



The Effect of Investment and Technology on Economic Growth In Sulawesi

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Abstract. Economic growth is an important indicator that reflects the progress of the development of a region. Investment and technology are important factors in economic growth. This study aims to analyze the influence of investment and technology on economic growth in Sulawesi. The data analysis in this study uses multiple linear regression analysis using SPSS software version 27. The results of the study partially show that Domestic Investment (DI) does not have a significant effect on economic growth. This is due to the inequality in the distribution of economic benefits, the lack of development of the downstream sector, the low absorption of local labor, and infrastructure constraints. Foreign Investment (FDI) has a significant positive impact on economic growth. As foreign investment is focused on strategic sectors such as mining and nickel processing, which provide high added value Technology has a significant negative effect on economic growth. The digital divide in Sulawesi is also one of the factors that affect the negative impact of technology on economic growth, while simultaneously these three variables have a significant effect on economic growth. This means that the combination of domestic investment, foreign capital, and technology has increased productivity, created jobs, and advanced strategic sectors.

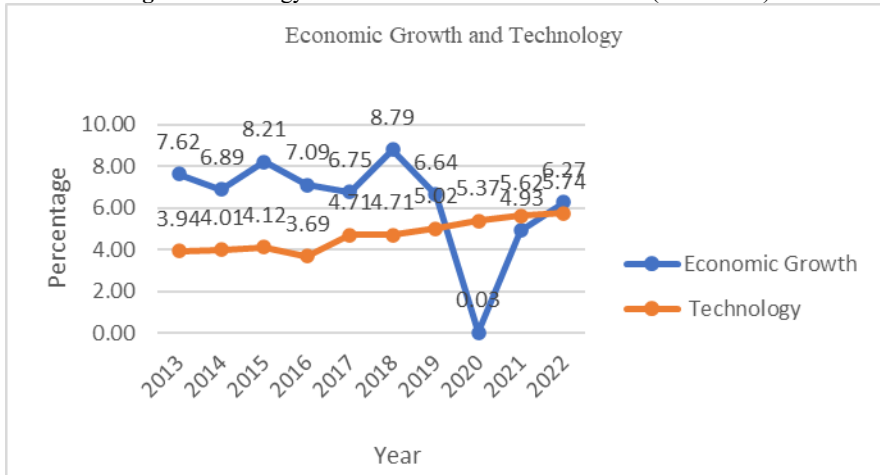
Keywords: investment, technology, economic growth, Sulawesi

1 Introduction

Economic growth is an important indicator that reflects the progress of the development of a region. Investment and technology are also important factors in economic growth. Endogenous economic growth theory explains that long-term economic growth can be explained by internal factors in the economic system, not only by external factors or government policies [1]. Economic growth is measured through an increase in gross domestic product (GDP) and is determined by capital accumulation, technological advancements, and population growth [2]. Sulawesi, which consists of six provinces, is one of the regions included in the MP3EI corridor (Master Plan for the Acceleration and Expansion of Indonesian Economic Development), making the Sulawesi economic corridor part of domestic and global connectivity. In 2022, the economic growth of all island groups was recorded as conducive despite being overshadowed by global geopolitical pressures due to increased community activities during COVID-19 [3]. The development of

technology and economic growth in Sulawesi over 10 years (2013-2022) have fluctuated. This can be seen in Figure 1.1. below :

Fig. 1. Technology and Economic Growth in Sulawesi (2013-2022)



Source: BPS (data processed)

In 2018, Sulawesi's economic growth experienced a significant increase of 2.04 points from 2017. However, in 2020 Sulawesi's economic growth experienced a very drastic decline of 6.61 points. The difference is seen in technological developments, in 2018 it was 4.71% and increased by 0.31 points in 2019 and 0.35 points in 2020. In some periods, it can be seen that technological developments are inversely proportional to economic growth. When technological developments rise, economic growth decreases. In addition, economic growth is also influenced by investment growth in the region. According to [4] Capital limitations are a challenge in achieving optimal growth. Likewise [5] states that the role of public investment is a determining factor in economic growth. The development of the investment value of Domestic Investment (DI) and Foreign Direct Investment (FDI) in Sulawesi during the period 2013-2022 looks very different from year to year (see Figure 2).

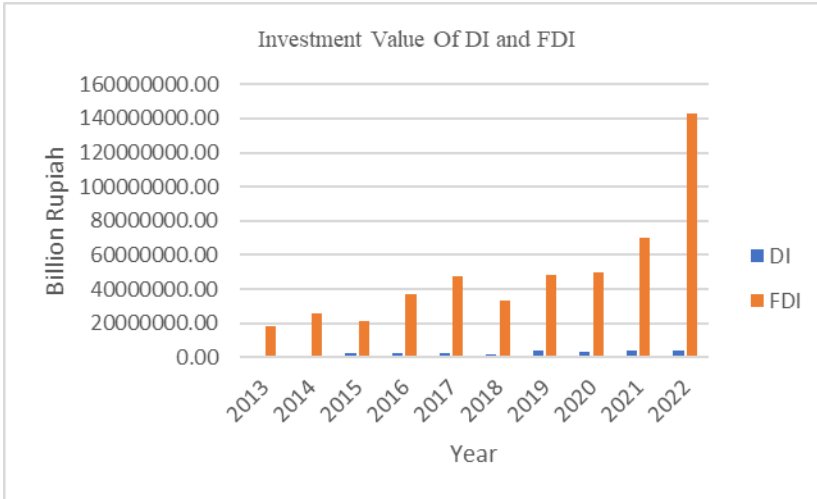


Fig. 2. Investment Value of DI and FDI in Sulawesi

Source: BPS (data processed)

Economic growth is an economic problem in the long term. Economic growth also explains the achievements of a country/region's economic development from period to period. Endogenous growth theory states that factors such as investment in research and development (R&D), knowledge accumulation, and learning by organizations play an important role in increasing productivity and innovation. In other words, investments in human resources, infrastructure, and technology not only increase output in the short term but also create internal mechanisms that drive sustainable economic growth. Research [6] shows that domestic investment contributes directly to increased production capacity and economic growth. Likewise, technological developments show that advances in information and communication technology (ICT) can increase productivity and innovation. Indonesia's moderate increase in economic growth (5-7%) was influenced by increased domestic investment[7]. This shows the potential to achieve more stable growth. Domestic investment also has a positive and significant effect on economic growth. The higher the investment, the greater its contribution to increasing economic output [8].

Increased foreign and domestic investment contributes to economic growth by creating jobs, improving technology, and improving infrastructure. While there is a wealth of theoretical and empirical evidence suggesting FDI can drive growth, the results have varied widely. About 43% of the studies reviewed showed positive and significant effects, while 17% showed negative effects [9] [10]. Some research results also show that *Foreign Direct Investment* (FDI) has an insignificant impact such as [11] [7] [12]. This is due to the inadequate quality of human resources to absorb the benefits of the investment. In addition, the government also needs to maintain economic stability and create conditions that support foreign investment. There is a positive relationship between infrastructure investment and economic growth, especially in the medium term. Various studies show that infrastructure investment

can increase productivity and growth. However, it is important to make wise investments because over-investing can result in unproductive projects [13].

In addition to investment, technological developments also have an impact on economic growth. Technological change is the main driver of economic growth and social welfare. Although technology increases income levels and creates new jobs, it can also eliminate jobs and create uncertainty in the world of work [2]. Therefore, the importance of education in preparing a skilled workforce to face this change is highly emphasized. Nonetheless, governments must maximize the benefits of technological advancements while minimizing their negative impacts to achieve sustainable growth. *The World Economic Forum* identifies the economic impacts of ICTs, including job creation and contribution to GDP growth. However, there is skepticism about how significant the impact of ICT spending will be on GDP growth, especially in developing countries [14]. Research on the impact of information and communication technology (ICT) on economic growth in developing countries, particularly in the MENA (Middle East and North Africa) and SSA (Sub-Saharan Africa) regions [15] shows that the use of various communication technologies, such as mobile phones, internet usage, and broadband adoption, are the main drivers of economic growth. Likewise, [12] states that a 1% increase in internet and mobile phone users can significantly increase gross domestic product (GDP). Although some studies show the positive impact of technology on economic growth, other studies show that the decline in the post-crisis economic growth rate is an effect of technology [16].

2 Method

This study uses secondary data in the form of annual data for the period from 2013 to 2022. This data was collected from the official website of the Central Statistics Agency of Indonesia. The number of samples used was 60 samples. However, there are outlier data so there are 51 samples left. This research is a type of quantitative research that involves the use of numerical data and statistical analysis. The data analysis used was multiple linear regression analysis using SPSS software. This method is used to analyze the influence of independent variables on dependent variables. In this study, the independent variables are Domestic Investment (DI), Foreign Direct Investment (FDI), and Technology. The dependent variable is economic growth, either partially or simultaneously.

3 Result

3.1 Descriptive Statistics

This study uses descriptive statistics to provide information on Domestic Investment (DI), Foreign Direct Investment (FDI), and technology. Table 1 shows a list of descriptive research variables of 51 samples (see Table 1). Before testing the hypothesis using regression analysis, a classical assumption test was first carried out in the form of normality, multicollinearity, and heteroscedasticity tests. The normality test uses a descriptive test with the normal curve of P-P Plots. Based on the results of the normality test (see Figure 3), it is found that the economic growth variables are

distributed normally because the data points are distributed around the diagonal line, and the distribution is in line with the diagonal line.

Table 1. Descriptive statistics

	Mean	Std. Deviation
Economic Growth	6.2933	1.55739
DI	7.1759	1.39821
FDI	14.4576	1.91548
Technology	4.6082	.79077
	Mean	Std. Deviation

Source: SPSS Output, 2024

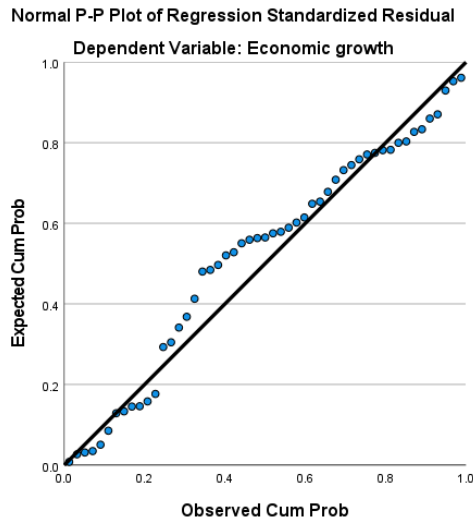


Fig. 3. Normality Test

Source: SPSS Output, 2024

The results of the multicollinearity test showed that the tolerance value was greater than 0.100 and the VIF was less than 10, so there were no symptoms of multicollinearity. Furthermore, the results of the heteroscedasticity test show that there is no heteroscedasticity, which can be seen in Figure 4 below :

Table 2. Multicollinearity Test

Coefficients			
Model		Collinearity Statistics	
		Tolerance	VIF
1	DI	.664	1.506
	FDI	.711	1.406
	Technology	.735	1.361

a. Dependent Variable: Economic growth

Source :
SPSS Output, 2024

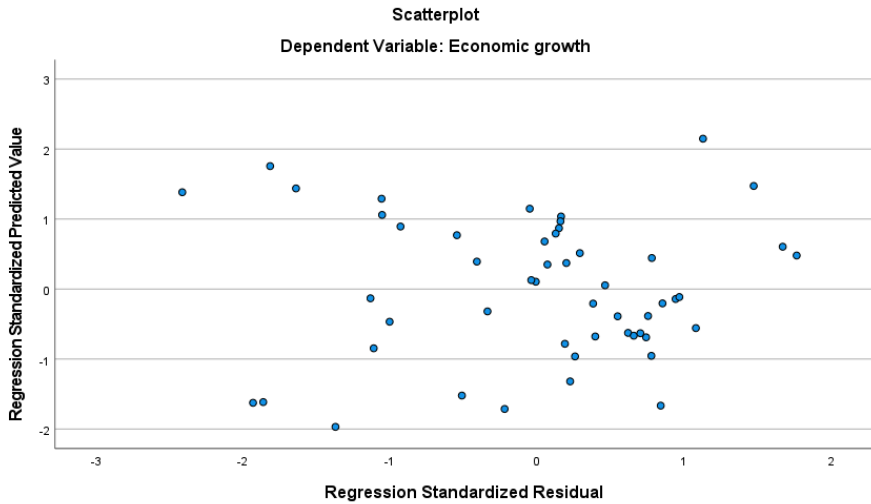


Fig. 4. Heteroscedasticity Test

Source:SPSS Output, 2024

3.2 Multiple Linear Regression Analysis

Based on the results of the regression analysis (see Table 3), results in the following equation :

$$\text{Economic Growth} = 8.633 + 0.154X_1 + 0.267X_2 - 1.587X_3$$

Table 3. Multiple Linear Regression Analysis

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.633	1.319		6.544	.000
	DI	.154	.141	.138	1.092	.280
	FDI	.267	.100	.329	2.685	.010
	Technolo	-	.237	-.806	-	.0

gy	1.587			6.686	00
a. Dependent Variable: Economic Growth					

Source: SPSS Output, 2024

The results of data processing show that the constant value of economic growth is 8,633. This shows that if the value of the variable coefficients of Domestic Investment (DI), Foreign Direct Investment (FDI), and Technology is 0, then economic growth will reach 8,633%. Partially, the Domestic Investment (DI) variable showed a significance value of 0.280 (> 0.05) which means that the variable had a positive but not significant effect on economic growth. The Foreign Investment (FDI) variable shows a significance value of 0.010 (< 0.05) which means that this variable has a significant effect on economic growth. Meanwhile, the Technology variable has a negative beta value with a significance value of 0.000 (< 0.05) which means that this variable has a negative and significant effect on economic growth.

3.3 Coefficient of Determination Test

Based on the results of statistical analysis, the value of the Adjusted R Square is 0.498 (see Table 4). This shows that the influence of the variables of Domestic Investment (DI), Foreign Investment (FDI), and Technology on the economic growth variable is 49.8%. Other factors not included in this study can contribute to 50.2%.

Table 4. Coefficient of Determination Test

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.706 ^a	.498	.466	1.13779
a. Predictors: (Constant), Technology, FDI, DI				
b. Dependent Variable: Economic Growth				

Source: SPSS Output, 2024

3.4 Simultaneous Tests (F-test)

Based on the results of simultaneous analysis, a calculated F value (15,560) was obtained with a significance level of $0.000 < 0.05$ (see Table 5). This shows that independent variables, namely Domestic Investment (DI), Foreign Direct Investment (FDI), and Technology, simultaneously affect economic growth (Y).

Table 5. Simultaneous Tests

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Significance

1	Regressi on	60.429	3	20.143	15.5 60	.0 00 ^b
	Residual	60.844	4 7	1.295		
	Total	121.273	5 0			
a. Dependent Variable: Economic Growth						
b. Predictors: (Constant), Technology, FDI, DI						

Source: SPSS Output, 2024

4 Discussion

Based on the results of statistical tests (t-test) conducted to analyze the extent to which each independent variable, such as Domestic Investment (DI), Foreign Investment (FDI), and Technology affect economic growth in Sulawesi. Under constant assumptions, the coefficient value describes the influence of Domestic Investment (DI), Foreign Investment (FDI), and Technology on economic growth in Sulawesi. The positive value shows that the increase in economic growth resulting from the coefficient value is not influenced by independent variables but by factors outside the scope of the model. The absence of Domestic Investment (DI), Foreign Investment (FDI), and Technology causes economic growth in Sulawesi to increase. The negative value shows that the existence of independent variables does not affect Indonesia's economic growth. The coefficient represents the amount of economic growth that is influenced by independent variables.

4.1 The Effect of Domestic Investment (DI) on Economic Growth

According to the findings of the study, Domestic Investment (DI) has a positive but not significant impact on economic growth in Sulawesi. This can be seen from the results of the statistical test which shows that the significance value is 0.280 (greater than 0.05). This shows that the increasing Domestic Investment Growth (DI) from year to year has not been able to fully affect the increasing economic growth. According to endogenous economic theory, economic growth is not only influenced by the amount of capital but also by other factors such as human resources and technology. This is in line with research conducted by [17] which linked the influence of Domestic Investment (DI) on economic growth which showed insignificant results due to inadequate infrastructure and other external factors. In contrast to research [6] [4] and [18] which state that increasing domestic investment contributes to economic growth in Indonesia by creating jobs, improving technology, and improving infrastructure.

The growth of Domestic Investment (DI) in Sulawesi has had a positive influence, especially in the development of strategic sectors such as mining and plantations. However, the impact is not significant on overall economic growth due to the inequality in the distribution of economic benefits, which means that most of the benefits from Direct Investment, especially in the mining and plantation sectors, are

not evenly distributed to local communities, the lack of development of the downstream sector, the low absorption of local labor, and infrastructure and human resource (HR) constraints.

4.2 The Effect of Foreign Investment (FDI) on Economic Growth

The results of the analysis show that Foreign Investment (FDI) positively affects economic growth, both partially and simultaneously. This can be seen from the results of statistical tests which show that the significance value is $0.010 (< 0.05)$. Since the hypothesis states that Foreign Investment (FDI) has a significant influence on economic growth in Sulawesi, these findings suggest that the hypothesis is accepted. Foreign Investment (FDI) is an important driver of productivity and economic growth. This is because Sulawesi is the center of global mining investment, especially in the extraction and processing of nickel, copper, and other metals that are urgently needed in the battery and electric vehicle industries. This industry is found in Central Sulawesi and Southeast Sulawesi.

In addition, the technology brought by foreign companies is often more sophisticated than that of domestic companies, thus increasing overall productivity. In addition, Foreign Investment (FDI) also contributes to improving the quality of local human resources (HR) through training and technology transfer programs, which has an impact on improving the ability of local workers in Sulawesi. This is in line with research conducted by [4][6] and [13] which shows that the existence of foreign investment affects economic growth. The results of this study are different from the findings [11] which state that foreign investment does not contribute significantly to economic growth.

4.3 The Effect of Technology on Economic Growth

Technology has a significant impact on economic growth in Sulawesi, according to research findings. This can be seen from the results of the statistical test which shows that the significance value is $0.000 (< 0.05)$. Although it has a significant effect, technology is statistically negatively correlated with economic growth in Sulawesi. This means that when technology increases, economic growth decreases in Sulawesi. Capital-intensive technologies used in key sectors in Sulawesi, such as mining and processing industries, often replace human labor with machines and automation. This negative impact can be seen in the reduction of employment for local communities, especially for low- or middle-skilled jobs. This leads to structural unemployment, where local workers who do not have high skills cannot be absorbed in industries that are increasingly dependent on technology.

The digital divide in Sulawesi is also one of the factors that affect the negative impact of technology on economic growth. Although some industrial areas in Sulawesi are experiencing technological advancements, many rural areas are still lagging in access to the internet, telecommunications infrastructure, and information technology. This gap makes underdeveloped regions experience delays in digital transformation, hampers local economic potential, and widens the gap between more developed and underdeveloped regions.

This is in line with research [16] which found a negative impact of technology on economic growth in Sulawesi. This finding is different from [15] and [2] which state that technology has a positive impact on economic growth, technology increases productivity and reduces costs.

5 Conclusion

Based on the results of research that has been conducted to analyze factors that affect economic growth in Sulawesi, it can be concluded that the Domestic Investment (DI) variable has a positive but not significant effect on economic growth, the foreign investment variable (FDI) has a positive and significant effect on economic growth while technology has a negative and significant effect on economic growth in Sulawesi. Thus, this can be a policy-making material for local governments to further optimize the impact of Domestic Investment (DI) by diversifying the investment sector and improving infrastructure and connectivity. Foreign Investment (FDI) that has a positive impact to be more inclusive and sustainable, should be transferred to technology and involve more local Human Resources (HR). Solutions to overcome the negative impact of technology on the economy in Sulawesi by improving the quality of local human resources, effective technology transfer, narrowing the digital divide, and sustainable technology regulation. Based on the results of this study, further research can add other variables related to labor absorption, non-economic factors, or mediator or intervening variables to get a broader picture of the factors that affect economic growth, especially in Sulawesi.

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