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Analysis of the Effect of Domestic Investment (PMDN), Number of Industrial Sectors, and Population on Gross Regional Domestic Product

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Abstract: This study examines the impact of Domestic Direct Investment (PMDN), the number of industrial sectors, and the population on the GRDP of Sidoarjo Regency in the 2010-2023 period. Using a quantitative approach and multiple linear regression. The results of the study indicate that simultaneously the variables PMDN, the number of industrial sectors, and the population have a significant positive effect on the GRDP of Sidoarjo Regency. Together, these three variables have a significant impact on GRDP, but individually only the number of industrial sectors and the population have a significant impact on GRDP. This study recommends strengthening investment efficiency through supporting policies, maximizing the role of industry, and demographic management to support sustainable economic growth in Sidoarjo Regency.

Keywords: PMDN, Number of Industrial Sectors, Population, GRDP

Introduction

Economic development is a top priority for every country and region, with the goal of Regional economic growth being one of the main indicators in assessing development success, which is generally measured through Gross Regional Domestic Product (GRDP). GRDP plays a role in describing production capacity, economic structure, and the level of community welfare in a region (Kuncoro in Aldona et al., 2021) . Sidoarjo Regency as one of the centers of economic growth in East Java shows fluctuating GRDP development, particularly a significant decline in 2020 due to the Covid-19 pandemic before recovering again the following year. This condition emphasizes the importance of evaluating the factors that influence the dynamics of regional GRDP to maintain sustainable economic growth (BPS, 2021) .

One of the main factors influencing regional economic growth is domestic investment, or Domestic Direct Investment (PMDN). PMDN plays a role in increasing production capacity, expanding employment, and strengthening the regional economic structure. In Sidoarjo Regency, PMDN experienced sharp fluctuations, particularly during the pandemic, but has shown a recovery trend since 2022. Previous empirical findings by (Akbar, 2022)

indicate that PMDN has a positive and significant impact on regional economic growth, thus changes in PMDN in Sidoarjo are suspected to directly contribute to year-to-year variations in GRDP.

In addition to investment, the industrial sector is also a crucial pillar of the Sidoarjo Regency economy. The number of large and medium-sized industrial sectors has shown a significant increase post-pandemic, strengthening Sidoarjo's position as the second-largest industrial region in East Java after Surabaya. The manufacturing industry has high added value and plays a strategic role as a driver of economic growth, as explained by Wahyuni & Satriawan (2023) , who noted that the development of the manufacturing sector has consistently made a significant contribution to the increase in East Java's GRDP.

Demographic factors also play a significant role in regional economic dynamics. Sidoarjo Regency has a large proportion of the working-age population, which can contribute to increased productivity and aggregate demand. However, a high population also has the potential to create an economic burden if not balanced by adequate labor absorption. Research (Tumaleno et al., 2022) shows that population growth has a significant impact on GRDP, but its effect is highly dependent on the quality of human resources and job availability. Therefore, the simultaneous influence of domestic investment (PMDN), the number of industrial sectors, and population is important to analyze to comprehensively understand the determinants of GRDP growth in Sidoarjo Regency.

THEORETICAL BASIS

Gross Regional Domestic Product (GRDP)

GRDP is a benchmark used to describe the economic condition of a region within a specified period, either based on current prices (ADHB) or constant prices (ADHK). Simply put, GRDP shows the value generated by the activities of all business actors in the region. GRDP ADHB is calculated using current-year prices, thus demonstrating changes in economic structure over time. Meanwhile, GRDP ADHK uses prices from a specific base year to assess economic growth between years and quarters (BPS, 2021) .

Classical Growth Theory

Classical economics is a school of modern economic thought. This theory first developed in the 18th and 19th centuries, pioneered by Adam Smith, who argued that the economy would function well if the government did not interfere in market activities. Furthermore, according to Smith, a nation's prosperity stems from a productive workforce.

According to (Rahardja & Manurung, 2019) , there are four main factors of economic growth according to classical economists: population, availability of capital goods, territorial size, and abundant natural resources. Of these factors, classical economists place

greater emphasis on population growth.

Neoclassical Theory

Neoclassical growth theory was developed by Solow (1956), who emphasized that economic growth originates from three sources: increased capital, labor availability, and technological progress. According to Todaro & Smith (2006), this theory is a development of the Harrod-Dommar capital theory, which adds labor and technology as primary sources.

Investment

According to (Rahardja & Manurung, 2019), investment is a flow concept calculated over a specific time period. Investment can influence the availability of capital goods in the future. This means that increased capital goods originate from investments made in the previous period. According to macroeconomic theory, Gross Regional Income (GDP) can be calculated by adding all variables, including investment. Investment itself has a significant influence on the economic growth of a region or country (Maisaroh & Risyanto, 2018) .

Domestic Investment (PMDN)

According to Meilaniwati & Tannia (2021), domestic direct investment (PMDN) is a form of investment aimed at driving national economic growth. One of PMDN's most important contributions is as a source of state revenue because it maximizes the utilization of domestic wealth. Domestic investment is also considered effective in accelerating economic growth; a sustained increase in investment will have a positive impact on overall economic development (Kambono, 2020).

Keynesian Theory

According to Keynes's investment theory, the Marginal Efficiency of Capital (MEC) and the real interest rate are important factors. MEC is an investor's estimate of the return on an investment. Meanwhile, the real interest rate is the cost of borrowing adjusted for inflation (Sudirman & Alhudhori, 2018) . Furthermore, Keynes believes that investment is influenced by several factors, such as the current state of the economy, anticipated future changes, and the reach of technology.

Harrod-Dommar Theory

The Harod-Domar theory emphasizes the importance of capital investment in increasing economic development, as investment can increase capital, which in turn increases output. According to Todaro & Smith (2006) , if the government does not invest, economic growth will be affected by two factors: savings and effective capital use.

Industry

According to (Putra et al., 2021) , industry has two meanings. Broadly, it can be interpreted as an industry that encompasses all optimal economic activities. Narrowly, industry is the activity of processing raw materials into semi-finished or finished products using mechanical, chemical, or manual means. This activity can increase the value of less valuable goods into high-value ones, so they can be used by end consumers. Rostow's theory, put forward in 1960, emphasized the importance of industry in economic development. During this take-off stage , the industrial revolution occurred, encompassing significant changes in production methods. At this stage, there are three important interrelated factors: first, an increase in productive investment by 5-10% of total national income, and second, the rapid development of the manufacturing sector. The first and second prerequisites are interrelated, as productive investment can drive the growth of the manufacturing sector, which in turn can increase overall economic growth. Third, the establishment of a supportive political, social, and institutional framework. This third prerequisite must be met to achieve the first and second prerequisites (Bagus Hermansyah, 2023).

Total population

According to (Yenny & Anwar, 2020), population can be defined as a group of individuals residing in a given area for a specific period of time. Meanwhile, according to (Andrianti, 2021) , residents are individuals who reside in a given area, follow applicable rules, and engage in ongoing social interactions. In sociology, population refers to individuals who occupy a specific space and shape patterns of social interaction.

Neo-Malthusian Theory

According to Garrett Hardin (Ministry of Education and Technology), everyone prioritizes personal interests, especially when it comes to resources. This can lead to a general disaster. If individuals freely utilize resources without considering the public interest, these resources will be overexploited, leading to depletion and harm to many. Meanwhile, Paul Ehrilc stated that the world is overpopulated and food supplies are scarce, leading to environmental damage.

Research Method

This study applies a quantitative approach that relies on numerical data at the stage of data collection, interpretation, and presentation through graphs, tables, and diagrams to provide ease of understanding (Machali, 2021) . The aim is to determine the real impact of Investment (X1), Number of Industrial Sectors (X2), and Population (X3) GRDP (Y) of Sidoarjo Regency for the period 2010-2023 using multiple regression analysis with the IBM SPSS version 27 application. This multiple linear regression model models the relationship between variable Y and the three variables X. The following multiple regression equation is obtained:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + e$$

Information:

Y = GRDP
a = Constant Value
$\beta_1 X_1$ = Magnitude of Investment Regression Coefficient
$\beta_2 X_2$ = Magnitude of Regression Coefficient Number of Sectors
$\beta_3 X_3$ = Size of Population Regression Coefficient
e = Error

Results and Discussion

Classical Assumption Test

a) Normality Test

Normality testing was performed using the One Sample Kolmogorov-Smirnov Test and analysis using a P–P Plot to assess the normality of the distribution in the study. The results of the normality test can be seen below:

Table 1. Results of the Kolmogorov-Smirnov Normality Test

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			14
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		.12078920
Most Extreme Differences	Absolute		.198
	Positive		.160
	Negative		-.198
Test Statistic			.198
Asymp. Sig. (2-tailed)[c]			.143
Monte Carlo Sig. (2-tailed)[d]	Sig.		.142
	99% Confidence Interval	Lower Bound	.133
		Upper Bound	.151

Source: SPSS output

Referring to Figure 4.1, the Asymp. Sig. (2-tailed) value obtained is 0.143 > 0.05. Thus, the data is declared normally distributed and meets the normality test criteria. This result is also supported by the graphic display, where the distribution of points can be seen following a diagonal line.

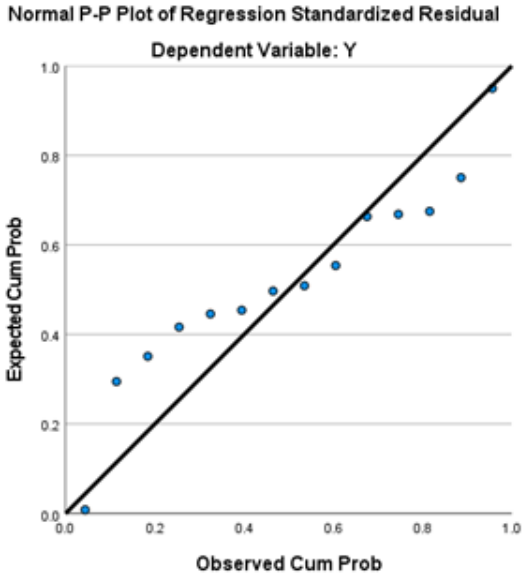

Figure 1. Normal PP Plot Graph
Source: SPSS output

b) Multicollinearity Test

This test aims to see the significant correlation between independent variables in the regression model, which can be assessed using the Variance Inflation Factor (VIF) value as a reference.

Table 2. Multicollinearity Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-90.018	25.902		-3.475	.006		
	X1	-.254	.118	-.699	-2.155	.057	.311	3.215
	X2	3.597	.857	.929	4.197	.002	.667	1.500
	X3	4.769	1.459	1.093	3.269	.008	.293	3.418

Source: SPSS output

From the results in Figure 4.3, it can be seen that the tolerance value is > 0.10 and VIF < 10. This shows that there is no multicollinearity between the independent variables in the model.

c) Autocorrelation Test

The aim is to examine the patterns of relationships between research data observed and analyzed in a series, both spatially and temporally. Autocorrelation can be seen through the Durbin-Watson (DW) value, shown below.

Figure 2. Durbin Watson curve

Based on the analysis results above using the Durbin Watson curve , the result of 1.525 is in the area between dL = 0.7667 and Du = 1.7788, so it can be concluded that the value is quite close to the number 2, so this model does not experience serious autocorrelation problems, although the value is smaller than 2 which indicates a tendency for weak positive autocorrelation. However, this value is still in the permissible category.

d) Heteroscedasticity Test

The aim was to determine whether these problems existed in the research model. This study used a scatterplot graph. The following are the results of the heteroscedasticity test:

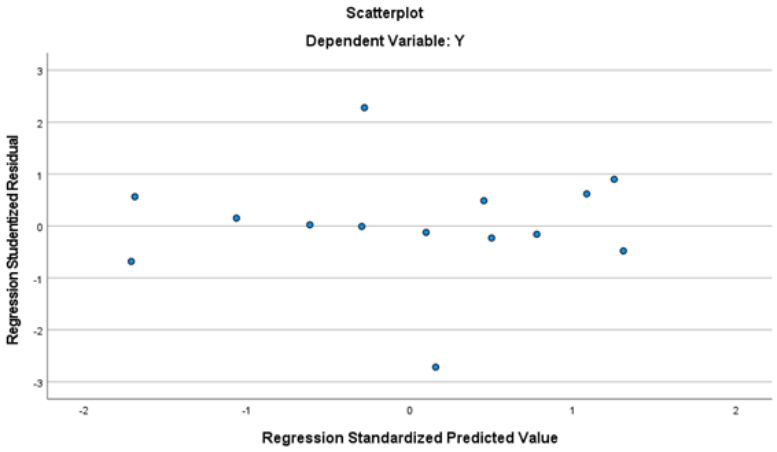

Figure 3. Heteroscedasticity Test Results

Source: SPSS output

The test results show that the points are randomly distributed around the zero line and do not form any particular pattern. Therefore, the variables in this study can be declared free from heteroscedasticity.

e) Coefficient of Determination Test (R 2)

Used to assess the suitability between the estimated values by the regression model and the sample data. The following test results are presented in the following table:

Table 3. Results of the Determination Coefficient

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.820[a]	.673	.575	.13772	1.525

a. Predictors: (Constant), X3, X2, X1

b. Dependent Variable: Y

Source: SPSS output

Based on the coefficient of determination output above, the result is 0.673, or 67.3%. This means that 67.3% of the GRDP (Y) variable can be explained by investment (X1), the number of industrial sectors (X2), and the population (X3). Meanwhile, the remaining 32.7% (100%-67.3%) is influenced by other factors.

f) Simultaneous Test (F Test)

This test is conducted to assess whether all independent variables impact the dependent variable. The following are the results of the simultaneous test:

Table 4. Simultaneous Test Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.391	3	.130	6.865	.009[b]
	Residual	.190	10	.019		
	Total	.580	13			

Source: SPSS output

With the calculation results, the F table value obtained is 3.71. Because the calculated F of 6.865 is greater than the F table (6.865 > 3.71) and the significance level of 0.009 is less than 0.05, it can be concluded that the three independent variables of investment (X1), the number of industrial sectors (X2), and the number of residents (X3) together have a positive influence on the dependent variable GRDP (Y).

g) Partial Test (t-Test)

This test is used to assess the extent to which each independent variable has a significant impact on the dependent variable. The results of the partial test are presented in the table below:

Table 5. Partial Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-90.018	25.902		-3.475	.006		
	X1	-.254	.118	-.699	-2.155	.057	.311	3.215
	X2	3.597	.857	.929	4.197	.002	.667	1.500
	X3	4.769	1.459	1.093	3.269	.008	.293	3.418

Source: SPSS output

1. The calculated t-value of -2.155 is greater than the t-table of -2.228, and the significance value of 0.057 is greater than 0.05. This indicates that the investment variable has no partial influence on the GRDP of Sidoarjo Regency.
2. The calculated t-value of 4.197 is greater than the t-table of 2.228, and the significance value of 0.002 is less than 0.05. Thus, the number of industrial sectors is proven to have a partial positive effect on the GRDP of Sidoarjo Regency.
3. The calculated t-value of 3.269 is greater than the t-table of 2.228, and the significance value of 0.008 is below 0.05. This indicates that population size has a partial positive influence on the GRDP of Sidoarjo Regency.

The Influence of Domestic Direct Investment (PMDN) on the Gross Regional Domestic Product (GRDP) of Sidoarjo Regency

The results of the study indicate that domestic direct investment (PMDN) has no significant effect on the GRDP of Sidoarjo Regency, in line with the findings (Cahyono, 2017) that the effectiveness of domestic direct investment is often hampered by suboptimal infrastructure and the long-term nature of projects whose impacts are only visible after they are operational. This condition is also reflected in Sidoarjo, where a number of large projects are still under construction and therefore have not yet made a direct contribution to regional added value. From the perspective of neoclassical growth theory, capital accumulation must go hand in hand with improvements in the quality of the workforce and technology, while Sidoarjo's labor-intensive economic structure suggests that labor productivity plays a greater role in driving short-term growth. Nevertheless, domestic direct investment (PMDN) still has strategic potential to support long-term growth if supported by increased efficiency of production factors and optimal infrastructure completion.

The Influence of the Number of Industrial Sectors on the Gross Regional Domestic Product (GRDP) of Sidoarjo Regency

The variable of the number of industrial sectors has been proven to have a significant influence on the GRDP of Sidoarjo Regency in the period 2010–2023. This finding is in line with Rostow's theory of economic growth, which emphasizes the role of industrialization as a key driver of productivity, job creation, and growth acceleration during the take-off stage. The results of this study are also consistent with (Wahyuni & Satriawan, 2023) , which shows that increasing the capacity and productivity of the industrial sector contributes directly to regional economic growth. As one of the industrial centers in East Java, the diversity and rapid development of the processing industry in Sidoarjo—supported by adequate investment and infrastructure—has strengthened local economic performance, created a multiplier effect for the trade, transportation, and service sectors, and maintained stable economic growth amidst global economic dynamics.

The Influence of Population on the Gross Regional Domestic Product (GRDP) of Sidoarjo Regency

The population variable has been shown to have a significant impact on the GRDP of Sidoarjo Regency during the 2010–2023 period, in line with (Wicaksono et al., 2021) which shows that an increase in the productive-age population can drive consumption, production, and economic activity by expanding the demand for goods and services. As part of the Gerbangkertosusila area and the Surabaya buffer zone, Sidoarjo's population growth not only adds to the workforce but also expands the consumer base that supports the development of the industrial, trade, and service sectors. However, population growth requires appropriate development policies to avoid putting pressure on infrastructure and public services. From a Neo-Malthusian perspective, population growth must be balanced with increased resource capacity to avoid an imbalance between the need for and the availability of economic and social facilities. Therefore, population management oriented towards sustainability is key to regional economic growth.

Conclusion

Based on the analysis of research data, the following conclusions were obtained, namely that during the 2010–2023 period, Domestic Investment (PMDN) did not have a significant impact on the GRDP of Sidoarjo Regency. This finding suggests that variations in PMDN during this period have not been able to provide a real boost to increasing the added value of the regional economy. Conversely, the number of industrial sectors has been shown to have a significant impact on GRDP, confirming that industrial development is the main driver of local economic activity. In addition, population size also has a significant

impact on GRDP, indicating that changes in population, especially the productive age group, contribute to increasing production capacity and aggregate demand, thus impacting the economic growth of Sidoarjo Regency.

Suggestion:

1. For the government, it is necessary to improve licensing facilities, investment incentives, industrial infrastructure, and cooperation with business actors to strengthen capacity and technology transfer.
2. For further researchers, it is recommended to conduct comparisons between regions, add research variables, and expand the period and data sources so that the analysis results are more comprehensive.

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