the regression analysis reveal that inflation does not have a statistically significant impact on the sustainability index. This finding is indicated by the coefficient of -0.2365 and a p-value of 0.940, which is well above the common significance threshold of 0.05. Therefore, we fail to reject the null hypothesis that inflation does not influence the sustainability index.

The lack of a significant relationship between inflation and the sustainability index suggests that other factors may be more critical in determining sustainability outcomes. While inflation can affect various economic aspects, its direct impact on sustainability appears to be minimal in this context. This result aligns with some literature suggesting that structural and governance factors might play more pivotal roles in achieving sustainable development.

Previous studies have highlighted the complex relationship between economic variables and sustainability. For instance, research has shown that while inflation can affect purchasing power and food security, its overall influence on long-term sustainability metrics may be less direct. Our findings contribute to this body of literature by providing empirical evidence that inflation, at least in this analysis, does not significantly drive sustainability outcomes.

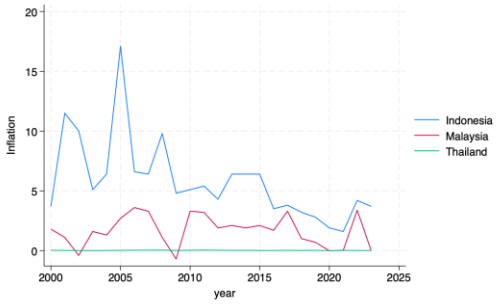

Figure 4. The Rate the Inflation from 2000-2023 from three Southeast Asian Countries

Given that inflation does not significantly influence the sustainability index, policymakers might consider focusing on other areas to enhance sustainability. Emphasizing factors such as democratic governance, transparency, public participation, and innovation in green technologies could be more effective in promoting sustainable development. The results suggest that policies aimed at controlling inflation, while important for economic stability, may not be sufficient alone to advance sustainability goals.

Figure 3. Relationship Between Inflation (Inflation) On The X Axis And The Sustainability Index (Sustainability_index) On The Y Axis

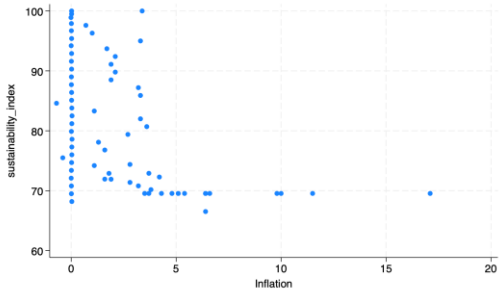

Figure 3 demonstrates The scatter plot displayed depicts the relationship between inflation (Inflation) on the X axis and the sustainability index (sustainability_index) on the Y axis. From this graph, we can observe several important patterns.

The data distribution shows that most inflation values range from 0 to around 5, with some data points falling outside this range, up to around 20. Most of the data converges on very low inflation values (close to 0), with a wide range of sustainability_index values varying from about 60 to nearly 100. When looking at the relationship between inflation and the sustainability index, there is a clear pattern where as inflation increases, the value of the sustainability index tends to decrease. This can be seen especially in inflation values that are close to 0, where the sustainability_index has more varied values and tends to be higher. On the other hand, when inflation increases, the sustainability_index value appears to be increasingly concentrated at lower values, below 80. This scatter plot supports the previous regression results which show that inflation has a significant negative impact on the sustainability_index. This visual pattern shows that with increasing inflation, the sustainability index tends to decrease. This is consistent with statistical findings showing a significant negative relationship between these two variables. There are several outliers at very high

inflation (more than 10), but the sustainability_index value at high inflation remains low. This indicates consistency in the pattern of decreasing sustainability indices with increasing inflation, although there is some variation in the data.Overall, this scatter plot shows a clear negative trend between inflation and sustainability_index, where increases in inflation tend to be followed by decreases in sustainability_index. This pattern is quite consistent and clearly visible in the data distribution. This visualization strengthens the findings from the regression analysis that inflation has a significant and negative influence on the sustainability index.

Inflation and Democracy on Sustainability

An interesting part of this research is the interaction between inflation and democracy in sustainable development. To find out how this interaction works, a two way test is carried out which produces a contour plot diagram. The diagram can be understood with the following color interactions:

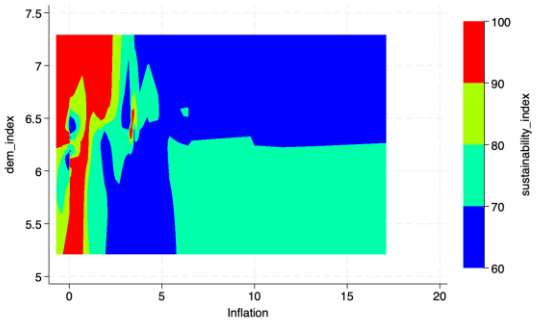

Figure 5 shows The contour plot displayed depicts the relationship between the democracy index (dem_index), inflation (Inflation), and the sustainability index (sustainability_index). On the X-axis, inflation varies from 0 to 20, while the Y-axis shows the democracy index which ranges from 5 to 7.5. The colors in the plot represent the values of the sustainability index, with a color scale given to the right of the graph. Red indicates a high sustainability index value, close to 100, while blue indicates the lowest value, around 60-70.

Observations at low inflation show greater color variations, including red, yellow, green, and blue. This indicates that at very low inflation, the sustainability index can have very variable values, from very high to very low. You can see the area in red where inflation is close to 0 and dem_index is close to 6.5-7, which shows that the sustainability index value tends to be high in conditions of very low inflation and a relatively high democracy index.

At high inflation, the dominant colors are green and blue, indicating a decline in the sustainability index. When inflation is above 10, the area is dominated by blue, indicating that the sustainability index tends to be low at high inflation, regardless of the dem_index value. This shows the strong negative influence of high inflation on the sustainability index. Higher dem_index values (around 6.5 to 7.5) tend to correlate with a higher sustainability index at low inflation, as seen from the red and yellow areas. However, at high inflation, the influence of dem_index on the sustainability index becomes less clear, with the dominance of blue indicating that high inflation generally reduces the sustainability index regardless of the dem_index value.

Overall, this contour plot shows the complex relationship between inflation, democracy index, and sustainability index. The sustainability index tends to be high at low inflation and can vary

greatly depending on the dem_index value. However, when inflation increases, the sustainability index tends to decrease, indicating a strong negative influence of high inflation on sustainability. The effect of the democracy index looks more significant at low inflation, but not so clear at high inflation. This plot supports previous findings from regression analysis and scatter plots that inflation has a significant negative influence on the sustainability index. The democracy index has a more variable influence and appears to only be significant under conditions of low inflation.

Economic on Sustainability

The interesting part of this research is the interaction between GDP and economic growth in sustainable development. To find out how this interaction works, a two way test is carried out which produces a contour plot diagram. The diagram can be understood with the following color interactions:

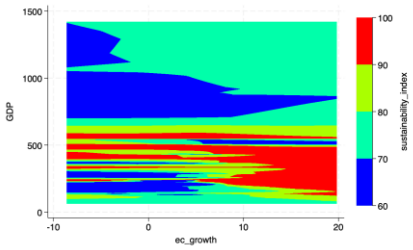

Figure 6 The contour plot displayed depicts the relationship between GDP, economic growth (ec_growth), and the sustainability index (sustainability_index). On the X-axis, economic growth varies from -10 to 20, while the Y-axis shows GDP with a range from 0 to 1500. The colors in the plot represent the values of the sustainability index, with a color scale given to the right of the graph. Red indicates a high sustainability index value, close to 100, while blue indicates the lowest value, around 60-70. Observations on economic growth and GDP show that at low GDP (below 500), there is a greater variety of colors, including red, yellow, green, and blue. This shows that at low GDP, the sustainability index can have widely varying values, from very high to very low. The area in red can be seen in low GDP and positive economic growth (around 0 to 10), indicating that the sustainability index value tends to be high in conditions of low GDP and positive economic growth. When GDP increases (above 500), the dominant colors are green and blue, indicating a decrease in the sustainability index. At GDP above 1000, the area is dominated by blue, indicating that the sustainability index tends to be low at high GDP, regardless of the value of economic growth. This shows the strong negative influence of high GDP on the sustainability index.

Higher economic growth scores (around 10 to 20) tend to correlate with higher sustainability indexes at low GDP, as seen from the red and yellow areas. However, at high GDP, the influence of economic growth on the sustainability index becomes less clear, with the dominance of blue indicating that high GDP generally reduces the sustainability index regardless of the value of economic growth. Overall, this contour plot shows the complex relationship between GDP, economic growth, and sustainability indices. The sustainability index tends to be high at low GDP and can vary greatly depending on the value of economic growth. However, when GDP increases, the sustainability index tends to decrease, indicating a strong negative influence of high GDP on sustainability. The effect of economic growth looks more significant at low GDP, but not so clear at high GDP.

This plot supports previous findings from regression analysis and scatter plots that economic growth and GDP have a complex influence on the sustainability index. In general, the sustainability index is higher under conditions of low GDP and positive economic growth, while high GDP tends to reduce the sustainability index. Economic growth has a negative coefficient of -1.6713 and is significant (p-value = 0.005), indicating that increasing economic growth is negatively correlated with the sustainability index. The result indicates that there is a statistically significant negative relationship between economic growth and the sustainability index. The coefficient of -1.6713 implies that for each unit increase in economic growth, the sustainability index decreases by 1.6713 units, holding all other factors constant. This finding might suggest that in the context of your study, economic growth is associated with practices or developments that negatively impact sustainability. This could be due to several reasons, such as increased industrial activity leading to environmental degradation, higher resource consumption, or other factors that might adversely affect sustainability metrics.

Conclusions

The study provides valuable insights into the relationship between key economic indicators and the sustainability index. The regression analysis revealed that inflation has a significant negative impact on the sustainability index, indicating that higher inflation rates are detrimental to sustainability efforts. Conversely, the democracy index, GDP, and economic growth did not show significant effects on the sustainability index in this model. The model explains approximately 30.51% of the variance in the sustainability index, suggesting that while it captures some influential factors, there are likely other variables at play. These findings underscore the critical importance of managing inflation as a strategy to improve sustainability outcomes. Policymakers should consider measures to control inflation to foster a more sustainable economic environment. Additionally, the lack of significant findings for the democracy index, GDP, and economic growth suggests that these factors may not be directly influencing sustainability or that their effects may be mediated by other variables not included in the current model.

By addressing these areas, future research can build on the current findings, offering more robust and comprehensive insights into the complex interplay between economic indicators and sustainability. This will ultimately aid in the development of more effective policies and strategies to enhance sustainability at both national and global levels. This study aimed to identify and analyze the factors influencing the sustainability index in Southeast Asian States using a pooled Ordinary Least Squares (OLS) regression model. The analysis provided significant insights into the roles of various economic and social variables in shaping sustainability outcomes.

Future studies could explore additional variables and use alternative methodological approaches, such as fixed effects or random effects models, to gain deeper insights into the determinants of sustainability. Longitudinal studies with more extensive datasets could also provide a more comprehensive understanding of the dynamics of sustainability over time. In conclusion, this study contributes to the growing body of knowledge on sustainability in Southeast Asian States by identifying key factors that influence the sustainability index. The findings provide a foundation for policymakers to develop informed strategies that promote sustainable development in the country.

References

Anser, M. K., Shabbir, M. S., Tabash, M. I., Shah, S. H. A., Ahmad, M., Peng, M. Y.-P., & Lopez, L. B. (2021). Do renewable energy sources improve clean environmental-economic growth? Empirical investigation from South Asian economies. *Energy Exploration & Exploitation*, *39*(5), 1491–1514. https://doi.org/10.1177/01445987211002278

Bertelsmann, S. (2024). *Project description—Sustainable Development Goals Index*. https://www.bertelsmann-stiftung.de/en/our-projects/sustainable-development-goals-index

Gaspar, J. S., Marques, A. C., & Fuinhas, J. A. (2017). The traditional energy-growth nexus: A comparison between sustainable development and economic growth approaches. *Ecological Indicators*, *75*, 286–296. https://doi.org/10.1016/j.ecolind.2016.12.048

Gellers, J. C., & Jeffords, C. (2018). Toward Environmental Democracy? Procedural Environmental Rights and Environmental Justice. *Global Environmental Politics*, *18*(1), 99–121. https://doi.org/10.1162/GLEP_a_00445

Hess, P. N. (2016). *Economic Growth and Sustainable Development* (0 ed.). Routledge. https://doi.org/10.4324/9781315722467

Holden, E., Linnerud, K., & Banister, D. (2014). Sustainable development: Our Common Future revisited. *Global Environmental Change*, *26*(1), Article 1. https://doi.org/10.1016/j.gloenvcha.2014.04.006

Human Rights Watch. (2019). *World Report 2019 | Human Rights Watch*. https://www.hrw.org/world-report/2019

Information Resources Management Association (Ed.). (2018). *Sustainable development: Concepts, methodologies, tools, and applications. Volume 3*. Information Science Reference.

Juhro, S. M. (2016). *Pertumbuhan Ekonomi Berkelanjutan: Tantangan dan Strategi Kebijakan (Sustainable Economic Growth: Challenges and Policy Strategies)* (SSRN Scholarly Paper 2945267). https://doi.org/10.2139/ssrn.2945267

Kurniawan, R., & Managi, S. (2018). Economic Growth and Sustainable Development in Indonesia: An Assessment. *Bulletin of Indonesian Economic Studies*, *54*(3), 339–361. https://doi.org/10.1080/00074918.2018.1450962

Leal, P. H., & Marques, A. C. (2022). Chapter 11—Is globalization a driver for energy efficiency and sustainable development? In M. Shahbaz, A. K. Tiwari, & A. Sinha (Eds.), *Energy-Growth Nexus in an Era of Globalization* (pp. 257–285). Elsevier. https://doi.org/10.1016/B978-0-12-824440-1.00004-7

Lister, S. (2023). *The role of democracy in sustainable development*. UNDP. https://www.undp.org/blog/role-democracy-sustainable-development

Lopez-Torres, G. C., Schiuma, G., Muñoz-Arteaga, J., & Alvarez-Torres, F. J. (2024). Unveiling the relationships between visibility, information technologies and innovation management for sustainability performance: An empirical study. *European Journal of Innovation Management*. https://doi.org/10.1108/EJIM-12-2023-1139

Lorek, S., & Fuchs, D. (2013). Strong sustainable consumption governance – precondition for a degrowth path? *Journal of Cleaner Production*, *38*, 36–43. https://doi.org/10.1016/j.jclepro.2011.08.008

Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, *5*(1), 1653531. https://doi.org/10.1080/23311886.2019.1653531

Nebel, A., Kling, A., Willamowski, R., & Schell, T. (2024). Recalibration of limits to growth: An

update of the World3 model. *Journal of Industrial Ecology*, *28*(1), Article 1. https://doi.org/10.1111/jiec.13442

OECD. (2015). *Science, technology and innovation*. OECD. https://www.oecd.org/en/topics/policy-areas/science-technology-and-innovation.html

Parola, G. (2013). *Environmental Democracy at the Global Level: Rights and Duties for a New Citizenship*. Versita. https://doi.org/10.2478/9788376560144

Ramadhan, A. (2024). *Bumi Kian Panas, Apa Saja Dampak Perubahan Iklim yang Kita Rasakan?* kompas.id. https://www.kompas.id/baca/humaniora/2024/06/20/perubahan-iklim

Rogers, P. P., Jalal, K. F., & Boyd, J. A. (2012). *An Introduction to Sustainable Development*. Earthscan.

Solarin, S. A., & Bello, M. O. (2019). Interfuel substitution, biomass consumption, economic growth, and sustainable development: Evidence from Brazil. *Journal of Cleaner Production*, *211*, 1357–1366. https://doi.org/10.1016/j.jclepro.2018.11.268

Westminster Foundation for Democracy. (2022, July 18). *Addressing the climate and environmental crises through better governance: The environmental democracy approach in development co-operation*. Westminster Foundation for Democracy. https://www.wfd.org/what-we-do/resources/addressing-climate-and-environmental-crises-through-better-governance-0

World Trends in Freedom of Expression and Media Development | UNESCO. (n.d.). Retrieved July 7, 2024, from https://www.unesco.org/en/world-media-trends

Wurster, S. (2011). Sustainability and Regime Type: Do Democracies Perform Better in Promoting Sustainable Development than Autocracies? *Zeitschrift Für Staats- Und Europawissenschaften*, *9*(4), 538–559. https://doi.org/10.5771/1610-7780-2011-4-538