THE INFLUENCE OF INFRASTRUCTURE, LABOR AND INVESTMENT ON ECONOMIC GROWTH IN INDONESIA

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ABSTRACT

Economic growth plays a crucial role in the overall well-being of a nation's population. It is composed of various components, each with its own significance in driving economic progress. Among these components are the road infrastructure variable, the labor variable, and the Domestic Investment variable, all of which contribute to stimulating economic growth. Therefore, it is imperative to analyze the extent to which these variables contribute to the economic growth of Indonesia. To conduct this analysis, the Error Correction Model (ECM) is employed as the analytical method. This model enables the determination of both the long-term and short-term effects of the road infrastructure variable, labor variable, and Domestic Investment variable on the Gross Domestic Product (GDP), which serves as an indicator of economic growth. The findings of this study reveal that the road infrastructure variable, labor variable, and Domestic Investment variable have a significant long-term impact on the Gross Domestic Product. Moreover, when considered collectively, these variables exert a substantial influence on the overall GDP. In the short term, although the road infrastructure variable, labor variable, and Domestic Investment variable do not individually exhibit a significant effect on the Gross Domestic Product, their combined impact proves to be significant.

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1. INTRODUCTION

Basically the goal of economic activity is economic growth which will be related to the welfare of the community, various ways are done by the parties concerned, especially the government to realize this haI through various policies (Utary, 2021). One of the policies that the government can carry out in encouraging economic growth can be through development where development acts as a cog in an economy that provides convenience for the community with regard to resources and can increase efficiency and productivity and effectiveness in its economic activities (Sianturi, 2014).

Development that is quite vital in the economic activities of a country, one of which is public infrastructure, infrastructure plays an important role in increasing economic growth, where it is often found that higher levels of economic growth go hand in hand with the level leads to higher and stable economic growth, and high economic growth helps to develop the country's infrastructure (Dhungel, 2020). Infrastructure services are needed to increase production and productivity in the economy at the cost of production and transportation (Nugraha et al., 2018). In addition, infrastructure helps to reduce various costs, connect different regions and countries, increase competitiveness, and improve market access at low costs. Well-developed

infrastructure plays a key role in accelerating economic activities and driving the country's economic growth (Setiani et al., 2014). In Indonesia itself, infrastructure, especially roads, experiences growth every year, but its development is fairly slow, as explained in the graph below:

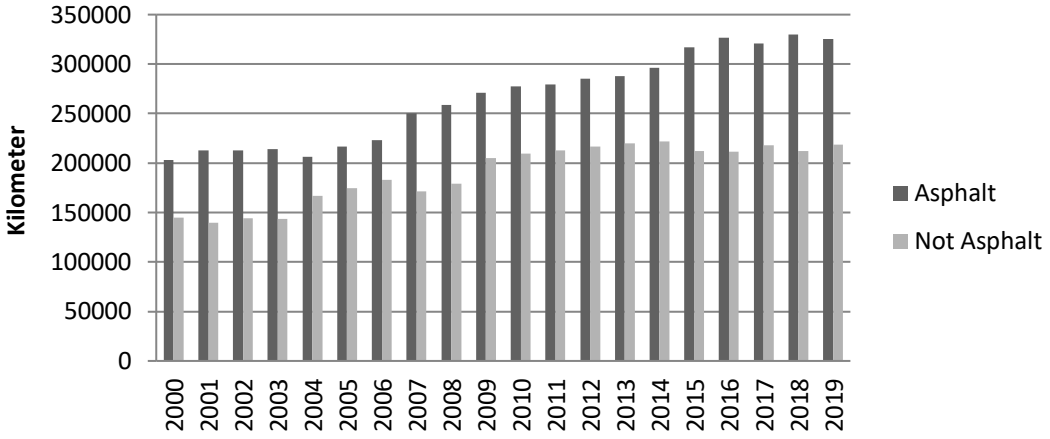

Figure 1. Road length by surface type in Indonesia 2000 – 2019
Source: Badan Pusat Statistik Indonesia, Processed

It can be seen in figure 1, a proper road surface is an asphalt road surface, and a less proper road surface is not asphalt. The non-asphalt road surface, which amounts to more than half of the total highways in Indonesia, is one example of the slowness of development in Indonesia. Non-asphalt highways are dominated in rural areas, the uneven distribution of development in Indonesia causes areas that are left behind to be far from prosperous so that they are unable to contribute greatly to the economic growth of their country (Santoso, 2003).

Economic growth is directly related to economic production (output) so that economic growth cannot ignore the vital component of labor. The labor force is formed from the population of a country, where the number of labor force should be balanced with the number of productive age people in a country. This imbalance can cause problems, especially if the imbalance results in a negative impact in the form of unemployment which reflects the community's welfare and can hamper economic growth in a country (Effendi & Hendarto, 2013). The imbalance can be caused by rapid population growth that is not matched by existing employment opportunities (Subki, 2018). Rapid population growth encourages the emergence of underdevelopment problems and makes development prospects more distant (Todaro, 2000). In countries with large population growth, it is possible to have a large workforce as well, this can have a positive impact if countries with large population growth that have a wide market reach have the ability to absorb labor so as to increase productivity which will encourage economic growth in a country (Arsandi et al., 2017).

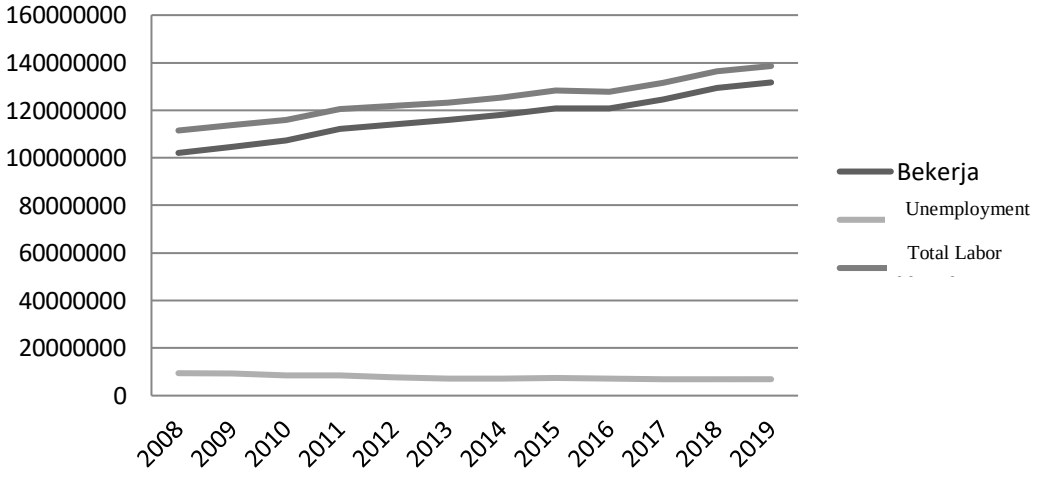

Figure 2. Indonesian Labor Force 2008-2020
Source: Badan Pusat Statistik Indonesia, Processed

The condition of the labor force in Indonesia in figure 2, shows that most of the labor force in Indonesia has worked and shows a positive trend with a percentage in 2008 and 2009 as much as 92% of the labor force has worked, in 2010 and 2011 as much as 93% of the labor force has worked, in 2012 to 2016 as much as 95% of the labor force has worked, where the agricultural sector is the sector with the most employment. And the unemployment rate also decreased slowly except in 2015 unemployment increased by 4% which was continuous with the level of employment which decreased by -11% in 2015, but in 2016 the unemployment rate decreased again and the level of employment also increased which showed that economic conditions were recovering.

Economic growth is also inseparable from the role of capital formation, referring to the Neo-Classical theory of economic growth popularized by Robert Solow which states that savings or capital, population and labor, and technology affect the level of output and economic growth. The higher the savings rate, the higher the capital and output produced. The formation of capital can be in the form of investment where the higher the level of investment, the more it wil increase the output or economic productivity that drives the economic growth of a country.

The capital can be sourced from within the country called Domestic Investment and Foreign Investment, in a developing country Domestic Investment is considered capable of driving the economy better and if domestic investment increases then economic growth will also increase (Mahriza, 2019). Not only does Domestic Capital Formation play a role, Foreign Investment also plays a role in economic growth where Foreign Investment can be a medium for transferring technology from abroad to within the country which can increase productivity and can increase product competitiveness both domestically and abroad .

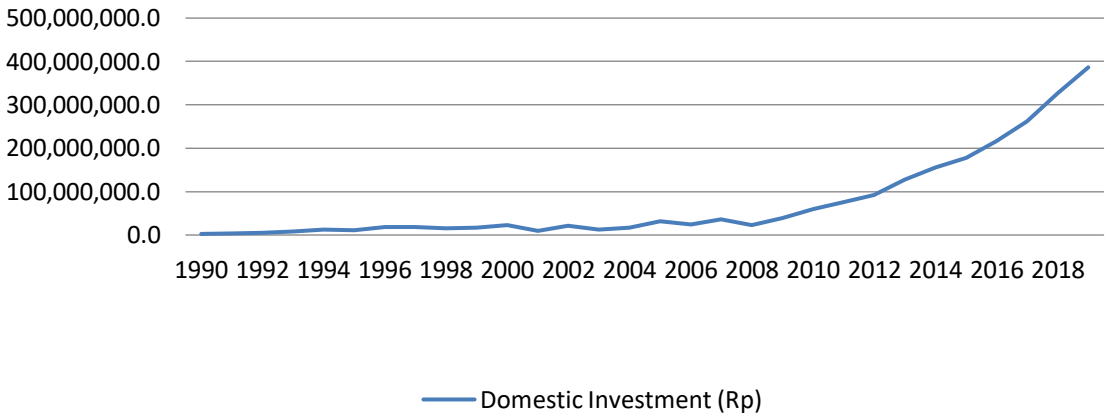

Figure 3. Development of Domestic Investment Realization 1990 – 2019
Source: Badan Koordinasi Penanaman Modal (BKPM), Processed

From figure 3, it shows that the development of domestic investment is quite fluctuating but shows a positive trend, where the increase in domestic investment has seen a significant increase starting from 2008. The significant increase in domestic investment should be able to affect Indonesia's economic growth rate as well, where the increase in investment can encourage an increase in output.

2. RESEARCH METHOD

The data analysis method used is a quantitative analysis technique with ECM (Error Correction Model) analysis with the main requirement that the data is not stationary at the level, but stationary at the differentiation level and the variables are cointegrated and pass the classical assumption test. This model is used to determine the long-term and short-term effects of each independent variable on the dependent variable (Oktavina, 2012).

This study uses the dependent variable in the form of Gross Domestic Product (GDP), and independent variables in the form of road infrastructure, total labor, and Domestic Investment with a time span from 1990 to 2019 (Sagita, 2014). The data used is a type of secondary time series data obtained from the World Bank website, Badan Pusat Statistik, and Badan Koordinasi Penanaman Modal (BKPM).

These variables are described in the following function equation:

$$GDP = f(RI, L, DI)$$

The general model of multiple regression is:

$$Y = \beta_0 + \beta_1 X_1 + E_t$$

The general model of Error Correction Model (ECM) is:

$$Y = \beta_0 + \beta_1 \Delta X_1 + \beta_2 ECT_{t-1} + e_t$$

The multiple regression model used is:

$$GDP = \beta_0 + \beta_1 RI_t + \beta_2 L_t + \beta_3 DI_t + e_t$$

The Error Correction Model (ECM) model used is :

$$GDP = \beta_0 + \beta_1 RI_t + \beta_2 L_t + \beta_3 DI_t + \beta_4 ECT_{t-1} + e_t$$

Description:
GDP = Gross Domestic Product (US$)
RIt = Road Infrastructure (Km)
Lt = Labor
DIt = Domestic Investment (million rupiah)
β0 = Constant Numbers
β1 β2 β3 β4 β5 = Regression Coefficient
ECTt-1 = Error Correction Term
et = Term Error (Confounding error)

3. RESULT AND DISCUSSION

3.1. Stationary Test

One of the requirements for using the Error Corection Model (ECM) method is not stationary at the level, the stationarity test of the data uses Augmented Dickey-Fuller (ADF). Where if the probability value of each variable is smaller than the alpha value of 5% then the data is stationary. The degree of integration test can be carried out if the data used is not stationary at the level.

Table 1. Unit Root Test and Integration degree Test with ADF Test

Variable	Probability		
	Level	1st Difference	2nd Difference
D(GDP,2)	1.0000	0.0916	0.0000
D(RI,2)	0.8926	0.0213	0.0000
D(L,2)	0.9987	0.0001	0.0000
D(DI,2)	1.0000	0.9999	0.0000

In Table 1, all variables are not stationary at the level level, so the stationarity test makes a change from the level to the first dispensation. In the first diferensation, the DI and GDP variables are not yet stationary because they have a probability value greater than the alpha level of 0.05, namely 0.9999> 0.05 and 0.0916> 0.05, so the stationarity test continues to the second diferensation. In the second diferensation all variables are declared stationary because they have a probability value smaller than alpha 0.05. After the test all variables are declared stationary, it can be interpreted if there is a long-term relationship between variables.

3.2. Cointegration Test

After the stationarity test shows the results in the same differentiation, then the cointegration test can be carried out. The cointegration test in this study uses the residual-based test method, which shows the following results,

Table 2. Cointegration Test with Residual Based Test Method

t-statistic	Critical Values		Probability	Notes
-3.181469	1% level	-3.699871	0.0323	Cointegrated
	5% level	-2.976263		
	10% level	-2.627420		

In Table 2, the results show that there is cointegration between the variables used, this can be seen from the probability value which shows that the residual significance level is smaller than alpha 0.05 (5%), which is 0.0323. Therefore, this model passes the cointegration test, so the Error Correction Model can be used in research.

3.3. Long-Term Model Estimation

In the cointegration test, it has been stated that all variables are cointegrated and there is an equilibrium in the long run. Then the results of the long-term coefficient estimation can be seen as follows,

Table 3. Long-Term Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.		
C	-4.35E+11	4.90E+10	-8.882331	0.0000	R-squared	0.994058
RI	1392245.	206129.7	6.754217	0.0000	F-statistic	1394.034
L	4533.087	1224.494	3.702009	0.0011	Prob(F-statistic)	0.000000
DI	814.3425	76.78002	10.60618	0.0000		

The t test or regression coefficient test individually obtained the following results; In the variable Road Infrastructure (RI) has a long-term influence on the Gross Domestic Product (GDP) variable which is indicated by a probability value smaller than the alpha level of 0.0000 <0.05. And it can be said that if there is an increase in road infrastructure along 1 km, it will increase GDP by 1,392,245 US$. And it can be said that if there is an increase in road infrastructure along 1 km, it will increase GDP by 1,392,245 US dollars.

In the variable Labor (L) has a long-term influence on Gross Domestic Product (GDP), which is indicated by a probability value smaller than the alpha level of 0.0000 < 0.05. Where every increase in labor by 1 person/person will increase GDP by 4,533,087 US$.

Then the Domestic Investment variable also shows that there is a long-term relationship with the Gross Domestic Product (GDP) variable which is indicated by a probability value that is smaller than the alpha level of 0.0000 <0.05. So an increase in investment of 1 billion rupiah will increase GDP by 814.3425 US dollars.

The F test which looks at the effect of independent variables simultaneously affecting the dependent variable in this study shows the results that the road infrastructure variable, the labor variable, and the Domestic Investment (DI) variable together have a significant effect on Gross Domestic Product (GDP) which is indicated by the probability value of the f-statistic smaller than the alpha level of 0.000000 <0.05. From these results, the long-term model in this study can be used to predict Indonesia's economic growth or in other words, the overall independent variable is able to explain the dependent variable significantly.

To show how much the independent variable explains the dependent variable, the Coefficient of Determination (R2) test is carried out, and in this study the coefficient of determination shows a value of 0.994058, which means that 99% of economic growth is influenced by Road Infrastructure (RI) variables, Labor (L) variables, and Domestic Investment (DI) variables. While the remaining 1% is explained by other variables.

3.4. Short-Term Model Estimation

The short-term regression model in this study uses the second difference and uses the Error Correction Term (ECT) variable.

Table 4. Short-Term Model Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.		
C	-6.29E+08	4.05E+09	-0.155574	0.8779		
D(RI,2)	-410405.0	352210.8	-1.165226	0.2576	R-squared	0.396842
D(L,2)	867.6489	1787.855	0.485302	0.6327	F-statistic	3.289701
D(DI,2)	440.6001	281.9302	1.562799	0.1338	Prob(F-statistic)	0.031661
ECT(-1)	-3.06E+11	1.02E+11	-3.002818	0.0070		

The three variables, namely the second difference of the road infrastructure variable, the labor variable, and the Domestic Investment (DI) variable, do not significantly affect Indonesia's economic growth in the short term. Where it can be seen in Table 4, that the t-statistic probabilities of the three variables have values of 0.2576, 0.6327 and 0.1338, where these values are greater than alpha 0.005 (5%).

Furthermore, the probability value of Error Correction Term (ECT) is greater than the alpha level of 0.0070 <0.05 which indicates that the Error Correction Model (ECM) used is valid.

The F test which looks at the effect of independent variables simultaneously affecting the dependent variable in this study shows the results that the road infrastructure variable, the labor variable, and the Domestic Investment (DI) variable together have a significant effect on Gross Domestic Product (GDP) in the short term, which is indicated by the probability value of the f-statistic smaller than the alpha level of 0.031661 <0.05.

In addition, it can be seen that the coefficient of determination of the model shows how much the ability of the independent variables to explain the dependent variable. The coefficient of determination (R2) is 0.396842. This means that 39.7% of variations in Indonesia's economic growth can be explained by variations in the Road Infrastructure variable (RI), the Labor variable (L), and the Domestic Investment variable (DI). While the remaining 60.3% is explained by variables outside the model.

3.5. Clasical Assumption Test

a. Heteroscedasticity Test

The results of the heteroscedasticity test show that the Obs * R-squared probability value of 0.8502 is greater than the alpha level of 0.05 (5%), therefore it can be stated that in this research model there is no Heteroscedasticity.

Table 5. Heteroscedasticity Test Result

Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.288823	Prob. F(4,20)	0.8818
Obs*R-squared	1.365253	Prob. Chi-Square(4)	0.8502
Scaled explained SS	4.794503	Prob. Chi-Square(4)	0.3090

b. Multicollinearity Test

The multicollinearity test results show that the VIF value of all variables is less than 10, which means that this study is free from multicollinearity problems.

Table 6. Multicollinearity Test Result

Variable	VIF
C	NA
D(RI,2)	1.075483
D(L,2)	1.082699
D(DI,2)	1.074257
ECT(-1)	1.203660

c. Autocorrelation Test

The autocorrelation test results show that the Obs * R-squared probability value is 0.7154 this value is greater than the real level of 5 percent or 0.05. Therefore it can be stated that there is no autocorrelation problem.

Table 7. Autocorrelation Test Result

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.020697	Prob. F(2,18)	0.9795
Obs*R-squared	0.057360	Prob. Chi-Square(2)	0.9717

4. CONCLUSSION

Following the completion of the analysis, the conclusions can be categorized into two distinct timeframes. In the long term (4.1), it is evident that various factors hold sway over the economic landscape, the Road Infrastructure (RI) variable exhibits a lasting impact on Gross Domestic Product (GDP), similarly, the Labor Variable (L) and Domestic Investment (DI) variable manifest enduring relationships with Gross Domestic Product (GDP), Moreover, when considered collectively, the Road Infrastructure (RI), Labor (L), and Domestic Investment (DI) variables jointly wield a substantial influence on Gross Domestic Product (GDP) over the long term. Conversely, in the short term (4.2), a nuanced perspective emerges is individually, the Road Infrastructure (RI), Labor (L), and Domestic Investment (DI) variables do not exert significant influence on Indonesia's economic growth, however, their combined effect becomes apparent, as together, these variables significantly impact Gross Domestic Product (GDP) in the short term.

The variables that have been analyzed which include road infrastructure variables, labor variables, and Domestic Investment (DI) variables show an effect on economic growth, so it would be better if development and development towards a better direction can be carried out so that the variables that have been analyzed can make a maximum contribution to Indonesia's economic growth.

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