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THE EFFECT OF INVESTMENT, LABOR, AND EDUCATION LEVEL ON ECONOMIC GROWTH IN INDONESIA IN 2019-2023

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ABSTRACT

The purpose of this study is to look at the effects of important independent variables such as investment, labor force, and education level on the dependent variable of Indonesian economic development from 2019 to 2023. The analysis uses a quantitative research design using secondary data from the Central Statistics Agency (Badan Pusat Statistik). The empirical inquiry is carried out using Panel Data Regression Analysis. The findings of this study indicate that the variables DDI, labor force, and education level collectively influence economic growth. Additionally, FDI, labor force, and education level collectively influence economic growth. DDI, FDI, labor force, and education level collectively influence economic growth in Indonesia from 2019 to 2023.

Keywords: *Investment, Labor Force, Education Level, and Economic Growth*

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INTRODUCTION

Economic growth, as evidenced by fluctuations in the Gross Regional Domestic Product (GRDP), represents a key macro level indicator for evaluating effectiveness of development implementation in a given country or region. The economic growth of a country or region can indicate the performance and economic development in that area. A higher economic growth rate signifies better economic activity. The economic growth of that region is shown by the growth rate of GRDP at constant prices (Todaro, 2008).

The rapidity or lack of economic development in a region is also influenced by phenomena at both the global level and within the region itself. For example, in ASEAN (Association of Southeast Asian Nations) countries, each nation faces challenges that affect its economic growth. One of the obstacles is the influence of globalization demands, which expect each country to engage in open trade and economies, gradually blurring the boundaries of economic activities among ASEAN countries (Khairunisa, 2019).

Indonesia is the largest countries in Southeast Asia, covering an area of approximately 1.9 million km², with 17,001 islands and a population of 278.7 million (BPS, 2023). Given these figures, Indonesia certainly faces several national challenges, with one significant issue being its economy. Over the past decade (2014-2023), Indonesia's economic condition has experienced fluctuations. For instance, in 2020, the country saw a drastic decline of -2.07%. This downturn was primarily caused by the Covid-19 pandemic, which affected economic activities across all regions. The impact was felt nationwide in Indonesia. However, post-pandemic, the Indonesian economy began to show gradual improvement. In 2021 and 2022, there was a significant increase, although in 2023, there was a decline to 5.05%. If the growth of GRDP from year to year remains unstable, it could result in insufficient growth in production. Consequently, there are concerns that the additional job opportunities may not be enough to absorb the rising labor force, making it difficult to reduce unemployment rates. Several factors influencing GRDP include investment, labor absorption, and education.

Several issues facing development in Indonesia need to be addressed promptly. One approach to tackling these problems is by increasing investment, both domestic and foreign. According to Sukirno (2012), Investment is commonly

understood as the allocation of financial resources by investors or firms toward the acquisition of capital assets and production equipment, with the objective of increasing the economy's capacity to produce goods and services. Investment contributes significantly to increasing GRDP. The use of foreign capital does have a substantial impact on economic development. However, in the long term, it can lead to dependence on foreign investment. This is because most of the profits generated from foreign investments are typically enjoyed by foreign entities. Additionally, the presence of foreign investors can negatively impact domestic investors in similar sectors, as domestic investors often struggle to compete in terms of technology. Therefore, economic development should ideally rely on domestic capital capabilities, while the use of foreign capital should be aimed at stimulating and supporting the strength of domestic investment.

The impact of increasing foreign and domestic investment is expected to support GDP by contributing significantly not only through the transfer of financial resources but also through technology transfer and improved management knowledge. For example, this can involve enhancing the quality and productivity of human resources and supporting the applied technologies, ensuring that technological plans can be effectively implemented. The relationship between investment and labor absorption is direct; as investment levels rise, more labor can be absorbed. Domestic investment's role in GRDP indicates that it can significantly boost GDP. To enhance economic growth, another factor to consider is the availability of quality resources, both natural and human, which is essential for creating a strong GRDP. Investment in human resources is particularly important for regions in Indonesia that aim to improve their economic growth rates, and this can be achieved through education.

Education serves a pivotal function in enhancing a nation's capacity to assimilate modern technologies, expand productive capabilities, and promote sustainable development (Todaro, 2006). The quality of human resources can be assessed through various educational indicators, one of which is the Average Years of Schooling, providing insight into the population's educational attainment (ALS).

On the other hand, the high unemployment rate in Indonesia's provinces is partly due to many individuals only completing their education at the elementary or junior high school level. The low education levels in Indonesia impact the workforce, resulting in high unemployment due to limited skills and knowledge. The ALS in Indonesian provinces from 2019 to 2023 has shown a tendency to increase. In 2019,

the ALS for the population was only 8.75 years, equivalent to the 8th grade level of Junior High School. By 2023, the ALS had reached 9.13 years, corresponding to the 9th grade level of junior high school. Therefore, can be said the average population in Indonesian provinces completes education at the elementary to junior high school level or its equivalent. The research aims to examine the influence of investment, labor fotce, and educational attainment on economic growth across the provinces of Indonesia.

LITERATURE REVIEW

1. Grand Theory

1.1 Solow

The Solow growth model characterizes a nation's economic output as a function of two primary inputs: capital and labor, under the assumption of a constant proportional relationship between them (Fatmawati, 2015).

In terms of labor efficiency, technology can refer to the community's knowledge of various methods used in the production process. Labor efficiency can be enhanced through advancements in education, healthcare, and the skill levels of the population. These improvements can subsequently impact the productivity levels generated by the workforce.

1.2 Human Capital

The human capital theory views individuals as a form of capital that is just as important as other types of capital. According to Todaro (2020), human capital can be defined as the investment made by individuals to increase their future consumption levels, particularly through education and health. This investment enhances an individual's abilities and skills. Health and education are interconnected; high education levels without good health do not improve productivity, and conversely, higher education can raise health awareness.

Health indicators within human capital can be measured using life expectancy, which reflects an individual's health quality. Other methods, such as infant and maternal mortality rates, can also be employed

depending on the research objectives. Education indicators include literacy rates and average years of schooling. Although literacy rates may seem basic due to easier access to education, both indicators together provide a clearer picture of an individual's educational quality. Specifically, average years of schooling can clarify differences in individuals' abilities and productivity across various education levels.

2. Previous Research

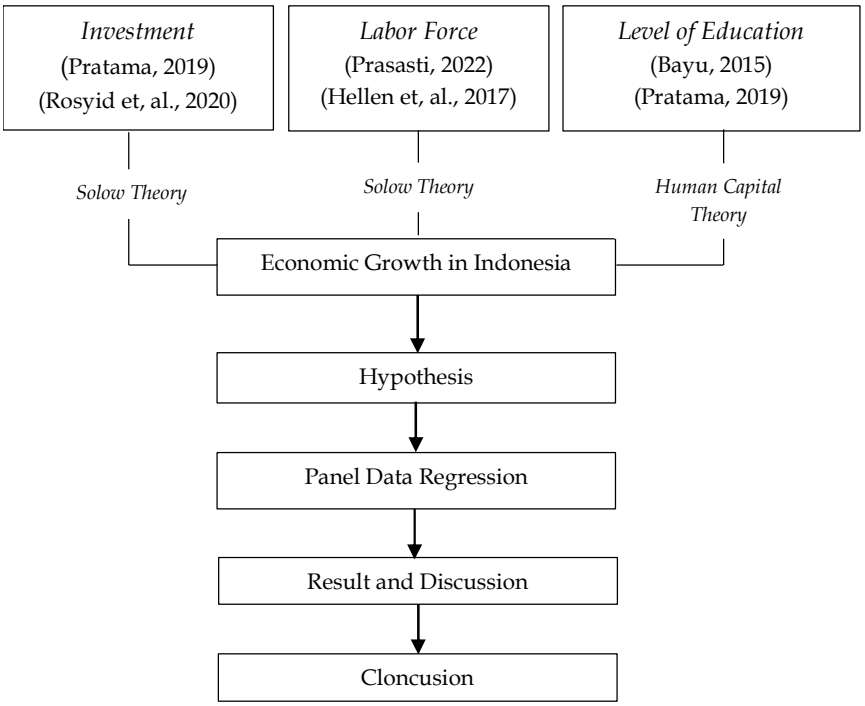
Risky Pratama (2019) conducted a study to analyze the impact of investment both domestic and foreign labor force size, and educational attainment on economic growth and their subsequent effects on poverty in North Sulawesi. Utilizing secondary time series data from 2003 to 2015 obtained from the Central Statistics Agency of North Sulawesi, the findings indicate that investment and labor significantly and positively influence economic growth. Educational attainment also exerts a statistically significant effect on growth. Moreover, investment contributes to poverty alleviation indirectly through its positive impact on economic growth. The labor force does not exhibit a statistically significant indirect effect on poverty via economic growth. Additionally, both educational attainment and economic growth demonstrate significant direct effects on poverty reduction in the region.

Dian Prasasti (2022) examined the influence of investment, labor, and government expenditure on economic growth across districts and municipalities in South Sulawesi Province for the period 2012–2021. Applying a multiple linear regression with panel data, the research found that while investment had a negative but statistically insignificant effect on economic growth, both labor and government spending exerted positive and statistically significant impacts during the observed period.

Mutia Sari (2016) explored the relationship between investment, labor, and government expenditure and their effects on economic growth in Indonesia. The estimation results reveal that these three variables collectively and simultaneously influence economic growth. Each investment, labor, and government spending was found to have a statistically significant and positive effect on national economic performance.

3. *Conceptual Framework*

It can be described as a conceptual framework in this research discussing Economic Growth, using independent variables such as Investment, Labor, and Education Level as follows:



4. *Hypothesis*

A hypothesis is a temporary answer to the research problem formulated as a question in the study. The hypotheses in this research are as follows:

1. It is suspected that the coefficients of the variables PMDN (Domestic Investment), Labor, and Education Level have an effect on economic growth in Indonesia.
2. It is suspected that the coefficients of the variables PMA (Foreign Investment), Labor, and Education Level have an effect on economic growth in Indonesia.
3. It is suspected that the coefficients of the variables PMDN, PMA, Labor, and Education level have an effect on economic growth in Indonesia.

RESEARCH METHOD

This study employs panel data regression analysis, integrating both time series and cross sectional data to capture dynamic variations across entities and over time. The choice of a panel data model offers several advantages, including providing more data, resulting in greater degrees of freedom, being informative, varied, and having less multicollinearity among variables (Gujarati, 2008). Before conducting the regression, it is essential to determine the best model among Random Effect, Fixed Effect, or Common Effect. To identify the best model, Chow Test, Hausman Test, and Lagrange Multiplier Test need to be performed.

The Chow Test is used to determine the best model between the Common Effect Model (CEM) and the Fixed Effect Model (FEM) for panel data (Sriyana, 2024). The decision rule for the Chow Test is as follows: if H_0 is accepted, CEM is chosen; if H_1 is accepted, FEM is chosen. Next, the Hausman Test is conducted to determine of the right model between fixed effect and random effect (Ghozali, 2017). The decision rule for the Hausman Test can be formulated as follows: if H_0 is accepted, Random Effect Model (REM) is chosen; if H_1 is accepted, FEM is chosen. Subsequently, the Lagrange Multiplier (LM) Test is employed to assess the most appropriate panel data regression approach, specifically to determine whether the Common Effect Model (CEM) or the Random Effect Model (REM) is more suitable for the data structure (Widarjono, 2007). The hypothesis for the Lagrange Multiplier Test can be formulated as follows: if H_0 is accepted, CEM is chosen; if H_1 is accepted, REM is chosen.

Classical assumption tests are essential to verify that the regression model provides accurate, unbiased, and consistent estimates. These tests include assessments for multicollinearity, heteroskedasticity, and autocorrelation.

After determining the best model among fixed effect, common effect, and random effect, the selected model can be regressed. Subsequently, hypothesis tests (F-test and t-test) and the coefficient of Determination Test (R-Squared) are conducted. To determine the impact of investment, labor, and education level on economic growth in each province of Indonesia, the datais processed using Stata 13. The form of the panel data model in this research is:

$$Y_{it} = \beta_0 + \beta_1 PMDN_{it} + \beta_2 TPAK_{it} + \beta_3 TP_{it} + U_{it}$$

$$Y_{it} = \beta_0 + \beta_1 PMA_{it} + \beta_2 TPAK_{it} + \beta_3 TP_{it} + U_{it}$$

$$Y_{it} = \beta_0 + \beta_1 PMDN_{it} + \beta_2 PMA_{it} + \beta_3 TPAK_{it} + \beta_4 TP_{it} + U_{it}$$

Explanation:

Y : Economic Growth

PMDN : Domestic Investment

PMA : Foreign Investment

TPAK : Labor

TP : Education Level

β_0 : Constant

$\beta_1\beta_2\beta_3\beta_4$: Regression coefficients for the independent variables

U : Error Terms

i : Province *(cross section)*

t : Year *(time series)*

RESULT AND DISCUSSION

In panel data regression analysis, the initial entails selecting the most appropriate estimation model. This process typically begins with the Chow test, which is used to evaluate whether the Fixed Effect Model (FEM) provides a better fit than the Common Effect Model (CEM). Following this, the Hausman Test is applied to determine the consistency and efficiency of estimators when choosing between the FEM and the Random Effect Model (REM). Lastly, the Lagrange Multiplier (LM) Test is conducted to assess the suitability of the REM compared to the CEM, thereby facilitating the selection of the most appropriate model for the panel data structure.

Table 1 Model Selection

Model Selection	**Effect Test**	**Prob (Model 1)**	**Prob (Model 2)**	**Prob (Model 3)**
Chow Test	Prob > F	0.0000	0.0009	0.0009
Hausman Test	Prob>chi2	0.0000	0.0030	0.0000
Lagrange Test	Prob > chibar2	0.0113	0.0219	0.4486

Based on Table 1, Fixed Effect Model (FEM) is the best model among the three regression models. This is supported by the results of two tests: Chow test and

Hausman Test. Therefore, the analysis proceeds with classical assumption tests, which include Multicollinearity, Heteroskedasticity, and Autocorrelation tests. Detailed estimation results from the study can be found in Table 2.

Table 2 The Results of The Classical Assumption Test

Test	Model 1 (FEM)	Model 2 (FEM)	Model 3 (FEM)
Multicollinearity	1.24	1.23	1.55
Heteroscedasticity	0.0006	0.0000	0.0000
Autocorrelation	0.0006	0.0021	0.0003

Based on Table 2, the results multicollinearity test indicate that correlation among the independent variables in the three models shows VIF values not exceeding 10, suggesting that multicollinearity is not present. From the heteroskedasticity test, the significance or probability Chi-square value is less than 0.05, indicating the presence of heteroskedasticity. Using the Breusch-Godfrey LM Test, it can be concluded that the Prob>Chi^2 for all three models is lower than the significance level of 5 percent (0.05). Therefore, it can be inferred that there is evidence of autocorrelation in the models. This suggests that adjustments may be needed to ensure the reliability of the regression results. It can be concluded that autocorrelation has occurred. Therefore, it is necessary to address this issue by applying a correction to the standard error using White's Robust Standard Error (Rizki et al., 2022).

Based on the analysis in this study, first model shows that Domestic Investment (PMDN) has an influence, but it is not significant for economic growth in Indonesia from 2019 to 2023. According to the results, an increase in PMDN leads to a decline in economic growth. This finding aligns with Solow's theory, which states that investment plays a crucial role in enhancing economic growth; typically, an increase in PMDN should correspond with increased economic growth. However, this result contrasts with the research by Hayatullah Humaini et al. (2017), which found a positive effect of PMDN on economic growth in Jambi Province from 2000 to 2015. External factors, such as rising raw material prices or declining global demand, may dampen the positive effects of increased PMDN, leading to reduced economic growth.

Furthermore, it was discovered that the labor variable had little bearing on economic expansion. This finding runs counter to Solow's growth theory, which highlights how important production drivers like labor, population, capital accumulation, and technical advancement propel economic expansion. Solow asserts that labor has a favorable impact on economic growth. Additionally, the current result differs from Muhammad Danan Riyadi (2022) finding that labor had a positive but statistically insignificant impact on West Java's economic growth. A lack of competent workers may be the cause of labor's limited influence in this situation, which could jeopardize the productive contribution of a growing labor force to local economic growth.

In the first model, the education variable demonstrates a significant influence on Indonesia's economic growth during the period 2019–2023. This outcome supports human capital theory, which posits that higher average levels of education are positively correlated with increased labor productivity. Individuals with more advanced educational attainment typically possess enhanced skills and knowledge, enabling greater efficiency and output within the same time frame (Hanushek & Woessmann, 2008). However, this result stands in contrast to the findings of Arifin (2023), whose study concluded that educational attainment did not significantly influence economic growth in Gorontalo City.

In the second model, the analysis reveals that Foreign Direct Investment (FDI/PMA) significantly affects economic growth in Indonesia over the same period. This is consistent with Solow's growth theory, which emphasizes the central role of investment in fostering economic expansion, suggesting that increased FDI should stimulate higher growth. Nonetheless, this finding diverges from the results of Jufrid et al. (2016), who found that while FDI had a positive association with Indonesia's economic growth between 1980 and 2014, the effect was statistically insignificant.

However, Renea Shinta Amida (2019), in her analysis of the effects of foreign and domestic investment on Indonesia's economic growth between 2010 and 2018, concluded that Foreign Direct Investment (FDI/PMA) did not exert a statistically significant impact on economic growth. This result may be influenced by a range of factors, including global economic fluctuations, governmental policy decisions, political stability, and other macroeconomic variables that contribute to an uncertain economic environment.

Furthermore, the labor variable was found to have no significant effect on economic growth in Indonesia during the period 2019-2023. This finding is inconsistent with Solow's neoclassical growth model, which posits that economic growth is driven by the availability and utilization of production factors such as labor, population, capital accumulation, and technological progress. According to Solow, labor is a critical driver of economic expansion, as both population growth and labor force development are regarded as essential contributors to long-term economic performance.

The results of the education variable test in the second model indicate that education has a significant impact on economic growth in Indonesia from 2019 to 2023. According to human capital theory, higher average schooling is linked to increased labor productivity. Individuals with higher education levels tend to have better skills and knowledge, enabling them to work more efficiently and produce more within the same time frame (Hanushek & Woessmann, 2008).

In the third model, the analysis shows that Domestic Investment (PMDN) has an effect, but it is not significant for economic growth in Indonesia from 2019 to 2023. This finding aligns with Solow's theory, which asserts that investment plays a crucial role in enhancing economic growth; typically, an increase in PMDN should lead to an increase in economic growth; typically, an increase in PMDN should lead to an increase in economic growth. However, this result contrasts with research by Hayatullah Humaini et al. (2017), which found a positive impact of PMDN on economic growth in Jambi Province from 2000 to 2015. External factors, such as rising raw material prices or declining global demand, may dampen the positive effects of increased PMDN, leading to a decline in economic growth.

According to the third model's empirical findings, Indonesia's economic development from 2019 to 2023 is statistically significantly impacted by the Foreign Direct Investment (FDI/PMA) variable. This result is in line with Solow's growth theory, which highlights how important investment is for promoting economic growth and contends that higher FDI improves economic performance. This outcome, however, runs counter to the conclusions of a study that examined the impact of both domestic and foreign investment on Indonesia's economic growth between 2010 and 2018 and found that FDI had no discernible effect on growth. These disparities could be caused by a number of internal and external variables, such as political stability, domestic policy frameworks, and worldwide economic conditions, all of which can lead to economic uncertainty and poor performance.

In contrast, the labor variable was found to have an insignificant effect on economic growth in Indonesia during the same period. This result runs counter to the human capital theory, which views labor as a critical factor in enhancing productivity. It also contradicts Solow's neoclassical growth model, which asserts that economic growth is primarily driven by the effective use of key production factors, such as labor, population, capital accumulation, and technological progress. According to Solow, labor plays an essential role in supporting sustained economic development. These findings also diverge from those of Muhammad Danan Riyadi (2022), who reported a positive, albeit statistically insignificant, relationship between labor and economic growth in West Java. The limited contribution of labor to growth may be explained by a mismatch between labor supply and skill levels indicating that a surplus of unskilled or under-skilled labor does not adequately support regional economic advancement.

In the third model, the education level variable was found to have an effect on economic growth in Indonesia during the period 2019–2023, although the effect was statistically insignificant. This result is broadly consistent with the principles of human capital theory, which emphasize that investment in education yields benefits not only at the individual level but also contributes significantly to national economic growth and long-term societal welfare. However, the findings contrast with those of Arifin (2023), whose study on the impact of education level on economic growth in Gorontalo City similarly found no significant effect, suggesting that education may not consistently translate into improved economic performance across different regions.

This discrepancy highlights that the level of education does not always correspond directly with job quality or productivity. In some cases, individuals with varying levels of formal education may perform similarly when engaged in equivalent work tasks. As such, individuals with lower levels of formal education who have access to targeted skills training may achieve productivity levels comparable to those of more highly educated workers. This underscores the importance of not only increasing educational attainment but also enhancing the relevance and applicability of education and training to the labor market.

CONCLUSION AND SUGGESTION

A. Conclusion

Based on the problem formulation and objectives of the research conducted, the following conclusions can be drawn:

1. The coefficients of Domestic Investment (PMDN), labor, and education level significantly affect economic growth in Indonesia from 2019 to 2023. According to the results of this study, any increase or decrease in the amount of PMDN, labor, and education level in each province in Indonesia will impact the country's economic growth.
2. The coefficients of Foreign Direct Investment (PMA), labor, and education level also significantly affect economic growth in Indonesia from 2019 to 2023. The findings indicate that any increase or decrease in the amount of PMA, labor, and education level in each province will similarly affect economic growth in Indonesia.
3. The coefficients of Domestic Investment (PMDN), Foreign Direct Investment (PMA), labor, and education level significantly influence economic growth in Indonesia from 2019 to 2023. The results of this study show that increases or decreases in the amounts of PMDN, PMA, labor, and education level in each province will affect economic growth in Indonesia.

B. Suggestion

Based on the findings of this research, the author anticipates that this research will serve as a reference point for future academic inquiry. The following recommendations are proposed for consideration in policy formulation:

1. To foster both domestic and foreign investment, it is imperative to cultivate a more conducive investment environment. This can be achieved by streamlining the permitting process and improving inter-agency coordination through bureaucratic reform. Such measures are expected to enhance investor confidence and stimulate capital inflows.
2. The government should reinforce existing laws, especially regulations regarding the flow of foreign and domestic investment. By doing so, Indonesia can better leverage its potential to increase investment.

3. Future research should consider adding other variables that may influence economic growth, allowing for more credible estimation models and better explanations of economic growth in Indonesia.

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