Article Type: Research Paper

Infrastructure development as a catalyst for sustainable economic growth in OIC countries

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Abstract: Infrastructure development plays an important role in promoting sustainable economic growth, especially in member countries of the Organization of Islamic Cooperation (OIC). The purpose of this study is to understand how different types of infrastructure, such as digital, physical and non-physical infrastructure, investment, investment and human development index (HDI) impact sustainable economic growth. This study uses data from 52 OIC member countries over the period 2022-2023. To analyse the data, a statistical method called Estimated Generalized Least Squares (EGLS) is used, which is specifically designed to overcome differences in conditions between countries in the data. This method helps to obtain more accurate results despite the imbalance or variation of data between countries. The results of this study show that non-physical infrastructure and HDI have a positive and significant influence on sustainable economic growth. Non-physical infrastructure, such as institutions and basic services can help strengthen the economic system. HDI also plays an important role in improving the quality of human resources. Meanwhile, physical infrastructure, digital infrastructure and investment have not shown a significant direct effect. Therefore, it is recommended that the governments of OIC countries focus on strengthening institutions and improving diverse human qualities to support inclusive and sustainable economic growth.

Keywords: Infrastructure; Sustainable Economic Growth; HDI; Investment; OIC Countries

JEL Classification: O47; O15; H54; O18; C23

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THIS ARTICLE IS AVALILABLE IN:
http://journal.umy.ac.id/index.php/esp

DOI: 10.18196/jesp.v26i1.25840

CITATION:
Amiliana, V., & Suliswanto, M. S. W. (2025). Infrastructure development as a catalyst for sustainable economic growth in OIC countries. *Jurnal Ekonomi & Studi Pembangunan, 26*(1), 115-134.

ARTICLE HISTORY
Received:
08 Feb 2025
Revised:
14 Apr 2025
26 Apr 2025
Accepted:
26 Apr 2025

Introduction

Sustainable economic growth is central to the global development agenda, as it seeks to improve welfare while safeguarding the requirements of future generations (Mentes, 2023). Important indicators commonly used to measure the efficacy of sustainable development include increased investment, expanded infrastructure, and improved quality of human resources, as indicated by the Human Development Index (HDI) (Deffinika et al., 2021). The integration of physical, non-physical, and digital components is emerging as a major

catalyst for economic transformation in the digital era (Komariyah et al., 2023). In OIC member countries, it was found that economic indicators are very important to support economic growth in the long term (Slesman et al., 2015). The current low level of participation in financial markets with research on Islamic countries will provide information that serves to increase economic growth in OIC member countries by strengthening economic and financial services in accordance with Islamic sharia principles (Kim et al., 2018).

Physical infrastructure, including roads, bridges and public facilities, is essential to improve accessibility and economic efficiency. However, the imperative for non-physical infrastructure, such as an enabling regulatory framework, along with digital infrastructure, such as internet connectivity, is becoming increasingly important to address the complexities of globalization (Masduki et al., 2021). This transformation is underpinned by strategic investments in the digital sector, which markedly improve competitiveness and productivity on both local and global scales (Tachiwou & Hamadou, 2011). Technological advances should be utilized as effectively as possible by the general public to support economic activities (Pratama & Suliswanto, 2023). Recent research shows that advances in digital infrastructure not only facilitate economic integration but also positively affect socio-economic metrics, such as improving the quality of education and healthcare (Hasyim et al., 2020; Yu et al., 2024). Conversely, investments in physical infrastructure must be complemented by human capital capacity building to ensure that economic gains are equitably distributed (Chirisa et al., 2024).

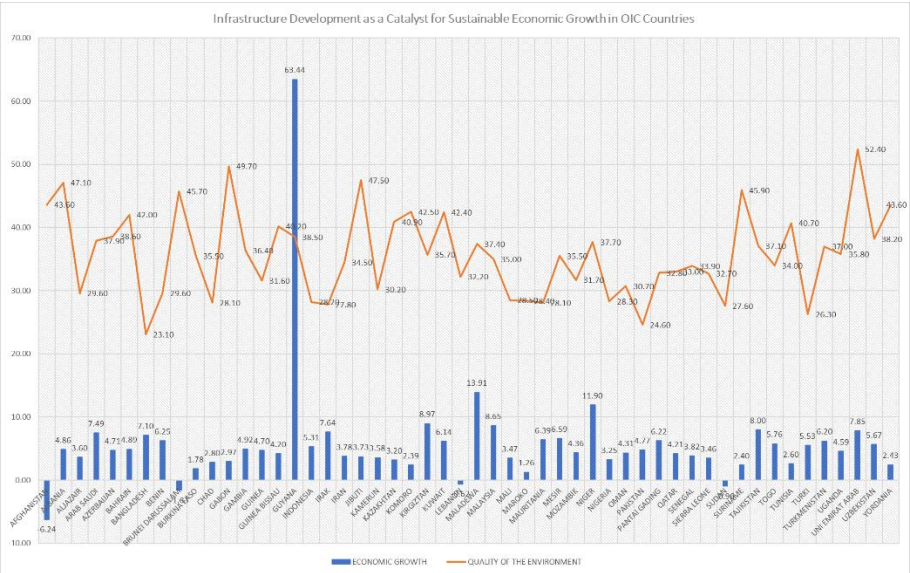

Figure 1 Economic Growth and the Environmental Performance Index of OIC Countries in 2023
Source: World Bank

Developmental progress that covers not only material aspects but also non-physical dimensions, including access to education and healthcare services (Lailah Afrianti et al., 2024). Therefore, sustainable economic development should be seen in relation to the

interaction between investments in physical and non-physical sectors, in addition to maximizing digital technologies (Mondal et al., 2023).

Global recognition has been given to the importance of investment management and infrastructure development as critical components for sustainable growth (Prus & Sikora, 2021). Previous research has underscored the need for careful planning to ensure that physical and non-physical development not only catalyze economic expansion but also promote social inclusion and reduce poverty (Panjaitan et al., 2019). In short, the interaction between these elements suggests a symbiotic relationship, where the establishment of physical and digital infrastructure, coupled with human capacity development and sound investment policies, can enhance economic resilience to global challenges and promote sustainable growth (Bahr et al., 2024; Ha & Chuah, 2023).

Despite extensive research on the relationship between infrastructure and economic growth, most studies have predominantly centered on countries with advanced or emerging digital economies. These analyses often overlook the unique socio-economic challenges faced by OIC countries, such as infrastructural inequality, institutional instability, and uneven access to digital technologies. Moreover, prior research rarely examines the combined influence of physical, non-physical, and digital infrastructure alongside investment and HDI within a comprehensive model tailored to OIC member states. Countries like Sudan, Yemen, and Afghanistan continue to face systemic barriers—conflict, limited digital penetration, and economic volatility—that are not captured in general global studies. Consequently, a holistic investigation that integrates these variables specifically within the OIC context remains notably absent in the literature. This study aims to fill this critical gap by analyzing how these factors collectively influence sustainable economic growth in OIC countries, using updated data from 2022–2023.

Sustainable economic progress in OIC countries is in accordance with the principles of maqasid al-syariah, which underscores the importance of social justice, welfare, and accountability (Jan et al., 2021). Islam views development as an imperative to improve quality of life through digital, physical and non-physical infrastructure that facilitates public engagement, accessibility and economic parity (Laila Hasyim Tambun et al., 2023). Education and healthcare are essential elements, as indicated by the Human Development Index (HDI), being prioritized to create superior human resources, accordingly (Afriyana et al., 2023). Investment in Islam is encouraged to generate collective benefits (*istislah*) and avoid monopoly, while protecting the environment from damage, as advocated in QS Al-A'raf [7]:31. Digital technology takes an important role in strengthening the Islamic economy, particularly in the administration of zakat and waqf, thereby empowering the community. With these basic principles, OIC countries have the potential to develop a productive and inclusive sustainable economy, anchored in Islamic values (Ali and Jadidah, 2024). A number of previous studies have examined various factors that affect economic growth, such as research conducted by (Deffinika et al., 2021.

The few studies that have been conducted concentrate exclusively on countries characterized by widespread access to digital technologies. Whereas in Organization of Islamic Cooperation (OIC) countries, including Sudan, Yemen, and Afghanistan, the

adoption of digital technologies continues to face significant barriers stemming from inadequate infrastructure, ongoing conflicts, and pronounced economic disparities. Investigations into technology adoption and its consequences for economic progress in OIC countries are scarce (Aghaei & Rezagholizadeh, 2017; Skare & Riberio Soriano, 2021). On the other hand, previous studies often ignore other important variables that can affect economic growth, including infrastructure development, investment, and the Human Development Index. Therefore, this study aims to explain the impact of infrastructure development, investment, and the human development index on a country's economic growth, especially in OIC member countries. Furthermore, this study will provide insight into the policies needed to optimize economic growth while contributing to environmental conservation.

Research Method

This study uses a quantitative approach with a panel data model to analyze the relationship between digital, physical, non-physical infrastructure, investment, and the Human Development Index (HDI) to sustainable economic growth. The panel data model was chosen because of its advantages in overcoming heterogeneity between countries and providing more consistent and efficient estimation results than cross-sectional or time-series methods separately. The research population includes all member countries of the Organization of Islamic Cooperation (OIC), totaling 52 countries. From this population, 52 countries were selected as samples based on the availability of complete data for the period 2022-2023. Some countries were excluded due to unavailable or incomplete data on one of the variables analyzed.

Table 1 Description of Research Variable Data

No.	Variables	Data	Symbol
	Dependent Variable (Y)		
1	Sustainable Economic Growth	The calculation results of economic growth data with the environmental index using the index formula	SEG
	Independent Variable (X)		
2	Digital Infrastructure	Percentage of internet users	AT
3	Physical Infrastructure	Logistics Performance Index Survey by *World Bank*	PI
4	Non Physical Infrastructure	Percentage of population with access to electricity	NPI
5	Investment	Foreign direct investment, net inflows (% of GDP)	I
6	Human Development Index	Average achievement in the three basic dimensions of human development-longevity and health, knowledge, and a decent standard of living.	HDI

The sample countries cover Asia, Africa, and the Middle East, providing a broad picture of the dynamics of economic growth in OIC countries. The data used in this study are sourced from the World Bank, Human Development Reports, and UNCTAD for the years 2022-

2023. These sources provide data on variables that are credible and relevant to the research. The type of data used is panel data, which includes cross-sectional (52 countries) and time-series (2 years) elements. Data analysis was conducted using EViews 12 software with Panel EGLS (Estimated Generalized Least Squares) estimation using cross-section weighting. EGLS (Estimated Generalized Least Squares) is a statistical method used to improve the accuracy of regression analysis, especially when the data has problems like heteroscedasticity (unequal variance across observations) or correlation between observations. This method was chosen to overcome heteroscedasticity and autocorrelation that may appear in panel data models (Raouf, 2022).

This research methodology is designed to provide a comprehensive picture of the determinants of sustainable economic growth in OIC countries. By using panel data and EGLS approach, this study provides reliable results to support more inclusive and sustainability-oriented policies.

Abdillah's research (2023) analyzes the effect of digitalization and economic variables on economic growth in Asian countries, the analysis method used is panel data regression analysis using the equation formula:

$$SEG=\beta 0+\beta 1DI+\beta 2PI+\beta 3NPI+\beta 4I+\beta 5HDI+\epsilon$$

The explanation for each variable is as follows:
SEG = Sustainable economic growth
DI = *Digital Infrastructure*
PI = *Physical Infrastructure*
NPI = *Non Physical Infrastructure*
I = Investment
HDI = Human Development Index
β0 = Intercept (constant).
β1,β2,...,β5 = Regression coefficient that measures the effect of each variable X on Y.
ϵ\epsilonϵ = Term error or residual.

Result and Discussion

This chapter will show the results and discussion related to research which includes the results of data processing using Eviews 12 software.

Description of the research area

This research uses the countries of the Organization of Islamic Cooperation (OIC) as the object of research. Countries that are members of the OIC countries.

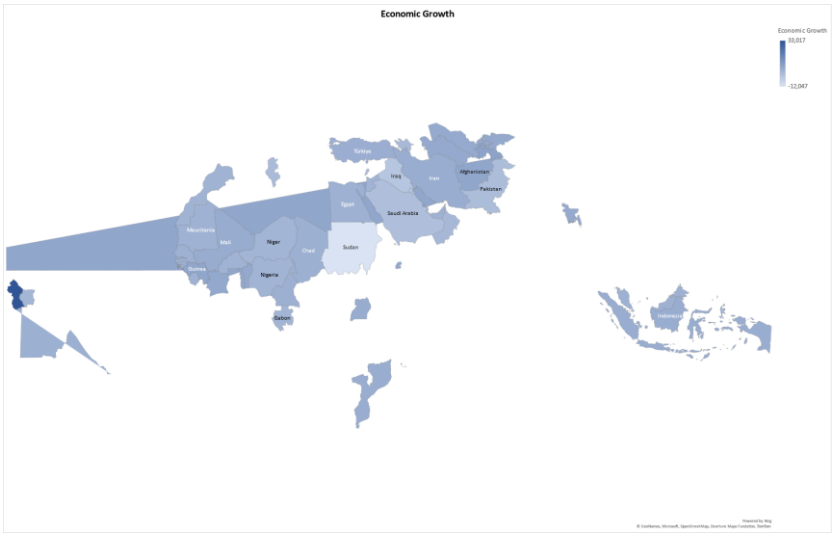

Figure 1 Map of economic growth in OIC countries
Source: World Bank (2023)

Based on the economic growth map of OIC countries above, it can be seen that the highest rate of economic growth is 33.017 and the lowest is -12.047. The map above also illustrates the disparity of economic growth. Countries with high infrastructure and stability, namely Turkey and Indonesia, have better economic growth than countries with structural constraints such as Chad and Afghanistan.

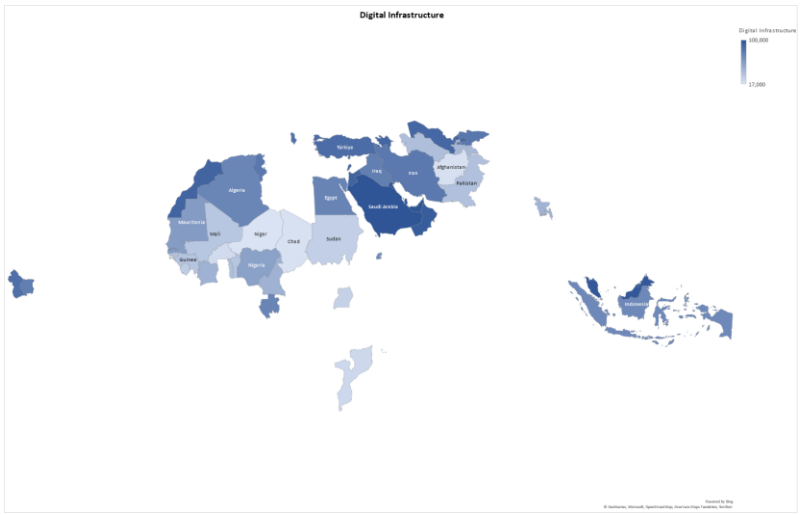

Figure 2 infrastructure digital distribution of Economic Growth in OIC Countries
Source: World Bank (2023)

Of the OIC countries, the highest digital infrastructure is mostly in the Asian region, which shows a digital infrastructure level of 100,000. This is supported by high government support factors in the form of policies, fast-moving investment. These countries see digitalization as a key opportunity to strengthen their economies and provide opportunities for them to improve the quality of life of their citizens. Digital infrastructure

also creates a smarter society in conditions where science and technology are more advanced and will have an impact on economic growth, especially in the field of digital infrastructure, to develop more rapidly. As well as countries that are still lagging behind in the field of digital infrastructure, the lowest number is 17,000.

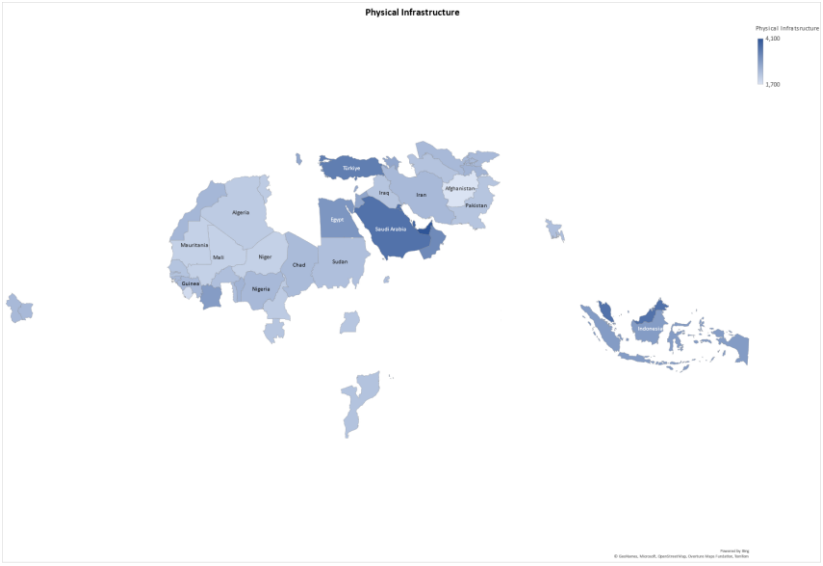

Figure 3 Physical Infrastructure distribution of Economic Growth in OIC Countries
Source: World Bank (2023)

The state of physical infrastructure in Organization of Islamic Cooperation (OIC) countries, seen through indicators of high and low logistics performance, varies widely depending on factors such as geographic location, economic progress, government policies, and available resources. Logistics performance measures how efficient and effective a country is in terms of its transportation infrastructure, distribution of goods, connectivity, and overall logistics costs. This indicator is crucial as logistics plays a vital role in supporting international trade, distribution of goods, and economic development. In general, Asian OIC countries with highly developed logistics infrastructure, such as the United Arab Emirates, Qatar, and Saudi Arabia, have invested heavily in developing their physical, transportation, and technological infrastructure to support global trade Indonesia, Malaysia, and some Central Asian countries are working to improve their logistics performance by building ports, airports, and modern transportation systems The highest physical infrastructure number on the map above is 4.100. At the same time, countries struggling with political instability and geographical challenges, such as Afghanistan, Yemen, and Pakistan, still have much to do to improve their logistics performance.

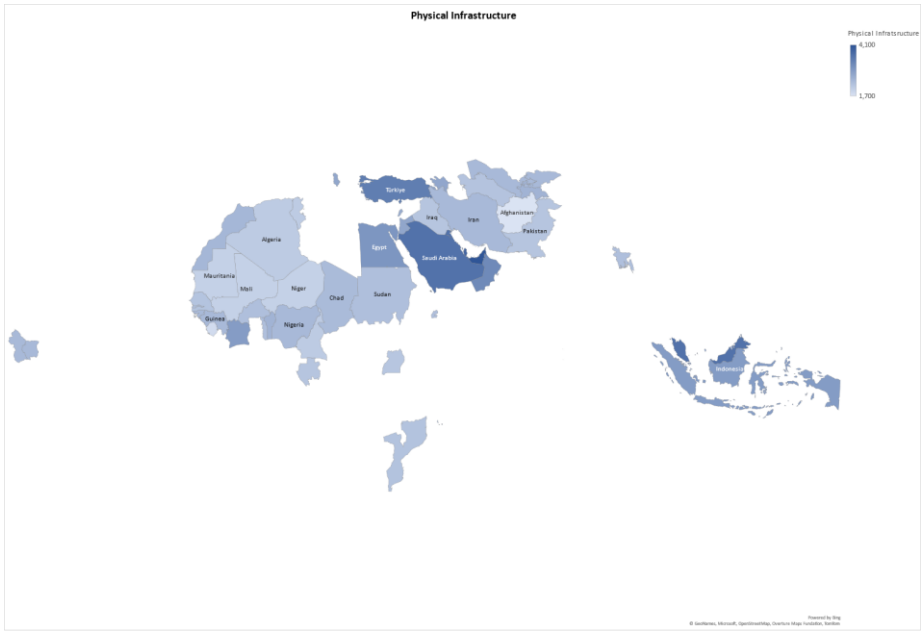

Figure 4 Non-Physical Infrastructure distribution of Economic Growth in OIC Countries
Source: World Bank (2023)

The non-physical infrastructure of OIC countries varies greatly depending on the level of development and challenges faced by each country. Countries such as the United Arab Emirates, Qatar, and Turkey and many of the darker countries depicted on the map have well-developed non-physical infrastructure due to policies that support the technology, education, finance, and governance sectors with the highest level of non-physical infrastructure at 100,000. However, countries affected by conflict or whose economies are struggling at a low of 11,700, such as Afghanistan, Yemen and Somalia, face major challenges in developing non-physical infrastructure that supports economic growth and social progress.

Figure 5 Investment distribution of Economic Growth in OIC Countries
Source: World Bank (2023)

Judging from the results of the map above, investment does not seem to affect growth in OIC countries, because it appears that the color of the map is faded, the data obtained by the highest investment value is 42,880 and the lowest value is -2,102. This may be due to the uneven distribution of investment although there are some OIC countries that attract a lot of investment, but the distribution of investment itself is very uneven. The United Arab Emirates, Qatar and Saudi Arabia attract the most foreign investment, while countries like Afghanistan and Yemen receive little to no foreign investment. This makes the map of the relationship between investment and economic growth look pale due to the high disparity between OIC countries.

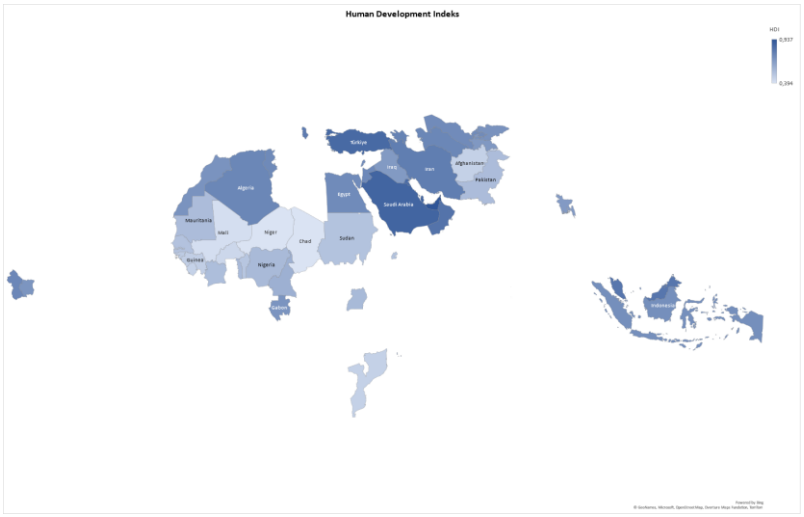

Figure 6 HDI distribution of Economic Growth in OIC Countries
Source: World Bank (2023)

Countries that are rich in natural resources (such as oil and gas) or have diversified economies tend to have higher HDIs. Countries that are involved in conflict or have limited resources, such as countries in sub-Saharan Africa and South Asia, have lower HDIs. There is a notable difference between rich OIC countries (e.g. Qatar, United Arab Emirates, Saudi Arabia) and poor countries (e.g. Niger, Chad, Yemen). This shows significant differences in access to education, healthcare and economic opportunities. The map above visualizes the distribution of the Human Development Index (HDI) in the Organization of Islamic Cooperation (OIC) member countries. The HDI is a measure that covers three main aspects: life expectancy, education level, and a decent standard of living (measured as gross national income per capita). This map provides an overview of the state of human development in the different regions of the world that are part of the OIC.

The estimation model used is Panel EGLS with cross-section weight. The sample consists of 52 cross-sections with 2 periods (2022-2023), resulting in a total of 52 balanced observations.

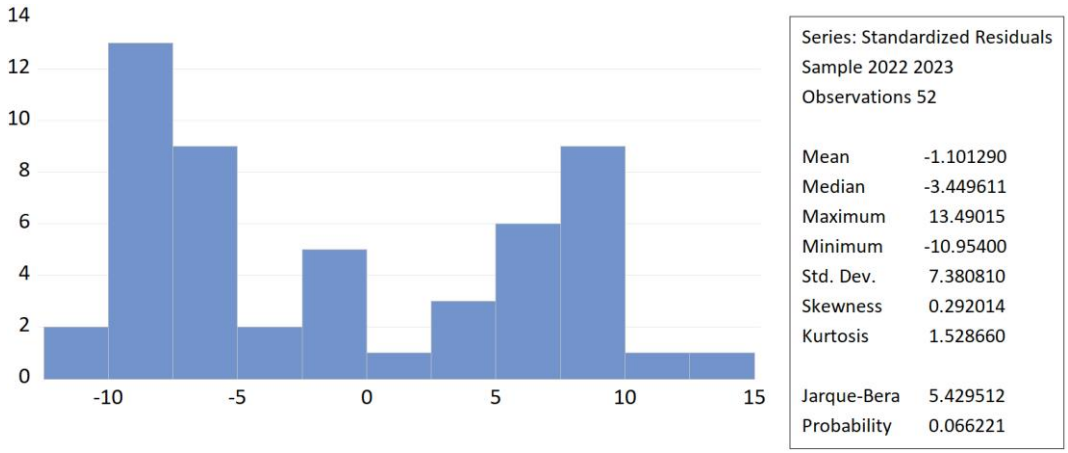

Figure 10 Normality Test Results

Based on the normality test results in Figure 9 using Jarque-Bera, the JB value is 5.429512 with a probability of 0.066221. Because the probability value is greater than the significance level of 0.05, it can be concluded that the residuals in the regression model are normally distributed. Thus, the normality assumption in regression has been met, so that the model used can provide valid and unbiased estimates.

Table Multicollinearity Test Results

	Y	X1	X2	X3	X4	X5
Y	**1.0000**					
X1	**0.3089**	**1.0000**				
X2	**0.1629**	**0.6543**	**1.0000**			
X3	**0.1820**	**0.7642**	**0.4418**	**1.0000**		
X4	**0.2942**	**-0.0220**	**-0.0426**	**-0.2128**	**1.0000**	
X5	**0.2856**	**0.8876**	**0.7182**	**0.8518**	**-0.0972**	**1.0000**

Based on the results of the correlation test between independent variables, it can be analyzed whether there are indications of multicollinearity in the regression model. Multicollinearity occurs when there is a very strong linear relationship between two or more independent variables, usually characterized by a correlation value of more than 1. In this study, all independent variables have a correlation value below 1, so it can be concluded that no multicollinearity occurs.

Hypothesis Test

The estimation model used is Panel EGLS with cross-section weight. The sample consists of 52 cross-sections with 2 periods (2022-2023), resulting in a total of 52 balanced observations.

Table 2 EGLS Results

Independent Variable (X)	Koefisien	Std. Error	t-statistik	Probabilitas
DI	-0,025903	0,017349	-1,493077	0,1422
PI	-1,043668	1,840921	-0,566927	0,5735
NPI	0,096752	0,033375	2,898937	0,0057
I	0,105578	0,337547	0,312780	0,7559
HDI	24,49807	4,140469	5,916737	0,0000
Konstanta (C)	15,73951	5,709765	2,756596	0,0083

Weighted Statistic :
- R-squared : 0,682498
- Adjusted R-Squared : 0,647987
- F-statistic : 19,77618 (Probabilitas = 0,0000)

From the results of the estimation model conducted using the EGLS Panel test, the Adjusted R-squared of 0.6825 indicates that 68.25% of the variation in the dependent variable (Sustainable Economic Growth) can be explained by the independent variables (digital infrastructure development, physical infrastructure, non-physical infrastructure, investment, and Human Development Index) while 31.75% is explained by other factors. The probability value for the simultaneous F test shown in the resulting Prob(F-statistic) is 0.000000. This value is smaller than the error value (α) of 0.05. This means that the variables of digital infrastructure development, physical infrastructure, non-physical infrastructure, investment, and Human Development Index have a significant influence on Sustainable Economic Growth.

In this study, panel data analysis used EGLS Panel. The use of Panel EGLS is considered more appropriate because of the assumption of homogeneity between cross-section data units and the time taken. This model considers that the behavior of the observed variables does not differ significantly among the member countries of the Organization of Islamic Cooperation (OIC) that are sampled. This is different from other studies, such as those conducted by Supianti (2023) and Amaliah et al. (2020), which used the Fixed Effect Model (FEM) to accommodate significant heterogeneity between data units, such as the level of development or socio-economic characteristics between regions.

The decision to use Panel EGLS in previous studies was supported by several factors. First, the data analyzed only covered two years (2022-2023). With the Estimated Generalized Least Squares (EGLS) approach, it is simpler and allows for efficient analysis without requiring complex residual distribution assumptions. Second, this study aims to identify the relationship of macroeconomic factors such as infrastructure, investment, and Human Development Index to economic growth across countries. In this context, the assumption of homogeneity across countries is considered adequate to describe global macroeconomic dynamics (Santi and Rafli, 2024).

In contrast, research by Supianti (2023) and Amaliah et al. (2020) show that FEM is more appropriate for data with real inter-unit heterogeneity. While research conducted by (Irfan, 2023) OIC countries have similarities in culture, religion and economic patterns.

Therefore CEM is more suitable for identifying than FEM, which is more suitable for capturing specific differences between countries.

From the selected regression model, namely the EGLS Panel regression model, a new econometric model is obtained, namely:

$$SEGI=15.739-0.0259*DI-1.0436*PI+0.0967*NPI+0.1055*I+24.498*HDI+\varepsilon it$$

From the new econometric model with the EGLS Panel model above, it is known that when the dependent variable or Sustainable Economic Growth increases by 15.739, the independent variable Digital Infrastructure will decrease by 0.0259. For the variable Physical infrastructure will decrease by 1.0436 and the non-physical infrastructure variable will increase by 0.0967 and the investment variable will increase by 0.1055 while the Human Development Index variable will also increase by 24.498.

This model helps explain the relationship between the independent variables and Sustainable Economic Growth. The results show that only significant variables (non-physical infrastructure, and HDI) have a real impact, so strategic steps in research or policy implementation should focus more on these variables.

The negative coefficient values in the econometric regression estimation results, as found in the OIC countries study, reflect the inverse relationship between certain independent variables and the dependent variable. In the context of the study, a negative coefficient on a variable such as physical infrastructure spending indicates that an increase in this variable may lead to a decrease in economic growth. This phenomenon can be explained by several factors.

First, this negative relationship can be caused by inefficiencies in the implementation of development policies. For example, infrastructure spending that is not matched by good governance or proper resource allocation may result in suboptimal output. A study by Santi and Rafli (2024) found that in many developing countries, infrastructure development is often plagued by corruption or inefficient budget utilization, resulting in a negative contribution to economic growth.

Second, negative results may reflect declining marginal effects, especially if infrastructure investments have reached a point where the incremental benefits of further spending are no longer significant.

Third, the heterogeneous socio-economic characteristics of OIC countries may also be an important factor. Many OIC member countries face institutional challenges, such as high levels of corruption, internal conflicts, and low human capacity, which reduce the effectiveness of infrastructure spending. This is consistent with the findings of Supianti (2023), who notes that the effectiveness of public spending is highly dependent on the socio-political conditions and level of human development in each region.

Fourth, these results may also be due to methodological or data issues, such as omitted variable bias or model specifications that do not include all relevant factors. For example, the regression analysis may fail to include relevant institutional or environmental variables, which could provide a more complete picture of the relationship between variables (Syukron & Fahri, 2019).

The results of this study emphasize the need for a more planned and data-driven infrastructure development strategy, taking into account local context and synergies with other factors, such as education and institutional reform. Thus, the negative coefficient does not necessarily indicate failure, but points to challenges that must be overcome for infrastructure spending to provide maximum benefits for economic growth.

The Sustainable Economic Growth Index (SEGI), which considers only economic and environmental dimensions, provides a more focused perspective on the relationship between economic growth and environmental quality. By using economic growth data as a representation of the economic dimension, SEGI analysis can show the extent to which an increase in gross domestic product (GDP) or growth of a particular economic sector has an impact on sustainable development (Arrow et al., 2003). Meanwhile, the use of the environmental quality index as the environmental dimension allows evaluation of the impact of the economy on ecosystems, such as air pollution, natural resource degradation, and renewable energy utilization (Dasgupta et al., 2002). The correlation between these two variables can reveal whether the economic growth of a country or region occurs while maintaining or even improving environmental quality.

This approach is relevant in assessing sustainable development policies that balance economic interests with environmental sustainability. If SEGI results show high economic growth but a decline in the environmental quality index, this could be an indication of overexploitation of natural resources or a lack of effective environmental policies. Conversely, if economic growth remains positive while environmental quality also improves, then this indicates the success of sustainable development strategies that integrate green innovation, energy efficiency, and strict environmental regulation (Gómez-Baggethun et al., 2010). Thus, SEGI, which focuses on these two dimensions, can be a useful measurement tool for governments and organizations in designing development policies that not only promote economic growth but also maintain ecological balance (Daly, 1997).

The Sustainable Economic Growth Index (SEGI) that considers both economic and environmental dimensions can be calculated using the following formula:

$$SEGI = w_1 . I_{ekonomi} + w_2 . I_{lingkungan}$$

The SEGI formula shows that the sustainability of economic growth can be measured by considering the balance between economic progress and environmental quality. If the value of w_1 is greater than w_2,, then the SEGI calculation emphasizes the economic aspect, meaning that economic growth has a higher priority than environmental

protection. Conversely, if w_2 is higher, then environmental sustainability becomes the main factor in assessing economic development.

If SEGI is high, it indicates that economic growth is taking place while maintaining or improving environmental quality. Conversely, if SEGI is low or negative, it indicates that economic growth is occurring with significant environmental degradation, which could impact long-term sustainability. Thus, SEGI can be used as a policy analysis tool that helps in measuring the effectiveness of sustainable development strategies and ensuring that economic growth does not come at the expense of ecological balance.

The estimation results show that non-physical infrastructure, and HDI variables have a significant influence on sustainable economic growth, while physical infrastructure, digital infrastructure, and investment are not significant. The significance of HDI confirms the importance of human resource development in promoting economic growth (Thanh & Tri, 2024). A more knowledgeable society will be better able to handle obstacles, take advantage of opportunities, and improve economic efficiency and scalability (Suliswanto & Rofik, 2024). Better health, education, and income contribute to increased labor productivity. This is consistent with Human Capital theory and the Sustainable Development Goals (SDGs), which place HDI as the key to sustainable development (Singh et al., 2022).

Non-physical infrastructure shows a positive and significant relationship, reflecting the impact of strengthening institutions and access to essential services such as education and health on economic inclusion. Investment also plays an important role with a significant coefficient, suggesting that capital allocation to strategic sectors can strengthen economic competitiveness in OIC countries. This finding is in line with Becker's (1964) Human Capital theory which emphasizes that improving the quality of human resources can increase productivity and economic competitiveness (Deming, 2022). A previous study by Nasfi (2020) also supports this view by finding that education and health play a major role in creating a productive workforce.

However, this study differs from Purwitsari's (2024) study which states that the contribution of non-physical infrastructure tends to be lower in developing countries due to limited institutional capacity. This difference may be due to the broader focus of the study on OIC countries, which have significant variations in institutional capacity.

Meanwhile, investment has an insignificant positive effect on sustainable economic growth. In the context of OIC countries, the strategic allocation of capital to productive sectors does not seem to have strengthened economic competitiveness and encouraged innovation. This result is not in line with the Endogenous Growth theory by Romer-Lucas (1990) which places investment in education and research as a major factor in promoting innovation and long-term economic growth (Song & Wu, 2022). Comparison with the study of Rabhi et al. (2024) shows alignment, where investment in both physical and non-physical infrastructure sectors has a positive effect on growth. However, this study also underlines the importance of prioritizing investments oriented towards social and

environmental sustainability so that the impact of investment in promoting sustainable economic growth is more significant.

HDI is shown to have a significant and positive influence on sustainable economic growth. This finding reinforces previous literature that places HDI as a key indicator of development (Nogueira et al., 2022). The study by Ha & Chuah (2023) emphasizes that improvements in health, education, and per capita income contribute to labor productivity, which ultimately drives economic growth. However, challenges remain. The study does not clarify whether the HDI increase occurred evenly across OIC countries or was only concentrated in a few countries. This gap needs to be explored further to understand the dynamics of inequality among OIC countries.

In contrast to non-physical infrastructure, physical and digital infrastructure did not show a significant effect in this study. This result contradicts Mocc's study (2023), which shows that the development of digital infrastructure in the capital cities of the archipelago has increased economic efficiency. Research by Chang Tang et al. (2022) also states that digital infrastructure (telecommunications) has an important impact on economic efficiency in China (Tang et al., 2022). The explanation for this discrepancy may lie in the fact that many OIC countries are still in the early stages of digital and physical infrastructure development, so the impact has not been felt directly.

Another study by Apriliana (2021) found that physical infrastructure contributes significantly to economic growth in urban areas. However, this study highlights the importance of holistic planning to ensure sustainability. In the context of OIC countries, this finding confirms that physical and digital infrastructure may take longer to deliver measurable economic benefits (Jasiūnas et al., 2021).

The results of the research on OIC countries can be comprehensively compared with previous studies using panel data methods, especially in the analysis of infrastructure and economic growth. For example, research by Zergawu et al. (2020) showed that the impact of infrastructure on economic growth is highly dependent on the quality of institutions (Kouadio & Gakpa, 2022). In this study, it was found that infrastructure has a significant positive marginal effect on economic growth, but only in countries with high institutional quality. In contrast, in countries with weak institutions, the effect becomes insignificant. This indicates that infrastructure needs to be supported by good institutions in order to boost economic growth Zergawu et al. (2020).

In addition, a study by Fosu and Twumasi (2022) highlights that different types of infrastructure, such as transportation and energy, have different effects on economic growth. In this study, transportation infrastructure spending showed an immediate positive effect on reducing unemployment and increasing productivity (Sobieralski, 2021), while energy infrastructure had a greater long-term effect on per capita income growth. However, poorly planned investments can lead to wasted resources and reduce the efficiency of public spending (Zhang, 2022).

Research by Hidayat et al. (2024) also supports the view that infrastructure should be planned according to local characteristics. The study shows that in regions such as China and Greece, transportation infrastructure plays a major role in improving regional accessibility and connectivity, which in turn supports the reduction of regional inequality and promotes economic growth (Hidayat et al., 2024).

These studies highlight the importance of strategic planning, institutional quality, and tailoring infrastructure to local needs. In the context of OIC countries, negative results on infrastructure spending may reflect weak institutions or lack of an integrated development strategy, as also revealed in previous studies. A more holistic approach, including institutional reform and effective management, is needed to optimize the impact of infrastructure on economic growth in the region. Overall, these results suggest that aspects of human development, investment, and strengthening of non-physical infrastructure are key priorities to promote sustainable economic growth (Ramadhan & Fauzi, 2023).

Conclusion

Based on the research results, it can be concluded that infrastructure development and the Human Development Index (HDI) have a crucial role in promoting sustainable economic growth in the Organization of Islamic Cooperation (OIC) countries. Non-physical infrastructure and HDI are shown to have a significant positive influence on economic growth, while physical, digital and investment infrastructure do not show a significant direct impact. These findings confirm that strengthening institutional capacity, improving access to essential services, and developing the quality of human capital are key factors in building an inclusive and sustainable economy. Therefore, development policies in OIC countries need to focus on long-term oriented investment strategies, strengthening institutions, and improving people's quality of life to ensure sustainable and highly competitive economic growth.

This study reveals that the greatest influence on sustainable economic growth in OIC countries comes from HDI, investment and non-physical infrastructure. Improving the quality of human capital, diversifying strategic investments and strengthening institutions are top priorities in development strategies. In contrast, the development of physical and digital infrastructure requires an integrative approach that aligns with social needs and environmental sustainability. The practical implication is that development policies in OIC countries need to emphasize human capacity development and investments that support economic sustainability. This study is limited to the period 2022-2023 and covers 52 OIC countries, so further research is needed to look at long-term dynamics and include more socio-cultural variables.

Author Contributions

Conceptualisation, V.A. and M.S.W.S; Methodology, V.A.; Investigation, V.A.; Analysis, V.A. and M.S.W.S.; Original draft preparation, V.A..; Review and editing, V.A. and M.S.W.S.; Visualization, V.A.; Supervision, M.S.W.S.

Acknowledgement

This research received significant support from several individuals and organizations. The author would like to express his gratitude to the Universitas Muhammadiyah Malang, especially the Department of Development Economics, which has funded the publication process of this article.

Conflicts of Interest

The authors of the study declare that they have no competing interests. The funders had no control over the study's design, data collection, analysis, and interpretation, paper authoring, or decision to publish the results.

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