RISK : Jurnal Riset Bisnis dan Ekonomi
Vol. 07, No. 01, Tahun 2026
available online at https://ojs.unik-kediri.ac.id/index.php/risk
ISSN (Online) 2722 – 3361; (Print) 2722 – 3108

The Impact of HDI, Labor Force Participation Rate, Investment, and Technology on Gross Regional Domestic Product in Kalimantan Island

Nikmatun Nazilah[1*], Ruth Eviana Hutabarat [2]
Fakutas Ekonomika dan Bisnis, Universitas Negeri Surabaya
email: nikmatun.22156@mhs.unesa.ac.id[1*], ruthhutabarat@unesa.ac.id[2]
*Koresponden penulis

Received: 17 Maret 2026 *Revised: 01 April 2026* *Accepted:01 Mei 2026*

Abstract: *Economic growth is a key long-term development issue that contributes significantly to the sustainability of regional development, particularly in Kalimantan Island as the third-largest contributor to Indonesia's economy. The relocation of the National Capital (IKN) from Java Island to Kalimantan is viewed as a strategic effort to create a new center of economic growth outside Java in order to reduce interregional economic disparities. This study aims to examine the effects of the Human Development Index (HDI), Labor Force Participation Rate (LFPR), investment, and technology on Gross Regional Domestic Product (GRDP) across five provinces in Kalimantan during the period 2018–2024. Panel data regression is employed as the analytical method. The results indicate that HDI and technology have negative and statistically insignificant effects on GRDP, while investment and LFPR have positive and statistically significant effects during the study period. These findings highlight the importance of improving human resource quality and optimizing technological advancement to enhance labor productivity, which in turn supports economic growth and public welfare. Economic growth can be achieved by strengthening human capital through improved access to education and healthcare. Furthermore, investment productivity should be enhanced through collaboration between the government and business actors by providing fiscal incentives, such as tax relief and capital support, particularly for the manufacturing and technology sectors, to promote more balanced and sustainable economic growth in Kalimantan.*

Keywords: *HDI, LFPR, investment, technology, GDPR*

INTRODUCTION

Sustainable economic growth has become a primary priority in global economic development. To achieve this goal, the relationship between employment, human capital, and economic complexity is critically important (Bappeda, 2020). Employment provides income and stability, which in turn drives economic growth. However, in developing countries, there are several specific challenges that hinder sustainable economic growth, namely gaps in employment opportunities, low human capital formation, and inequality in technology. These three factors have significant long-term impacts on efforts to reduce inequality and achieve sustainable economic growth. Recognizing the importance of this issue, various countries have placed economic growth on the global agenda. Economic growth has become the most important long-term issue and contributes greatly to sustainable development. In the Sustainable Development Goals (SDGs), point 8 regarding decent work and economic growth specifically sets targets focused on maintaining per capita economic growth in accordance with each country's national

conditions, with a minimum target of 7% Gross Domestic Product (GDP) growth per year in low-income countries (Ministry of PPN/Bappenas, 2016). In general, Gross Regional Domestic Product (GRDP) is defined as the value of overall increases in production across all economic sectors within a region, aimed at generating greater output to support the realization of economic growth (Sukirno, 2012). Changes in GRDP figures reflect the dynamics of productive activity occurring within a region, whether in the form of increases or decreases. National economic growth achievements do not depend solely on central government policy, but are also influenced by the performance of economic growth at the regional level. The government builds regional economies as the primary foundation for driving sustainable national economic growth ((Tangpatthamachart & Amornkitvikai, 2025).

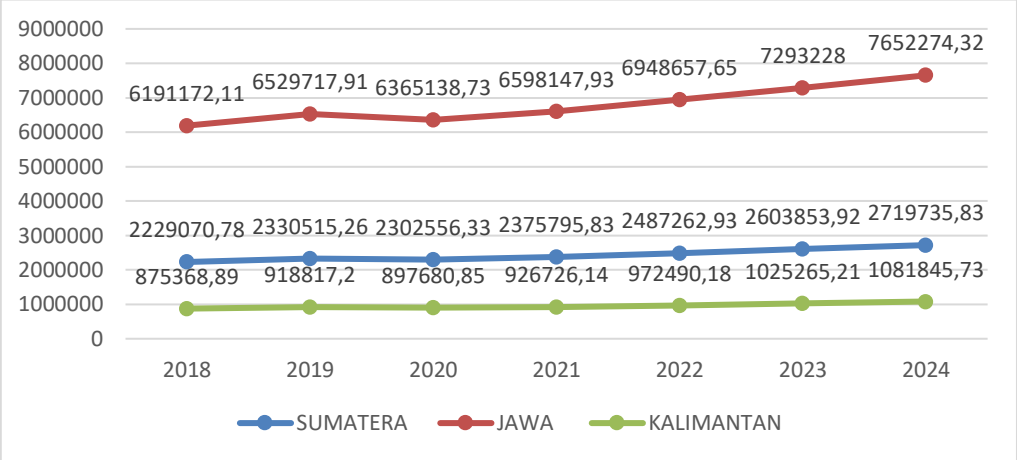


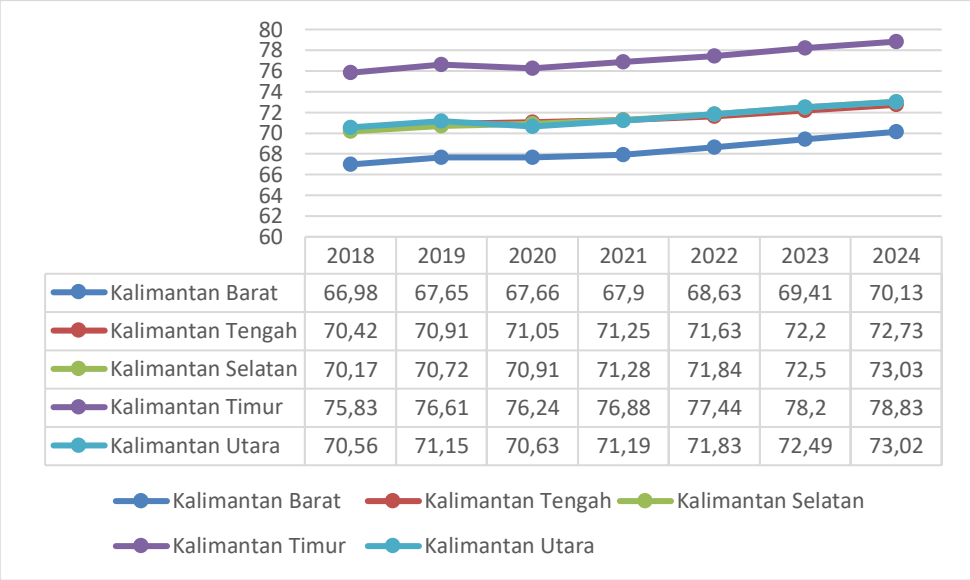
Figure 1. Gross Regional Domestic Product Based on Constant Prices in Western Indonesia Region 2018–2024

Source: BPS, 2025 (processed)

Based on the data above, it can be seen that the islands of Java and Sumatra make large contributions to GRDP. The relocation of the National Capital (IKN) from Java to Borneo is viewed as one of the efforts to create new economic growth centers in potential regions outside Java, in order to reduce economic inequality between regions and position Borneo as the third largest contributor to Indonesia's GRDP (Nurjanana et al., 2025). The idea of relocating the National Capital (IKN) from Java to Borneo had been developing since the era of President Sukarno's administration, however its implementation was only concretely realized during the administration of President Joko Widodo (Aningtyas et al., 2024). In 2020, society faced behavioral changes as a result of the COVID-19 pandemic. Communities acting as both producers and consumers, particularly those on the island of Borneo, changed massively due to limited access in production and shopping activities. This condition was triggered by the widespread implementation of regulations restricting public activities, aimed at curbing the transmission rate

of the COVID-19 pandemic. As a result of these restrictions, economic activity on the island of Borneo gradually deteriorated, resulting in varying degrees of losses across different regions (Reavindo, 2024).

The island of Borneo experienced a decline in GRDP for the first time in 2020, dropping from Rp 918,817.2 billion in 2019 to Rp 897,680.85 billion in 2020. The COVID-19 pandemic that occurred in Indonesia caused a slowdown in economic activity across various sectors, hampering all economic activities, which became the primary factor behind the decline in GRDP value in 2020 (Agustini, 2017). The GRDP value increased again consecutively from 2021 to 2024, reaching Rp 926,726.14 billion in 2021, Rp 972,490.18 billion in 2022, Rp 1,025,265.21 billion in 2023, and Rp 1,081,845.73 billion in 2024. This indicates that the island of Borneo has experienced economic recovery in the post-COVID-19 pandemic period.



	2018	2019	2020	2021	2022	2023	2024
Kalimantan Barat	66,98	67,65	67,66	67,9	68,63	69,41	70,13
Kalimantan Tengah	70,42	70,91	71,05	71,25	71,63	72,2	72,73
Kalimantan Selatan	70,17	70,72	70,91	71,28	71,84	72,5	73,03
Kalimantan Timur	75,83	76,61	76,24	76,88	77,44	78,2	78,83
Kalimantan Utara	70,56	71,15	70,63	71,19	71,83	72,49	73,02

Figure 2. HDI (Human Development Index) of Kalimantan Island 2018–2024

Source: BPS, 2025 (processed)

The achievement of optimal economic development cannot be separated from the quality of human resources, making the Human Development Index (HDI) a strategic indicator in measuring the level of progress of a region (Zarkasi et al., 2021). It focuses on three main aspects, namely education, health, and welfare (Yulianti & Qomariah, 2025). HDI data trends over the past several years have shown stable and sustained increases, indicating improvements in the quality of human resources (Sari et al., 2020). The social conditions of a region can be reflected through HDI development. Human Capital Theory argues that through investment in education and training, individuals enhance their abilities and knowledge, thereby making their productivity in economic activities more optimal. Human capital is not only about formal education, but also encompasses aspects of health, experience, and skills acquired throughout life (Fahrenbach,

2023). The economic growth rate of a region is influenced by HDI achievements, as evidenced in the research of Gustav et al. (2000), which demonstrated that HDI has a significant positive influence on economic growth in the long term. These findings are consistent with the results of research by Yovita Sari and Aning Kusuma Putri (2020), which suggested the existence of a positive correlation between HDI and economic growth. However, high HDI achievement does not automatically guarantee equitable economic development across regions.

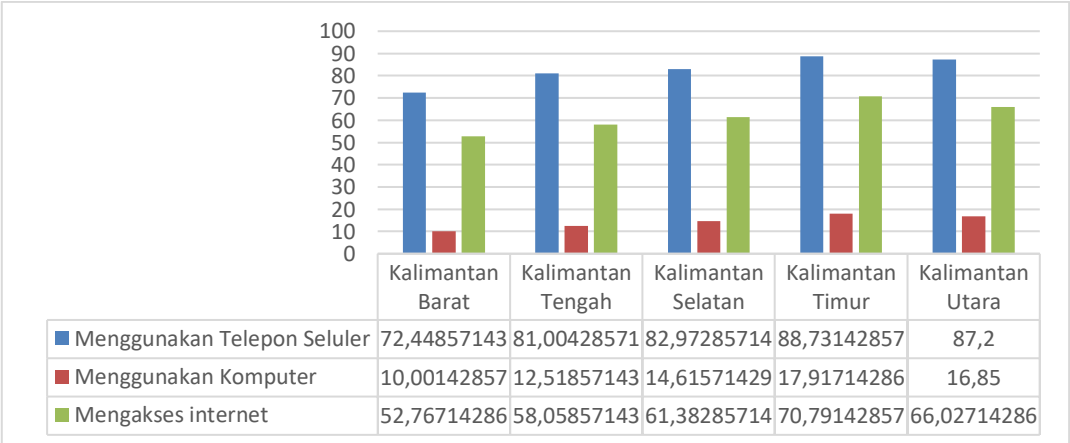
Solow (1956) explains in his theory that economic growth is determined by the interaction between physical capital, labor, and technology. Capital and labor influence growth through savings, investment, and population growth, while technology is regarded as an external factor that enhances production efficiency. In the short term, growth is achieved through improvements in the efficiency of capital and labor utilization, whereas in the long term, growth depends on capital accumulation to achieve stable growth (Nurwanda & Rifai, 2018). The long-term economy can also be assessed from the level of production and capital. It can be assumed that a region with high investment values will also possess increasingly larger capital, and with greater capital at its disposal, economic growth in that region will be accelerated. The production process will be influenced by the availability of labor and technology that develops in accordance with the rate of population growth. How quickly economic growth occurs in a region depends on the availability of labor and the pace of technological advancement in that (Budiono & Purba, 2023).

Investment is the most dominant and measurably influential physical capital component with respect to Borneo's economic growth. Increases in investment value directly contribute to the expansion of production output and improvements in regional productivity. Furthermore, sustainably conducted investment also drives increases in per capita income, which in turn expands the productive capacity of the community while simultaneously stimulating broader economic activity (Paku et al., 2025). The island of Borneo has shown a generally positive trend throughout the 2018–2024 period, although it experienced a fairly significant contraction in 2020 as a result of the COVID-19 pandemic, which triggered uncertainty among investors and widespread restrictions on economic activity. As the impact of the pandemic subsided, investment recovery began to materialize in 2021 and continued in the subsequent years. Alongside physical capital in the form of investment, another element within the Solow framework that plays an equally strategic role is labor, which also serves as one of the primary drivers of economic growth on the island of Borneo.

The Labor Force Participation Rate (LFPR) reflects a region's primary indicator in optimizing its labor potential in supporting the production process. A high LFPR indicates greater active participation of the working-age population in economic activities, which contributes to

increased production capacity and economic growth. Optimal labor participation can strengthen regional productivity through increased output and efficiency, particularly when supported by good quality human capital. Thus, an increase in LFPR can serve as a primary driver in accelerating economic growth by expanding the productive labor base that directly contributes to value-added formation across various sectors (Tsani & Martha, 2024). Furthermore, according to Christiayu Natalia & Setyo Tri Wahyudi (2023) in their research, which states that GRDP values will move in tandem with increases in the number of workers, so that the available number of workers becomes a benchmark for economic growth in East Java Province.

The island of Borneo is a region that contributes only approximately 6.15 percent, or 16.6 million people, of Indonesia's total population based on SP2020. Nevertheless, this region plays an important role in the national economy, particularly through the energy, mining, and plantation sectors. Conditions in Borneo show that increases in labor and investment are aligned with rises in aggregate economic output, as seen from the fluctuations in GRDP growth during the 2018–2024 period. This indicates the existence of structural factors that support the optimization of labor and capital contributions in driving economic growth. This phenomenon is consistent with Solow R.M's theory, which argues that economic growth increases in line with the availability of labor. Nevertheless, the effectiveness of the contribution of both factors is greatly influenced by the quality of human resources, the efficiency of investment allocation, and the support of productive fiscal policy (Wibowo et al., 2019).



	Kalimantan Barat	Kalimantan Tengah	Kalimantan Selatan	Kalimantan Timur	Kalimantan Utara
Menggunakan Telepon Seluler	72,44857143	81,00428571	82,97285714	88,73142857	87,2
Menggunakan Komputer	10,00142857	12,51857143	14,61571429	17,91714286	16,85
Mengakses internet	52,76714286	58,05857143	61,38285714	70,79142857	66,02714286

Figure 3. Percentage of Population Aged 5 Years and Above Who Have Used Information and Communication Technology in the Last 3 Months in Kalimantan Island 2018–2024

Source: BPS, 2025 (processed)

Based on Solow's economic growth theory, technological advancement is one of the main factors influencing long-term economic growth. The development of information and communication technology (ICT) in Indonesia has shown significant changes over the past two decades, in line with growing public demand for connectivity, efficiency, and the availability of

fast and accurate information. In the era of digitalization, ICT is no longer merely a supporting tool, but has become a primary infrastructure that plays an important role in driving economic development, government administration, the education sector, and improvements in the quality of public services (Herbowo, 2025). Technology is viewed as a form of accumulated societal knowledge regarding production techniques and methods, which is reflected in improvements in labor efficiency. The implementation of technology enables a constant number of workers to achieve more optimal productivity through increased efficiency in the production process. Such aggregate increases in output will drive improvements in a region's GRDP. These results are not entirely consistent with the findings of Maulana & Kusuma (2024), which elaborate that technology has a significant positive influence on economic growth on the island of Java. According to data from BPS 2024, Java has a high proportion of cellular signal coverage in Indonesia at 29.27%, while Borneo stands at 17.49%. Differences in structural conditions and regional characteristics mean that the influence of technology does not necessarily apply uniformly across other regions, such as the island of Borneo.

This condition is clearly evident in the context of Indonesia, particularly in the Borneo region. One of the priority agendas in the RPJMN (National Medium-Term Development Plan) for the 2020–2024 period is to address developmental disparities among provinces within one island region. The Borneo region has been identified as having a fairly significant level of disparity. This inequality indicator serves as an important parameter in evaluating the effectiveness of development equalization policies. Therefore, the high level of disparity indicates that the benefits of development have yet to be distributed evenly among the people of Borneo. Persistent disparity has the potential to hinder long-term socio-economic development, including in the aspect of information technology development. Realizing inclusive economic growth has become an urgent necessity to ensure equal access to opportunities for all individuals, including access to employment, which in turn can reduce income distribution inequality. Several previous studies have examined the determinants of regional economic growth with varied findings. Mursalin & Darmanto (2024) found that HDI has a positive and significant effect on economic growth, while Asnidar (2018) reported an insignificant effect of HDI on growth in East Aceh Regency, and Putri et al. (2020) found a significant negative effect in Bangka Belitung Province. Regarding investment, Aminuddin Anwar (2017) confirmed that investment significantly drives regional economic growth on the island of Java, a finding supported by Gunawan et al. (2019) in the Eastern Indonesia region. From the labor side, Christiayu Natalia & Setyo Tri Wahyudi (2023) demonstrated that LFPR has a significant effect on GRDP in East Java, while Hayati & Mahardika (2024) found no significant effect in the Eastern Indonesia region. For technology, Maulana & Kusuma (2024) found a significant positive effect of ICT on economic growth on the island of Java,

whereas Ikhsan & Satrianto (2023) reported an insignificant effect in high-income countries. The diversity of these findings consistently demonstrates that regional context encompassing economic structure, infrastructure characteristics, and level of development plays a decisive role in shaping the relationship between these variables and economic growth. Furthermore, the scarcity of studies that specifically examine the determinants of GRDP in Kalimantan Island, with its distinctive characteristics of extractive sector dominance and infrastructure gaps, reinforces the urgency of this study as an effort to fill that gap in the existing literature.

These varied findings indicate that regional context plays a crucial role in determining the relationship between these variables and economic growth. Research specifically focusing on Borneo with its unique characteristics of extractive sector dominance and infrastructure gaps remains very limited, thereby creating a research gap that this study aims to address. Based on these findings, this study aims to analyze the influence of the Human Development Index (HDI), LFPR, Investment, and Technology on GRDP as the primary indicator of economic growth in Borneo, both partially and simultaneously, during the 2018–2024 period.

METHOD

This study employs a quantitative method with the aim of obtaining a clear, objective, and statistically testable picture using a descriptive approach (Agustini, 2017). The secondary data collected are

Table 1. Operational Definition of Variables

Variabel	Proksi	Operational Definition	Satuan	Source
GRDP	Produk dometik regional bruto	Gross Regional Domestic Product calculated based on a specific base year price in Kalimantan Island	Billion Rp	BPS Indonesia, 2024
HDI	Human Development Index	A composite index encompassing the dimensions of education, health, and decent standard of living	Index (0-100)	BPS Indonesia, 2024
LFPR	Labor Force Participation Rate	The percentage of the active labor force relative to the total working-age population (aged 15 years and above)	Percent (%)	BPS Indonesia, 2024
INV	Realization value of FDI & DDI	The total realized value of foreign (FDI) and domestic (DDI) investment entering each province in Borneo	Billion Rp	BKPM/Ministry of Investment, 2024
ICT	Technology	The average percentage of residents aged 5 years and above who used mobile phones, computers, and/or accessed the internet within the past 3 months	Percent (%)	BPS Indonesia, 2024

This study employs a quantitative approach through panel data regression techniques to describe the relationship between the dependent variable and independent variables, given that

the data used is a combination of cross-sectional and time series data (Sugiyono, 2013). This method is highly ideal for modeling unobserved heterogeneity across provinces, while simultaneously analyzing the dynamics of variable changes over time. The selection of this method aims to mitigate potential bias in estimation and provide more efficient results (Wooldridge, 2020). This study uses panel data regression in level form (without logarithmic transformation). The selection of this model is based on the consideration that the focus of analysis is on absolute changes in the dependent variable, as well as the ease of interpreting results for policy formulation. Baltagi (2005) affirms that in panel data regression, problems of heterogeneity and heteroscedasticity can be addressed through error component model specification and appropriate estimation methods, so that logarithmic transformation is not mandatory as long as the model assumptions are satisfied (Baltagi, 2021). According to Gujarati (2012) in *Basic Econometrics*, Fourth Edition, differences in the units of measurement across variables do not affect the properties of OLS estimators or the coefficient of determination (R^2) in regression analysis. Therefore, logarithmic transformation is not warranted solely on the basis of scale differences between variables. The decision to apply a logarithmic transformation should instead be driven by the intended interpretation of coefficients specifically, whether elasticity estimation is the analytical objective or by the distributional characteristics of the data, such as severe skewness or non-constant variance, rather than by differences in the units of measurement alone (Gujarati, 2012).

The procedure for conducting panel data analysis begins with the stage of selecting and determining the model, such as the Chow test, Hausman test, and Lagrange Multiplier (LM) test. The Chow test functions to identify the most appropriate and suitable model between the Common Effect Model (CEM) and Fixed Effect Model (FEM) using the following hypotheses:

H0 : CEM is better

H1 : FEM is better

When the p-value (probability) < 0.05, the decision is to reject H0. This decision indicates that FEM is statistically more suitable and appropriate compared to CEM. Conversely, if the probability value shows > 0.05, then H1 is rejected, meaning CEM is better. The Hausman test can be used during model selection to determine which of FEM and REM is the most statistically appropriate, using the following hypotheses:

H0 : REM is better

H1 : FEM is better

When the probability value is < 0.05, the decision to reject H0 indicates that FEM is better and more appropriate than REM, and when the probability value is > 0.05, the decision to reject H1 means that the REM model is better and more appropriate than the FEM model.

Classical assumption tests are used to ensure and verify the validity and soundness of the panel data regression analysis, consisting of the multicollinearity test, heteroscedasticity test, and autocorrelation test. In the context of this study, multicollinearity is tested by analyzing the VIF (Variance Inflation Factor) value.

H0 : Multicollinearity occurs

H1 : Multicollinearity does not occur

When the VIF value is < 10, the decision to reject H0 indicates the absence of multicollinearity symptoms. When the VIF value is > 10, the decision to reject H1 indicates the presence of multicollinearity symptoms. To identify heteroscedasticity problems in panel data research, the detection method used is the Breusch-Pagan/Cook-Weisberg test.

H0 : Heteroscedasticity symptoms occur

H1 : Heteroscedasticity symptoms do not occur

If the probability is > 0.05, the decision to reject H0 indicates the absence of heteroscedasticity symptoms. Conversely, if the probability value is < 0.05, the decision to reject H1 indicates the occurrence of heteroscedasticity symptoms or problems.

The t-test uses the coefficient of each independent variable to simultaneously determine whether each independent variable has a partial impact on the dependent variable.

H0 : Coefficient is not significant

H1 : Coefficient is significant

If the probability value is < 0.05, the decision to reject H0 means the coefficient is individually significant. If the probability value is > 0.05, the decision to reject H1 means the coefficient is not partially significant. The F-test is a hypothesis test applied to measure statistical significance simultaneously in the regression model.

H0 : Coefficient is not significant

H1 : Coefficient is significant

When the probability value is < 0.05, the decision to reject H0 means the coefficient is simultaneously significant. When the probability value is > 0.05, reject H1 means the coefficient is not simultaneously significant.

The coefficient of determination, referred to as R-Square, is a statistical measure that explains how large a proportion of the variation in the dependent variable is influenced by the independent variables, expressed as a percentage. R^2 generally has a value between 0 and 1. For example, if R^2 shows a value of 0.64, it can be concluded that the independent variables can explain 64% of the dependent variable.

Data processing and regression analysis are carried out systematically using Stata 14 software. Referring to research conducted by (Najah et al., 2025), the multiple linear regression

model in this study is formulated as follows:

$$GRDPit = \alpha + \beta 1HDIit + \beta 2LFPRit + \beta 3INVit + \beta 4ICTit + \varepsilon it$$

Where:

GRDP	: Gross Regional Domestic Product Based on Constant Prices
HDI	: Human Development Index (HDI)
LFPR	: Labor Force Participation Rate (LFPR)
INV	: Realization value of FDI & DDI
ICT	: Technology
α	: Constant
i	: 5 Provinces
t	: 2018-2024
$\beta 1, \beta 2, \beta 3$	: Independent variable coefficients
ε	: Error coefficient

RESULT

In accordance with the research objectives, this Results and Discussion section presents a comprehensive analysis of how the variables HDI, Labor Force Participation Rate (LFPR), Investment, and Technology influence Economic Growth in Kalimantan Island. This study specifically focuses on the simultaneous relationship of these four factors.

Model Specification Test Results

The first stage that must be carried out in this study is the model specification test, so that the most appropriate model can be selected to interpret the relationships between variables in this study. These models include the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The model selected from among the available options is the Fixed Effect Model (FEM).

In panel data regression analysis, model selection is required to identify and confirm the best model to be used by conducting 3 tests consisting of the Chow test, Hausman test, and Lagrange Multiplier test. The Chow test is used to choose between the Pooled Least Squares (PLS) model and FEM, the Hausman test is used to determine between the FEM and REM models, while the Lagrange Multiplier test is used to determine between the REM and CEM models.

The table below provides evidence of the selection of the aforementioned model.

Table 2. Chow Test Results

Signifikansi Level	Prob
Prob > F	0,000

Source: Processed Data, 2025

Table 2 explains Table 2 explains that the results of the Chow test show that the Prob chi-square value is 0.0000, where this value of 0.000 < 0.05, thus the selected model is FEM. This is subsequently followed by the Hausman test to confirm the most appropriate model to be used in this study.

Table 3. Hausman Test Results

Signifikansi Level	Prob
Prob > Chi2	0,000

Source: Processed Data, 2025

The Hausman test in Table 3 shows a probability value of 0.000 < 0.05 (alpha 5%). Therefore, the best model selected from the Hausman test is the Fixed Effect Model (FEM). Since both tests, namely the Chow test and the Hausman test, have been conducted and the selected model is FEM, the Lagrange Multiplier (LM) test does not need to be performed, as it can already be confirmed that the selected model is FEM. The analysis then proceeds to the classical assumption tests, namely multicollinearity and heteroscedasticity.

Classical Assumption Test Results

The classical assumption testing begins with the multicollinearity test to identify whether or not there is correlation among the independent variables in the model. Multicollinearity identification can be performed using the VIF (Variance Inflation Factor), where a VIF value > 10 indicates the presence of a violation of the classical multicollinearity assumption. This violation causes the standard error of the regression coefficients to become increasingly large, resulting in a wider confidence interval for parameter estimates. As a consequence, there is a very high likelihood of errors occurring in drawing conclusions from the regression results (Kurniawan, 2019).

Table 4. Multicollinearity Test

Variable	VIF	1/VIIF
X1_C	4,44	0,225140
X4_C	2,94	0,340158
X2_C	1,60	0,624656
X3	1,33	0,754437

Source: Processed Data, 2025

Based on the multicollinearity test in Table 4, which shows that the VIF value is < 10, H0 is rejected, and the model is also free from multicollinearity symptoms. The next test conducted is the heteroscedasticity test, as follows:

Table 5. Heteroskedasticity Test Results

Signifikansi Level	Prob
Prob > Chi2	0,6596

Source: Processed Data, 2025

The heteroscedasticity test in Table 5 shows a prob value of 0.6596, meaning 0.6596 > 0.05. Therefore, H_0 is rejected, indicating the absence of heteroscedasticity in the model. This result confirms that the variance of the error term is homoscedastic, so that the OLS estimation in the Fixed Effect Model remains efficient and unbiased.

Data Regression

Based on the model selected in the Chow Test and Hausman Test, FEM is the best model. The purpose of this regression is to examine the effect of HDI, Labor Force Participation Rate (LFPR), Investment, and Technology on GRDP in Kalimantan Island for the period 2018–2024. The panel data regression results can be presented as follows:

Table 6. Fixed Effect Model (FEM)

Based on the table of results from panel data calculations applying the Fixed Effect Model (FEM) regression model, the regression equation is obtained and interpreted as follows:

Variabel	Koefisien	Std. Error	t-Statistic	Probabilitas
X1_C	8865.815	5302.185	1.67	0.106
X2_C	-3708.693	1763.983	,2.10	0.045
X3	.0011437	.0002723	4.20	0.000
X4_C	-289.8974	895.3137	-0.32	0.749
_cons	165782.3	6285.023	26.38	0.000
F= 0.000				
R Sq= 0.82				

GRDP = 165782.3 + 8865.815HDI - 3708.693LFPR + 0.0011437INV - 289.8974ICT

Table 6 presents that the Human Development Index has a positive and insignificant effect with a coefficient value of 8865.815 and a p-value of 0.106. LFPR has a negative and significant effect with a coefficient of -3708.693 and a p-value of 0.045, meaning that when LFPR increases by 1%, it is accompanied by a decrease in Gross Regional Domestic Product (GRDP) of -3708.693 billion rupiah. Investment has a positive and significant effect with a coefficient of 0.0011437 and a p-value of 0.000, meaning that when Investment increases by 1%, it is accompanied by an increase in GRDP of 0.001 billion rupiah. Technology has a negative and insignificant effect with a coefficient of -289.8974 and a p-value of 0.749.

Based on Table 6, the results of the partial t-test show that the HDI variable has a probability of 0.106, meaning 0.106 > 0.05, therefore statistically, HDI is not significant toward GRDP partially. The LFPR variable shows a probability value of 0.045, meaning 0.045 < 0.05, therefore statistically, LFPR is significant toward GRDP partially. The INV variable has a probability value

of 0.000, meaning 0.000 < 0.05, therefore statistically, INV is significant toward GRDP partially. The ICT variable has a probability value of 0.749, meaning 0.749 > 0.05, therefore statistically, ICT is not significant toward GRDP partially. The F-test result shows a probability of 0.000, meaning 0.000 < 0.05, therefore the HDI, LFPR, INV, and ICT variables are significant toward GRDP simultaneously. The coefficient of determination shows a value of 0.82, meaning that 82% is influenced by the determining variables of GRDP, while the remaining 18% is influenced by variables outside the model.

DISCUSSION

The Effect of HDI on Gross Regional Domestic Product in Kalimantan Island

The findings of the above study conclude that the HDI variable does not show a significant effect on the GRDP variable in Borneo. This finding contradicts Human Capital Theory, which elaborates that the level of HDI plays an important role in economic growth. The following finding is consistent with the study of Muhammad Awaluddin et al. (2024), which found that the level of HDI has a negative and insignificant effect on the GRDP of Balikpapan Province. Furthermore, the research of Kurniawan et al. (2024) found a similar result, namely that the level of HDI has a negative and insignificant effect on economic growth. The finding of Asnidar (2018), which found that the level of HDI has a positive and insignificant effect on economic growth in East Aceh Regency.

This finding differs from the study of Mursalin & Darmanto (2024), which describes that the level of HDI has a significant positive effect on economic growth. The study of Putri et al. (2020) describes that the level of HDI has a significant negative effect on the Economic Growth of Regencies/Cities in Bangka Belitung Islands Province. Due to differences in the composition levels of the three HDI components of education, health, and skills that influence economic growth, each region produces different results. The relatively high Human Development Index (HDI) achievement in Borneo has not yet demonstrated a significant contribution to regional economic growth. This phenomenon can be explained through the heterogeneity of economic structures found in each regency/city in Borneo. A number of regions show strong dependency on specific economic sectors, particularly agriculture, plantations, and mining, whose correlation with HDI improvement is not always causal and direct. From an environmental sustainability perspective, the dominant economic sectors in Borneo such as mining and plantations have the potential to generate negative externalities in the form of ecological degradation. Such conditions present distinct challenges in efforts to realize sustainable economic growth.

The Effect of Labor Force Participation Rate on Gross Regional Domestic Product in Kalimantan Island

In line with Solow R.M.'s theory, which states that increases in economic growth are greatly influenced by the size of the labor force. This finding is consistent with Winanto (2019) in Ponorogo Regency, which found that LFPR has a significant positive effect on economic growth in Ponorogo Regency. In addition, Christiayu Natalia & Setyo Tri Wahyudi (2023) in East Java Province found that the labor force participation rate, which reflects the capacity for labor absorption, shows a negative effect on per capita GRDP growth in East Java. This is caused by the lack of employment opportunities and the informalization of labor. In the context of Borneo, the labor market in the region is characterized by concentration in the primary sector (mining and plantations), which is capital-intensive rather than labor-intensive. As a result, a growing labor force may contribute to an increase in informal employment, household consumption-driven activities, or subsistence farming, rather than formal value-added production that directly increases GRDP. The higher the labor force participation rate, the lower the per capita GRDP growth consequently becomes. This result differs from the study conducted by Hayati & Mahardika (2024) in Eastern Indonesia, which found that LFPR does not have a significant effect on GRDP in Eastern Indonesia. The availability of labor, which consistently increases every year, will naturally influence economic growth in a region. Optimal labor absorption depends on the collaboration of relevant parties, including the government, employers, and job seekers.

The negative effect of LFPR on GRDP indicates that optimal labor absorption in Kalimantan requires structural reforms that extend beyond simply increasing the labor force participation rate. This is reflected in the high proportion of the workforce absorbed into the informal and subsistence sectors in Kalimantan, which are characterized by low productivity and do not contribute significantly to formal value-added output as measured by GRDP. Policies must therefore focus on enhancing the formal labor absorption capacity in key sectors, particularly through the development of downstream industries that link the extractive sectors namely mining and plantations with manufacturing and services. Such linkages would increase the valueadded contribution of each additional unit of labor, thereby transforming higher LFPR into tangible GRDP growth. Collaboration among regional governments, private sector actors, and vocational training institutions is essential to ensure that the continuously expanding labor force possesses skills aligned with the evolving demands of Kalimantan's economy, particularly in the context of the National Capital relocation (IKN), which is projected to generate new labor demand in the construction, services, and technology sectors.

The Effect of Investment on Gross Regional Domestic Product in Kalimantan Island

The findings of this study show that investment has a positive effect on economic growth. This finding indicates that an increase in investment realization can stimulate economic activity through the addition of production capacity, job creation, and improvements in production

process efficiency in Borneo. Investment originating from domestic sources (DDI) as well as foreign sources (FDI) serves as the primary stimulus in increasing aggregate output, which is reflected in the rise of GRDP. Economically, the inflow of investment strengthens capital accumulation, enabling productive sectors to develop more optimally, such as the mining sector which is the leading sector in Borneo. The capital invested not only increases the quantity of production factors, but also drives the adoption of technology and improvements in business management, resulting in increased productivity of production factors. This condition is relevant to the Neoclassical Growth Theory (Solow), which elaborates that capital accumulation through investment contributes to increased output until long-term equilibrium is achieved.

The findings of this study are also relevant to the Harrod-Domar Theory, which emphasizes that investment is the primary factor in driving economic growth through increases in capital stock. The higher the level of investment, the greater the production capacity that can be created, so that economic growth can take place sustainably. The above findings are consistent with the study conducted by Gunawan et al. (2019), which found that domestic investment (DDI) has an effect on GRDP in the Eastern Indonesia region during 2011–2016. In addition, Arsiska Sari et al. (2024) found a similar result, namely that DDI and FDI have a positive and significant effect on Gross Regional Domestic Product (GRDP) in North Sumatra.

The Effect of Information Technology on Gross Regional Domestic Product in Kalimantan Island

Technological improvement is a strategy that can be pursued to stimulate economic growth in Borneo. In this study, the technology indicator is measured based on the number of people who use mobile phones, computers, and have internet access in Borneo. The acceleration of technology in a region requires the support and seriousness of the government in the implementation of daily policies. In addition, the formation of an ecosystem that encourages sustainable technology utilization will accustom the community to adopting technology. This in turn will accelerate economic growth and is expected to improve community welfare (Rochdianingrum & Setyabudi, 2017).

The findings of this study differ from the findings of JiYoung Park et al. (2021), which state that technology has an effect on economic growth in Korea. In addition, Indrajaya & As Sidiq (2025) in Indonesia found that the development of digital technology has a significant positive effect on economic growth, however there are many major challenges, namely the uneven distribution of digital infrastructure, regional disparities, limited technologically literate human resources, and the dominance of the extractive sector (mining and plantations) that has not yet been fully integrated with digital technology.

The results of this study are consistent with the findings of Ikhsan & Satrianto (2023),

which state that fixed telephone subscriptions, mobile telephone subscriptions, internet users, and fixed broadband subscriptions do not have a significant effect on economic growth in high-income countries. The study findings show that technology has not yet provided a significant effect on economic growth in Borneo. The findings of Pradhana, Mallik, & Bagchi (2018) indicate that the economic growth of G20 countries has not been proven to be influenced by internet users. The expansion of internet users should be a priority because ICT can accelerate communication and decision-making for companies and households. However, thus far, its contribution has not yet been reflected in economic growth. Internet users have a negative effect on economic growth. This means that an increase in the number of internet users will not have an impact on the increase or decrease of economic growth in high-income countries.

This is because internet usage is still limited to personal needs, and has not yet been fully utilized for business needs on a broader scale. This condition indicates that the utilization of technology, proxied through capital per worker, is still not optimal in improving regional productivity and economic output. One of the main causes is the inequality in access and quality of technological infrastructure, particularly in non-urban areas of Borneo which are relatively underdeveloped compared to Java. BPS data shows that although internet access rates in Borneo continue to increase, its utilization is still dominated by communication and consumption needs, rather than for productive economic activities in stark contrast to Java, which has more evenly distributed digital infrastructure, higher levels of technological literacy, and stronger technology integration in the industrial and services sectors, making its impact on economic growth more significant.

CONCLUSION

For Borneo during the 2018 to 2024 period, it can be concluded that the Labor Force Participation Rate (LFPR) and investment have a significant effect on GRDP, while HDI and technology do not show a significant effect. These results differ from Solow's Human Capital Theory, which emphasizes the role of human resource quality in driving economic growth. These findings indicate that economic growth in Borneo is more driven by the active involvement of the labor force in economic activities and investment flows, compared to improvements in human quality and technology utilization, whose impacts tend to be long-term in nature. The regression analysis results show that the X variables are able to explain 82.95% of GRDP variation, while the remaining 17.05% is influenced by variables outside the model. The insignificant effect of HDI on GRDP is primarily caused by Borneo's economic structure, which remains centered on capital-intensive extractive industries (mining and plantations), where output is more dependent on natural resources and capital equipment than on the quality of human capital. Improvements in

education and health have not yet been fully converted into productive economic output, as there remains a persistent skills mismatch between labor supply and sectoral demand. Likewise, the insignificant effect of technology reflects the uneven distribution of digital infrastructure across provinces (with mobile signal coverage of only 17.49% compared to Java's 29.27%), as well as ICT utilization that is still dominated by personal consumption needs rather than productive economic activities. Therefore, improvements in HDI and technology are expected to produce stronger effects in the long term, particularly as the IKN relocation accelerates infrastructure development and structural economic transformation in Borneo. This indicates that improvements in HDI and technology have not yet been fully converted into tangible economic productivity. Based on these findings, the policies that need to be adopted by regional governments in Borneo are as follows. First, encouraging labor-intensive investment based on local potential to expand employment opportunities. Second, increasing formal employment opportunities to drive improvements in LFPR. Third, strengthening the linkage between improvements in human resource quality and labor market needs. Although HDI and technology have not yet shown a significant effect in the short term, sustained investment in education, health, and digital infrastructure remains necessary. Such investment is important so that in the long term it can support structural economic transformation and more inclusive growth in Borneo. Future research is recommended to incorporate additional determinants such as institutional quality, regional fiscal expenditure, and specific sectoral indicators in order to obtain a more comprehensive analysis of the determinants of GRDP in Borneo.

BIBLIOGRAPHY

Agustini, Y. (2017). Pengaruh Investasi PMDN , PMA , dan Penyerapan Tenaga Kerja Terhadap Pertumbuhan Ekonomi dan Jumlah Penduduk Miskin Kabupaten / Kota di Provinsi Kalimantan Barat. *Jurnal Ekonomi Bisnis Dan Kewirausahaan*, *6*(2), 97–119. https://doi.org/https://doi.org/10.26418/jebik.v6i2.22986

Aningtyas, A., Ika, S., Wardhani, A., Fawwaz, A., & Hamida, F. I. (2024). Pengambilan Keputusan Pembangunan Ibu Kota Negara (IKN): Analisis Perspektif Masyarakat di Luar Daerah Kalimantan Ditinjau dari Aspek Kemanusiaan. *Sanskara Ilmu Sosial Dan Humaniora*, *2*(01), 36–42. https://doi.org/10.58812/sish.v2.i01

Baltagi, B. H. (2021). *Econometric Analysis of Panel Data* (2nd ed.). Springer Cham. https://doi.org/https://doi.org/10.1007/978-3-030-53953-5

Bappeda. (2020). Analisis Ketimpangan Wilayah Provinsi Kalimantan Timur Semester II Tahun 2020. In *Analisis Ketimpangan Wilayah Provinsi Kalimantan Timur Semester II Tahun 2020* (pp. 1–31). Bappeda Kaltim. file:///C:/Users/Windows 10 Pro/Downloads/KETIMPANGAN PENDAPATAN KALTIM 2022.pdf

Budiono, S., & Purba, J. T. (2023). Heliyon Factors of foreign direct investment flows to Indonesia in the era of COVID-19 pandemic. *Heliyon*, *9*(4), 1–19. https://doi.org/10.1016/j.heliyon.2023.e15429

Fahrenbach, F. (2023). How the validation of prior learning can be used to assess entrepreneurial human capital investments and outcomes. *Jurnal Pelatihan Dan Pengembangan Eropa*, *47*(10), 1–14. https://doi.org/https://doi.org/10.1108/EJTD-09-2019-0168

Gujarati, D. N. (2003). *BASIC ECONOMETRICS* (4th ed.). McGraw-Hill/Irwin.

Herbowo, F. (2025). *statistik telekomunikasi indonesia*.

Kurniawan. (2019). *ANALISIS DATA MENGGUNAKAN STATA SE 14* (pertama). DEEPUBLISH. https://repository.deepublish.com/media/publications/590526-analisis-data-menggunakan-stata-se-14-pa-6cc3d2c4.pdf

Najah, S., Millah, H., & Kartikawati, Y. (2025). Pengaruh Investasi dan Indeks Pembangunan Manusia (IPM) Terhadap Pertumbuhan Ekonomi di Provinsi Jawa Timur. *Jurnal Ekonomi Syariah Pelita Bangsa*, *10*(01), 161–174. https://doi.org/10.37366/jespb.v10i01.2405

Nurjanana, N., Darma, D. C., Suparjo, S., Kustiawan, A., & Wasono, W. (2025). Two-Way Causality Between Economic Growth and Environmental Quality : Scale in the New Capital of Indonesia. *Sustainability*, *17*(1656), 1–22.

Nurwanda, A., & Rifai, B. (2018). Kajian Ekonomi & Keuangan Diagnosis Pertumbuhan Ekonomi dan Output Potensial Indonesia. *Kajian Ekonomi Dan Keuangan*, *2*(3), 177–194. https://doi.org/10.31685/kek.v2i3.385

Paku, M. M., Rinofah, R., & Kusumawardhani, R. (2025). Pengaruh PSBB Volume Perdagangan Terhadap Stock Return pada Perusahaan Layanan Perdagangan dan Investasi Sub Sektor Pariwisata Restoran dan Hotel adalah Pembatasan Sosial Berskala Besar (PSBB) berdasarkan PP No . 21 Tahun 2020 . Masyarakat (PPKM) di w. *Jurnal Ilmiah Manajemen Dan Kewirausahaan*, *4*(2809–2392), 202–218. https://doi.org/https://doi.org/10.55606/jimak.v4i1.5136

Reavindo, Q. (2024). ANALISIS PENGARUH MODAL MANUSIA TERHADAP PERTUMBUHAN EKONOMI KABUPATEN/ KOTA DI SUMATERA UTARA SELAMA MASA PANDEMI. *Jurnal Ilmiah MEA (Manajemen, Ekonomi, Dan Akuntansi)*, *8*(2), 795–808. https://doi.org/https://doi.org/10.31955/mea.v8i2.4078

Rochdianingrum, W. A., & Setyabudi, T. G. (2017). Keterkaitan antara jumlah umkm dan tingkat teknologi terhadap pertumbuhan ekonomi di jawa timur. *Ekuitas: Jurnal Ekonomi Dan Keuangan*, *32*, 543–562. https://doi.org/10.24034/j25485024.y2019.v3.i4.4136

Sari, Y., Nasrun, A., & Putri, A. K. (2020). ANALISIS PENGARUH INDEKS PEMBANGUNAN MANUSIA DAN KEMISKINAN TERHADAP PERTUMBUHAN EKONOMI KABUPATEN/KOTA DI PROVINSI KEPULAUAN BANGKA BELITUNG TAHUN 2010-2017. *Equity: Jurnal Ekonomi*, *8*(1), 4–6. https://doi.org/https://doi.org/10.33019/ekuitas.v8i1.9

Sugiyono, P. D. (2013). *Metode Penelitian Kuantitatif Kualitatif dan R&D* (Prof. Dr. Sugiyono (ed.)). ALFABETA, CV. https://digi-lib.stekom.ac.id/assets/dokumen/ebook/feb_35efe6a47227d6031a75569c2f3f39d44fe2db43_1652079047.pdf

Sukirno, S. (2012). *economic development* (S. Sukirno (ed.); 3rd ed.). Jakarta : Raja Grafindo Persada , 2013. https://onesearch.id/Record/IOS3187.INLIS000000000014691

Tangpatthamachart, S., & Amornkitvikai, Y. (2025). Research in Globalization Demographic shifts and economic growth : A global analysis across ageing and non-ageing economies. *Research in Globalization*, *11*, 1–19. https://www.sciencedirect.com/science/article/pii/S2590051X25000541

Tsani, M. permata dien, & Martha, S. (2024). Analisis Faktor-Faktor yang Memengaruhi Indeks Pembangunan Manusia di Pulau Kalimantan dengan Spatial Error Model. *Forum Analisis Statistik*, *4*(2), 93–108. https://doi.org/https://doi.org/10.57059/formasi.v4i2.85

Wibowo, A. A., Yunianti, E., Gunawan, D. S., & Soedirman, U. J. (2019). DETERMINANTS OF GROSS REGIONAL DOMESTIC PRODUCT IN EASTERN INDONESIA REGION 2011-2016. *Trikonomika*, *18*(1), 18–24. https://doi.org/https://doi.org/10.23969/trikonomika.v18i1.1233

Yulianti, Y., & Qomariah, S. (2025). Indeks Pembangunan Manusia Ilmu Pengetahuan. *CENDEKIA: Jurnal Ilmu Sosial, Bahasa Dan Pendidikan*, *5*(1), 190–200. https://www.emerald.com/ejtd/article/47/10/1/31770/How-the-validation-of-prior-learning-can-be-used

Zarkasi, R., Sifriyani, & Pragga, S. (2021). IDENTIFIKASI FAKTOR-FAKTOR YANG MEMPENGARUHI MENGGUNAKAN REGRESI PANEL Identification of The Factors That Influence The Human Development Index In Kalimantan Using Panel Regression. *BAREKENG: Jurnal Ilmu Matematika Dan Terapan*, *15*(2), 277–282. https://doi.org/https://doi.org/10.30598/barekengvol15iss2pp277-282