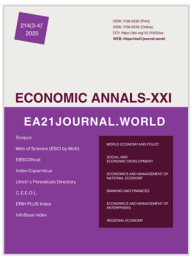

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Analysis of economic growth influenced by industrial development, investment and labor in Southeast Sulawesi Province of Indonesia

Abstract. Quality economic growth is key to improving public welfare in Indonesia. This study aims to analyze the influence of industry, investment, and labor on economic growth in Southeast Sulawesi Province of Indonesia for the period 1999-2018. The research method uses a quantitative and qualitative descriptive approach and official secondary data. The analysis is conducted using the Autoregressive Distributed Lag (ARDL) model that is able to estimate short- and long-term relationships in mixed time series data. Stationarity, cointegration, and classical assumption tests are conducted to ensure model validity, followed by short-term analysis using the Error Correction Model (ECM). The results show that industry, investment, and labor have a positive effect on economic growth. The role of industry is significant in both the short and long term, while investment and labor have a positive but insignificant effect. These findings emphasize the importance of developing the industrial sector as a priority in driving sustainable economic growth in Southeast Sulawesi. Policies that support increasing the effectiveness of investment and labor are also needed to strengthen the contribution of both factors. The results of this study provide recommendations for local governments in formulating effective development strategies to improve public welfare evenly through quality economic growth.

Keywords: Economic Growth; Industry; Investment; Labor; Southeast Sulawesi
JEL Classifications: E24; E41; E64; I18; J28; J31
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1. Introduction and Brief Literature Review

A country's economic development must be continuously pursued to catch up with developed countries. Economic growth generally occurs when there is an increase in Gross Domestic Product (GDP) or Gross Regional Domestic Product (GRDP), which can be triggered by increases in physical capital, human resources, and the workforce. A region's economic growth does not occur automatically but is influenced by stimulus factors, including appropriate development policies and optimization of leading economic sectors. An important indicator of regional economic growth is the GRDP growth rate, which reflects the increase in the production of goods and services in the region. Hence, regional government strategies in pursuing economic development must be tailored to the potential and available resources (Tartiyus et al., 2015).

According to Kuznets in Tartiyus et al. (2015), economic growth is an increase in a country's long-term capacity to provide various economic goods to its population, which is determined by appropriate technological progress, institutions, and ideologies. Kuznets also emphasized the importance of productivity compared to population growth, as well as the importance of redistributing labor from less productive sectors such as agriculture to more productive manufacturing sectors (Furaijl et al., 2025). Meanwhile, a different view was put forward by Schumpeter who stated that economic growth is cyclical, does not always occur stably, and can experience ups and downs. In this condition, the term development also experienced a shift in meaning and appreciation, where in some conditions it was seen as part of the old regime that did not fully bring prosperity (Hayden, 2024).

In 2018, there were 1,788,875 working-age residents with a labor force participation rate (TPAK) of 69.78%, and 1,207,488 people were employed, mostly in the agricultural sector (35.42%) and as laborers/employees/staff (33.08%). The open unemployment rate (TPT) decreased to 3.26%, but still showed a gender gap, where female unemployment was higher (3.96%) than male unemployment (2.79%). Therefore, a strategy is needed to improve the quality of human resources through education, job training, provision of scholarships, and development of educational infrastructure and job training institutions.

Based on these conditions, there is an urgent need to conduct a systematic and in-depth study of economic development policy strategies aimed at creating quality economic growth to improve the welfare of the people of Southeast Sulawesi Province. This is in line with the findings of Geamanu (2012), who stated that with the rapid development of applied mathematics and econometric techniques, strategic models are needed to assess and test development phenomena, such as endogenous economic growth systems. These models are expected to shape effective and sustainable long-term development policies and strategies (Muh Nur et al., 2017; Sadeq et al., 2025).

This research is expected to provide both scientific and practical benefits. Scientifically, this research contributes to knowledge, particularly in the field of economics and studies related to increasing economic growth in Southeast Sulawesi Province. Practically, the research findings are expected to provide important information for the Southeast Sulawesi Provincial Government in formulating appropriate development policies, ensuring that the selected development alternatives can stimulate economic growth while improving the welfare of the community.

2. Method

This research method uses quantitative and qualitative descriptive approaches to analyze the influence of the industrial sector, investment, and labor on economic growth in Southeast Sulawesi Province. The study period covers the period from 1999 to 2018, with Southeast Sulawesi Province as the primary location for data collection and analysis.

The data used are secondary data obtained from various official institutions, including the Office of the Governor of Southeast Sulawesi Province, the Central Statistics Agency (BPS) of Southeast Sulawesi Province, the Regional Development Planning Agency (BAPPEDA) of Southeast

Sulawesi Province, and publications from Bank Indonesia of Southeast Sulawesi Province. The data includes various publications and reports from 1999 to 2018, and is supported by other literature relevant to the focus of the study. This study examines three main variable effect including Industry, Investment, workforce on economic growth. To analyze the relationship between these variables, an econometric approach using the Autoregressive Distributed Lag (ARDL) method was used. This model was chosen because it is capable of estimating long-term and short-term relationships in mixed time series data, both stationary at the level (I(0)) and first-order (I(1)). This model was then converted into log-linear form to produce more stable and efficient estimates.

The initial step in the analysis is to test the stationarity of the data using the unit root test. The goal is to ensure that all variables in the model have the appropriate degree of integration, namely I(0) or I(1). If a variable with a second-order degree of integration (I(2)) is found, then the ARDL method cannot be used. The hypotheses used in this test are ***H0:*** the data is non-stationary (contains a unit root) and ***H1:*** the data is stationary (does not contain a unit root).

Afterward, a cointegration test was performed using the bound testing approach to verify the existence of a long-term relationship between the variables in the model. Next, a classical assumption test was performed to ensure that the regression model met the Best Linear Unbiased Estimator (BLUE) criteria. This test included multicollinearity, autocorrelation, heteroscedasticity, and normality.

The next step is to determine the optimal lag length for each variable in the ARDL model using information criteria such as the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (SBC). After the lag is determined, the ARDL model is estimated and diagnostic tests are performed to assess its stability and validity. Finally, the analysis is conducted in two time dimensions. Short-term analysis is performed using the Error Correction Model (ECM) to assess the speed of adjustment to long-term equilibrium. Meanwhile, long-term analysis is used to examine the permanent influence of independent variables on economic growth in Southeast Sulawesi Province.

3. Results

Descriptive Analysis of Research Variables

This analysis aims to determine the general description of research variables related to the influence of the role of industry, investment and labor on economic growth in Southeast Sulawesi Province based on a time series for 20 years, namely the period from 1999 to 2018. Based on the results of data processing to determine the description of research variables using the program Eviews Ver. 9.0, then the results of descriptive analysis of research variables are opened up below.

Based on Table 1, it can be seen that economic growth as measured by the GRDP growth rate indicator based on constant prices over the last 20 years, namely from 1999 to 2018, shows mean (average) of 7.12% with a maximum value of 11.65% and minimum value of 2.55% and a standard deviation of 1.91%. Meanwhile, the first independent variable that influences the rate of economic

Table 1:
Results of descriptive analysis of research variables in Southeast Sulawesi Province for the period 1999 to 2018

	X_1_INDUSTRY	X_2_PMTDB	X3_TPAK	Y_PDRB
Mean	7.271000	32.04450	66.55800	7.128000
Median	7.370000	28.47500	67.37000	7.290000
Maximum	8.970000	42.25000	74.74000	11.65000
Minimum	5.950000	22.32000	52.77000	2.550000
Std. Dev.	1.102776	7.045564	5.776306	1.910832
Skewness	0.114285	0.411036	-1.037734	0.118482
Kurtosis	1.473007	1.563569	3.332006	4.446471
Jarque-Bera	1.986627	2.282612	3.681498	1.790360
Probability	0.370348	0.319402	0.158699	0.408534
Sum	145.4200	640.8900	1331.160	142.5600
Sum Sq. Dev.	23.10618	943.1595	633.9485	69.37432
Observations	20	20	20	20

Source: Data processing results made by the authors using Eviews 9.0

growth is the role of industry with an indicator measuring the contribution of the processing industry sector with a mean value of (average) of 7.27% of GRDP with a maximum value of 8.97% minimum value of 5.95% sand standard deviation of 1.10%. The second independent variable is the role of investment with the measurement indicator of the contribution of Gross Regional Domestic Fixed Capital Formation (PMTDB) towards GRDP with mean value (average) of 32.04% the maximum value is 42.25% and the minimum value is 22.32% and the standard deviation is 7.05%. The third independent variable is the role of the workforce with the measurement indicator of the Labor Force Participation Rate (TPAK) for those aged 15 years and above towards GRDP. With value mean (average) of 66.56% while the maximum value is 66.55% and the minimum value is 52.77% and a standard deviation of 5.78%.

Simultaneous Hypothesis Test (F test)

To find out this simultaneous influence, it can be seen by looking at the probability value of the F test in Table 2, which can be seen from the processing results described below.

The results of data processing show an F Statistic value of 0.027574 < the probability value α of 0.05, so it can be concluded that $\boldsymbol{H_1}$ ***accepted***. This means there is a significant simultaneous influence between the independent variables on the dependent variable. In this case, the role of industry, investment, and labor significantly influenced the increase in economic growth in Southeast Sulawesi Province during the period from 2018 to 2020.

Table 2:
F Test Results

R-squared	0.810696	Mean dependent var	7.668824
Adjusted R-squared	0.621391	S.D. dependent var	1.429991
S.E. of regression	0.879890	Akaike info criterion	2.887012
Sum squared resid	6.193652	Schwarz criterion	3.328125
Log likelihood	-15.53960	Hannan-Quinn criter.	2.930860
F-statistic	4.282501	Durbin-Watson stat	2.516227
Prob(F-statistic)	0.027574		

Source: Data processing results made by the authors using Eviews 9.0

Partial Hypothesis Test (t-test)

Testing using partial tests (t-tests) is carried out to prove the hypothesis that states the role of investment, the role of industry, and the role of the workforce partially significantly influence the rate of economic growth in Southeast Sulawesi Province, from 1999 to 2018, whether accepted or rejected. Partial testing (t-test) is conducted by comparing probabilities at a significance level of α = 0.05. The following is the magnitude of t_{count} and the probability for each independent variable:

a) The influence of last year's GRDP on the economic growth in the short term:
   1) GRDP (-1) with a significance value of 0.0121 < from a probability value of 0.05; so it can be concluded that $\boldsymbol{H_i}$ ***accepted***. This means that the GRDP growth rate last year had a positive and significant impact on the economic growth rate in Southeast Sulawesi Province during the period 1999 to 2018.
   2) GRDP (-2) with a significance value of 0.1318 > from a probability value of 0.05; so it can be concluded that $\boldsymbol{H_i}$ ***rejected***. This means that the GRDP growth rate two years ago had a negative and insignificant effect on the economic growth rate in Southeast Sulawesi Province during the period 1999 to 2018.

b) The Influence of Industry on the Economic Growth Rate in the short term:
   1) INDS with a significance value of 0.2762 > from the probability value of 0.05; so it can be concluded that HiThis means that the role of industry had a positive but insignificant effect on the rate of economic growth in Southeast Sulawesi Province during the period 1999 to 2018.
   2) INDS (-1) with a significance value of 0.6021 > from the probability value of 0.05; so it can be concluded that Hi. This means that the role of industry one year ago had a negative and insignificant impact on the rate of economic growth in Southeast Sulawesi Province during the period 1999 to 2018.
   3) INDS (-2) with a significance value of 0.2286 > from the probability value of 0.05; so it can be concluded that Hi. This indicates that the industry's role two years ago had a negative and insignificant impact on the rate of economic growth in Southeast Sulawesi Province from 1999 to 2018.

4) INDS (-3) with a significance value of 0.0102 > from the probability value of 0.05; so it can be concluded that Hi. This means that the role of industry over the past three years has had a positive and significant impact on the rate of economic growth in Southeast Sulawesi Province during the period 1999 to 2018.

c) The Influence of Investment Role to the Economic Growth Rate in the short term:
PMTDB with a significance value of 0.1930 > the probability value of 0.05; so it can be concluded that H_i ***rejected***. This means that the increase in expenditure in Gross Domestic Fixed Capital Formation has a positive and insignificant effect on the rate of economic growth in Southeast Sulawesi Province during the period.

d) The Influence the Workforce to the Economic Growth Rate in the short term:
TPAK with a significance value of 0.2296 > the probability value of 0.05; so it can be concluded that H_i ***rejected***. This means that the increase in labor force participation had a positive and insignificant effect on the rate of economic growth in Southeast Sulawesi Province during the period 1999 to 2018.

e) The Influence of Industry to the Economic Growth Rate in the long term:
INDS with a significance value of 0.0355 < from a probability value of 0.05; so it can be concluded that H_i ***accepted***. This means that the role of industry has a positive and insignificant influence on the rate of economic growth in Southeast Sulawesi Province during the period 1999 to 2018.

f) The Influence of Investment Role to the Economic Growth Rate in the long term:
PMTDB with a significance value of 0.0956 > the probability value of 0.05; so it can be concluded that H_i ***rejected***. This means that the increase in expenditure in Gross Domestic Fixed Capital Formation has a positive and insignificant effect on rate of economic growth in Southeast Sulawesi Province during the period 1999 to 2018.

g) The Influence of the Workforce to the Economic Growth Rate in the long term:
TPAK with a significance value of 0.2481 > the probability value of 0.05; so it can be concluded that H_i ***rejected***. This means that the increase in labor force participation had a positive and insignificant effect on the rate of economic growth in Southeast Sulawesi Province during the period 1999 to 2018.

Coefficient of Determination Test (R^2)

The magnitude of the contribution of the role of investment, the role of industry and the role of labor to the rate of economic growth in Southeast Sulawesi Province, namely by looking at the coefficient of determination (R^2). The size of adjusted R^2 is 0.8107; this means that the contribution of the role of investment, the role of industry, and labor to the rate of economic growth is 81.07% while the remaining 18.93% is the influence of other variables that are not included in this research model.

4. Conclusion

Based on previous studies, it can be concluded that industry, investment, and labor have a positive influence on economic growth in Southeast Sulawesi Province. The role of industry has been proven to have a positive and significant influence on the rate of economic growth in both the short and long term. While the roles of investment and labor, although positive, are not significant, meaning they do not directly influence economic growth. Thus, increasing the role of industry is a key factor in driving economic growth in Southeast Sulawesi, while investment and labor require strengthening to have a more tangible impact.

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