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Original Article

Analysis of the Effect of Average Years of Schooling and Open Unemployment on the Gross Regional Domestic Product of Central Sulawesi Province, 2019-2023

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Abstract

The economy of Central Sulawesi Province shows fluctuating growth in Gross Regional Domestic Product (GRDP), with agriculture and mining as the primary drivers. Nevertheless, a number of obstacles remain, including sluggish economic growth in certain years, a relatively low Human Development Index as reflected in the Average Years of Schooling (RLS) indicator, and a continuing open unemployment problem. This situation highlights the need to understand how social factors relate to regional economic performance. This study seeks to examine the influence of Average Years of Schooling (RLS) and open unemployment on GRDP in Central Sulawesi Province. A quantitative approach employing panel data regression analysis is applied. Data spanning 2019 to 2023 are used to examine the relationship between RLS and open unemployment with respect to GRDP. The analysis reveals that RLS exerts a positive and significant influence on GRDP, with a 1 percent rise in RLS capable of raising GRDP by 3.162 percent. On the other hand, open unemployment has a negative and significant influence, whereby a 1 percent increase in open unemployment causes GRDP to fall by 0.222 percent. Overall, improvement of education quality through RLS is proven to drive regional economic growth, while high unemployment becomes an inhibiting factor for GRDP growth. Therefore, regional development policy needs to focus on improving access to and quality of education as well as creating job opportunities to reduce unemployment, so that the economic growth of Central Sulawesi can be more optimal.

Keywords: Average Years of Schooling, Gross Regional Domestic Product, Open Unemployment.

1. Introduction

A country pursues economic development to raise its per capita income and enhance societal welfare. Several indicators can be used to boost national income. In this context, the government acts as a regulator by implementing policies that shape the nation's economic life. Gross Regional Domestic Product (GRDP) plays a role in increasing the economic growth of a country (Sukirno, 2008). When GRDP increases, economic growth increases. However, the GRDP in each province in Indonesia is not the same because the economic driving factors developed by each community in each province are different, so the rate of economic growth in each province is also different (Haryanto, 2013).

Economic development is a continuous development process carried out by each region. The results achieved by each region will differ depending on the conditions and targets that have been determined by each region. A primary gauge for capturing the yearly economic performance of a province or region is the gross regional domestic product (GRDP). Two

common valuation methods exist for interpreting this indicator, namely current prices and constant prices (Kuncoro, 2015). This data allows observers to identify the broad patterns of economic growth and the well-being of the local population. The GRDP value further indicates the degree to which a region is capable of utilizing and overseeing its existing resources (Rahman & Chamelia, 2015).

One of Indonesia's provinces, Central Sulawesi, plays a highly strategic role. It supports the country as a center for production and processing in agriculture, plantations, fisheries, and nickel mining. The province is specifically designated as a food agriculture node, a fishery node, and an industrial cluster. However, the Central Sulawesi Provincial Government, acting as the development authority, must solve a key problem. That problem is how to stimulate the region's economic growth and improve the well-being of its residents. Data from BPS shows that from 2019 to 2023, economic growth in Central Sulawesi followed a fluctuating pattern. The rates were 8.83 percent in 2019, a reduced 4.86 percent in 2020, 11.68 percent in 2021, an increased 15.22 percent in 2022, and a reduced 11.91 percent in 2023 (BPS Central Sulawesi, 2024). This economic situation resulted from slowing growth in the agriculture, forestry, and fishery sectors, which serve as the economy's mainstays, along with the services, industry, and trade sectors. As Haryanto (2013) notes, consistently falling economic growth causes national income to decline and unemployment to worsen.

Improving the Human Development Index (HDI) through better Human Resources (HR) from an educational standpoint, specifically mean years of schooling (RLS), represents one approach to enhancing economic growth. BPS data shows that in 2019, Central Sulawesi Province recorded an RLS of 8.91 years for people aged 15 and over. This indicates that the average resident in that age bracket had finished 8.91 years of formal schooling. The RLS value for the province was 8.89 years in 2022 and 8.96 years in 2023. On a regional scale across Sulawesi Island, Central Sulawesi holds the second position, behind North Sulawesi Province. A lower HDI has a positive relationship with higher poverty rates and slower economic growth. Consequently, government action is essential for realizing economic development.

In addition to HDI, another aspect that can affect economic growth is unemployment. Unemployment is a problem that always afflicts a region or country, because unemployment can cause problems for the economy and can also trigger the emergence of social problems, namely criminal acts (Sukirno, 2008). Based on BPS data, the open unemployment rate in Central Sulawesi Province in 2022 reached 3.00 percent and could only be suppressed by 0.05 percent in 2023 to 2.95 percent, so that even though it decreased, the percentage of unemployment is still relatively high. A high number of unemployed people results from poor absorption of vocational school graduates. The main causes are the graduates' still inadequate skills and competencies, along with a public mindset that tends to chase only government jobs (Rohmah & Prakoso, 2022). Thus, the government needs to pursue efforts aimed at upgrading human resource quality and expanding available employment. As BPS Central Sulawesi (2024) notes, high economic growth serves as evidence that a region has successfully developed its economy. Based on this background, the research objective is defined which to analyze how RLS and open unemployment affect GRDP in Central Sulawesi Province across the years 2019 through 2023.

Several earlier investigations have explored how education, unemployment, and economic growth interact within Indonesia. For instance, Bahtia et al. (2025) studied the influence of educational attainment, unemployment, and health on economic expansion by utilizing panel data covering 33 Indonesian provinces from 2010 through 2023. Another inquiry by Barokha and Septriani (2025) looked into the impact of educational indicators on economic growth across 34 provinces over the 2019 to 2023 timeframe. Furthermore,

Suparman and Muzakir (2023) explored the connections among human capital, unemployment, and economic growth using interprovincial panel data in Indonesia. However, most of these studies focused on the national level or interprovincial comparisons so they have not yet provided a more specific picture of the conditions of a particular region, especially Central Sulawesi Province. In addition, research that jointly examines the influence of Average Years of Schooling (RLS) and the open unemployment rate on GRDP across 2019 to 2023, a period encompassing both the COVID-19 pandemic and the subsequent economic recovery, remains scarce. As such, this study was undertaken to address that gap by offering more focused empirical evidence on the determinants of GRDP in Central Sulawesi Province.

2. Literature Review

2.1. Gross Regional Domestic Product (GRDP)

BPS (2024) defines Gross Regional Domestic Product (GRDP) as the sum of value added contributed by all business units operating in a particular region, or as the aggregate final value of the region's goods and services. There are two classifications of this indicator, consisting of GRDP based on current prices and GRDP based on constant prices. The former uses prices from the current year to calculate production and added value. The latter applies base year prices as a benchmark for measuring economic growth (BPS, 2024).

GRDP is the main indicator of regional economic conditions and can be calculated in both current and constant price forms. Sukirno (2016) defines economic growth as a long term rise in per capita output that prioritizes both process and continuity. Additionally, GRDP per capita serves as a tool for assessing the welfare level of a community (Zaris, 1987), where the higher the GRDP, the better the regional economic condition. Regional economic growth is influenced by endogenous and exogenous factors and analyzed through macroeconomic models (Afrizal, 2013).

GRDP at constant prices is used to see economic growth from year to year, while current prices describe changes in economic structure (Sukirno, 2016; BPS, 2019). The traditional development approach also places the increase in GRDP as the main focus of regional development (Kuncoro, 2015). In addition, GRDP by business field covers 17 economic sectors such as agriculture, processing industry, construction, trade, transportation, financial services, and other services (BPS, 2024).

2.2. Average Years of Schooling

Todaro (2000) argues that education constitutes a fundamental objective of development. Its importance lies in strengthening a nation's capacity to adopt modern technology and in supporting lasting growth and development. Meanwhile, Mean Years of Schooling (RLS) refers to the level of formal education completed by people aged 25 and older. This figure represents the total years of schooling finished without including repeated years. According to BPS (2024), RLS serves as an indicator for measuring the quality of education within a regional community. The higher the RLS, the higher the educational level achieved.

Todaro (2000) points out that how long a person pursues education plays a major role in determining their income. As education serves as a type of human capital that strengthens the quality of human resources, the returns gained from investing in it tend to exceed the costs involved. Individuals with higher education generally enter the workforce later, but have faster income growth compared to those who work earlier (Todaro, 2000).

2.3. Open Unemployment

According to BPS (2020), which focuses on employment indicators, the term "unemployed" covers several categories: people who lack a job and are searching for one, individuals who are setting up a business, people without work who have given up looking due to a perceived lack of opportunities, and those who have secured a job but have not yet started it (Hussmanns et al., 1990). Numerous countries, Indonesia included, frequently encounter unemployment as one of their major challenges. A rise in the unemployment rate can lead to various social and economic consequences, among them lower quality of life, growing poverty, and economic instability.

Uneven job distribution across GRDP sectors is one cause of the unemployment rate. Furthermore, the education level and soft skills of community members can also influence how high or low the unemployment rate stands, according to Irawan et al. (2023). When job availability is limited while the working age population is large, each sector's GRDP receipt may be less than optimal. Therefore, training programs and the creation of job opportunities are needed to boost GRDP growth.

3. Methods

3.1. Type and Kind of Research

According to Sugiyono (2017), associative research represents a formulation of research problems aimed at examining connections among two or more variables. That approach is adopted here. The study is based on secondary quantitative data collected from the Central Bureau of Statistics in Central Sulawesi Province for the period spanning 2019 to 2023.

3.2. Analysis Tool

To generate a well specified and unbiased forecasting model, the study used Microsoft Excel and Econometric Views Student Version 10 (Eviews) for data processing and regression. As Gujarati notes in Ghozali (2017) the panel data technique merges cross section data with time series data. The panel data model equation that has been converted into the variables that have been studied is as follows:

$$Y = \alpha + \beta 1RLS + \beta 2PT + Uit$$

Description:

Y	= GRDP
β1, β2 & β2	= Regression Coefficient
α	= Constant
RLS	= Average Years of Schooling
PT	= Open Unemployment
Uit	= Variables outside the research component

Two key components made up the analytical phase of this research: classical assumption testing and hypothesis testing. Classical assumption testing must be carried out as a precondition for multiple linear regression analysis grounded in the ordinary least squares (OLS) approach. This testing is essential for verifying that the estimated regression model is optimal, specifically that it provides accurate, unbiased, and consistent estimates. If the model proves optimal, the regression findings can then serve as recommendations either for expanding knowledge or for solving real world problems. Among the classical assumption tests applied are the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. A reliable regression model depends on data that is normally or

approximately normally distributed, and when this is not the case, transformation must first be performed. Beyond that, a sound regression model should also be free of multicollinearity, heteroscedasticity, and autocorrelation issues.

3.3. Hypothesis Testing

Following the fulfillment of all classical assumptions needed to assess the regression model, the subsequent step involves determining the acceptance or rejection of the hypothesis through a simultaneous F test and a T test of significance. While the F test assesses whether the independent variables, as a combined group, have an influence on the dependent variable, the T test assesses whether each independent variable on its own has an influence on the dependent variable.

A. It is presumed that RLS has a significant and positive effect on GRDP of Central Sulawesi for the years 2019-2023.
B. It is presumed that open unemployment has a significant and positive effect on GRDP of Central Sulawesi for the years 2019-2023.

In the subsequent phase, attention turns to the regression model itself. The process begins with formulating the regression equation. Following that, the coefficient of determination, or R squared, is employed to assess how well the model fits the data. This R^2 figure tells us the extent to which movements in the independent variable correspond to movements in the dependent variable.

3.4. Operational Definition of Variables

A. GRDP represents the total final value of goods and services produced in Central Sulawesi Province between 2019 and 2023, measured in rupiah.
B. Average Years of Schooling is the level of education that has been achieved by the population of Central Sulawesi Province in the period 2019-2023, expressed in years.
C. Open unemployment is the number of people who are in the labor force in Central Sulawesi Province, but do not have a job and are actively looking for work during the years 2019-2023, expressed in percent units.

4. Results and Discussion

4.1. Research Results

4.1.1. Analysis of GRDP of Central Sulawesi Province 2019-2023

GRDP serves as a measure of the output or added value that a region produces at a particular point in time. Research from 2019 to 2023 (BPS Central Sulawesi Province, 2024) covering 12 regencies and one city shows that the average GRDP for Central Sulawesi's 13 regencies and cities has risen. Out of these 13 regions, 11 regencies depend on agriculture and tourism for their economic growth. Morowali Regency, however, channels its development toward the processing industry. Palu City focuses on three main areas: construction, trade, and government administration.

Morowali Regency stands at the top of the thirteen regencies and cities when GRDP is compared. The processing industry and the mining sector account for a notably large share of this outcome. Recorded figures indicate that the average annual expansion over the last five years has been exceptionally rapid, climbing 28 percent for the processing industry and 20 percent for mining. Meanwhile, the smallest GRDP figures across Central Sulawesi Province are found in Banggai Laut and Banggai Kepulauan, which lag behind the other ten regencies and cities. Banggai Kepulauan achieves an average GRDP of just 2.7 trillion, while Banggai

Laut reaches only 1.6 trillion. These two regencies rely exclusively on the agricultural sector for their development.

4.1.2. Analysis of Average Years of Schooling of Central Sulawesi Province 2019-2023

Average Years of Schooling (RLS) is an important indicator of educational quality. A higher mean year of schooling reflects the large number of years a person needs to complete their education (Soleha & Faizin, 2023). Better education is expected to improve skills and work competitiveness, thus being able to reduce the unemployment rate.

Data released by the Central Bureau of Statistics (2024) shows that Central Sulawesi Province recorded an average RLS of 8.8 years during the 2019 to 2023 period. On average, this means the population has achieved a schooling level comparable to the 8th or 9th grade of junior high school. This statistic is an important benchmark for assessing community education levels and the quality of local human resources. Men have a higher RLS value compared to women. The minimum requirement for Average Years of Schooling across Indonesia is 9 years, as reported by BPS (2024).

The largest RLS figure in Central Sulawesi Province was obtained by Palu City. In 2019 the RLS value of Palu City for males was 11.91 years and for females was 11.22 years, continuing to increase until 2023 with a male RLS of 12.10 years and 11.38 years for females. Meanwhile, the lowest RLS value belongs to Parigi Moutong Regency, where the RLS value in 2019 for males was 7.76 years and for females was 7.36 years. In 2023 the RLS value of Parigi Moutong Regency for males was 8.00 years and for females was 7.77 years. Meanwhile the other twelve regencies have RLS values above 8-9 years.

4.1.3. Analysis of the Open Unemployment Rate of Central Sulawesi Province 2019-2023

Among Indonesia's ongoing economic issues, unemployment affects many regions, including Central Sulawesi Province. When unemployment rates are high, the situation becomes severe and strongly influences local conditions. As Sukirno (2016) explains, the number of unemployed people acts as a measure of a region's economic advancement and can signal the presence or absence of fair income distribution.

The study reveals that Central Sulawesi Province recorded a 3.32 percent unemployment rate on average across the last five years, from 2019 to 2023. During this period, unemployment generally decreased. The open unemployment rate was 3.11 percent in 2019, climbed to 3.77 percent in 2020, and then declined steadily from 2021 to 2023. By 2023, it had fallen to 2.95 percent, a reduction of 0.05 percentage points compared to 2022. Even so, the overall decrease in open unemployment remains modest. The average annual decline is extremely low, just 0.05 percent per year.

Palu City ranks first for the highest open unemployment rate over the last five years. From 2019 through 2022, the unemployment rate in Palu City consistently exceeded 6 percent, though it declined to 5.65 percent in 2023. On the other end of the spectrum, Banggai Kepulauan Regency reports the lowest open unemployment figure, which remains under 2 percent. This low rate results from the regency's strengths in fisheries and tourism, combined with government backing for small and medium enterprise (SME) growth.

4.1.4. Analysis of the Effect of Average Years of Schooling and Open Unemployment on GRDP of Central Sulawesi Province 2019-2023

A. Model Specification Test

Prior to running the panel data regression, a series of initial tests were conducted by the author to identify the most appropriate model for the analysis. There are three models available within panel data regression, consisting of the Common Effect Model (CEM), the Fixed Effects Model (FEM), and the Random Effect Model (REM). To decide on the proper model specification, three tests were employed by the researcher, namely the Chow Test, the Hausman Test, and the LM Test.

1) Common Effect Model (CEM)

Within panel data regression, the simplest approach is the Common Effect Model (CEM). It merges cross sectional and time series information without separating individuals or accounting for different time points. The model assumes that intercepts and slopes remain unchanged, so it can be estimated with ordinary least squares (OLS), similar to conventional regression. The estimation results, obtained from processed data using Eviews 12, yielded the following CEM findings.

Table 1. Common Effect Model (CEM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.928885	2.617180	3.029553	0.0036
LOGRLS	3.481100	1.301573	2.674534	0.0096
LOGTPT	0.234403	0.367112	0.638505	0.5255
R-squared	0.193308	Mean dependent var		15.77612
Adjusted R-squared	0.167285	S.D. dependent var		0.894696
S.E. of regression	0.816438	Akaike info criterion		2.477324
Sum squared resid	41.32745	Schwarz criterion		2.577681
Log likelihood	-77.51304	Hannan-Quinn criter.		2.516921
F-statistic	7.428528	Durbin-Watson stat		0.022009
Prob(F-statistic)	0.001282			

Source: Eviews 12 processed data results, 2025

According to the Common Effect Model (CEM) estimates, the model is jointly significant because the Prob(F-statistic) equals 0.001282. This result confirms that LOGRLS and LOGTPT collectively affect LOGPDRB. The R squared value stands at 0.193308, which indicates that 19.33 percent of the variance in GRDP is accounted for by the model's variables, while other factors explain the remainder. Looking at individual effects, LOGRLS has a positive and statistically significant impact on GRDP (coefficient 3.481100; p value 0.0096). This means that higher Average Years of Schooling will increase GRDP. On the other hand, LOGTPT fails to show a significant impact on GRDP (p value 0.5255). Thus, based on this study, the open unemployment rate has not been shown to influence GRDP.

2) Fixed Effect Model (FEM)

In the Fixed Effect Model (FEM), each individual is given a different intercept to account for unchanging unique characteristics. The slope coefficients, however, remain identical for all individuals and across all time points.

Table 2. Fixed Effect Model (FEM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.484609	1.909267	4.967669	0.0000
LOGRLS	3.003484	0.868689	3.457492	0.0011
LOGTPT	-0.229936	0.078717	-2.921036	0.0052
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.987748	Mean dependent var		15.77612
Adjusted R-squared	0.984318	S.D. dependent var		0.894696
S.E. of regression	0.112041	Akaike info criterion		-1.340727
Sum squared resid	0.627661	Schwarz criterion		-0.838946
Log likelihood	58.57364	Hannan-Quinn criter.		-1.142742
F-statistic	287.9347	Durbin-Watson stat		0.794169
Prob(F-statistic)	0.000000			

Source: Eviews 12 processed data results, 2025

The Fixed Effect Model (FEM) estimates shown in Table 2 indicate strong model performance, evidenced by an R squared value of 0.9877. Individually, LOGRLS has a positive and statistically significant influence on GRDP, whereas LOGTPT has a negative and statistically significant influence. Moreover, all variables together have a significant influence on GRDP. Nonetheless, a relatively low Durbin Watson value suggests the possible presence of autocorrelation.

3) Chow Test

Through the Chow test, the Common Effect Model (CEM) and the Fixed Effect Model (FEM) are compared in order to identify which model is more appropriate. The basis for this decision is the Cross section F probability value, assessed against a significance level of $\alpha = 0.05$ (5 percent). When the Cross section F probability is below 0.05, H1 is accepted, whereas a probability above 0.05 leads to the acceptance of H0. Here, H0 refers to the Common Effect Model (CEM) and H1 refers to the Fixed Effect Model (FEM).

Table 3. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	270.181758	(12,50)	0.0000
Cross-section Chi-square	272.173367	12	0.0000

Source: Eviews 12 processed data results, 2025

Table 3 contains the Chow Test findings. The probability for the Cross section F stands at 0.0000, placing it below the critical threshold of 0.05. This outcome supports H1, indicating that the appropriate model according to the Chow Test is the Fixed Effect Model (FEM). Because the Fixed Effect Model (FEM) emerges as the chosen model, the analysis requires an additional procedure, the Hausman Test. The objective of this test is to evaluate whether the Fixed Effect Model (FEM) or the Random Effect Model (REM) is more suitable for the research context.

4) Random Effect Model (REM)

Known as a regression model for panel data, the Random Effect Model (REM) incorporates error terms and relies on the Generalized Least Square (GLS) technique for estimation. Researchers turn to REM after the Chow Test selects the Fixed Effect Model (FEM)

as the superior model, since REM will later be compared with FEM. The following results come from the Random Effect Model (REM) regression.

Table 4. Random Effect Model (REM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.129458	1.820233	5.015545	0.0000
LOGRLS	3.162250	0.821266	3.850455	0.0003
LOGTPT	-0.221722	0.078047	-2.840858	0.0061
Effects Specification				
			S.D.	**Rho**
Cross-section random			0.892032	0.9845
Idiosyncratic random			0.112041	0.0155
Weighted Statistics				
R-squared	0.301114	Mean dependent var		0.884765
Adjusted R-squared	0.278570	S.D. dependent var		0.130569
S.E. of regression	0.110901	Sum squared resid		0.762546
F-statistic	13.35633	Durbin-Watson stat		0.644395
Prob(F-statistic)	0.000015			
Unweighted Statistics				
R-squared	0.153693	Mean dependent var		15.77612
Sum squared resid	43.35696	Durbin-Watson stat		0.011333

Source: Eviews 12 processed data results, 2025

Once the regression producing the REM results has been carried out, the Hausman Test is performed next. This test aims to choose between the Fixed Effect Model (FEM) and the Random Effect Model (REM) in order to identify the estimation model that is more appropriate and fits better.

5) Hausman Test

The results from the Hausman test, performed with the Correlated Random Effect Hausman Test, are presented here.

Table 5. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	0.745075	2	0.6890	
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
LOGRLS	3.003484	3.162250	0.080142	0.5749
LOGTPT	-0.229936	-0.221722	0.000105	0.4228

Source: Eviews 12 processed data results, 2025

Table 5 presents the Hausman Test outcomes, where the Cross section Random Probability equals 0.6890. Because this value is larger than 0.05 (0.6890 > 0.05), the test rejects H1 and does not reject H0. Thus, the Random Effect Model (REM) is chosen as the best regression model for the analysis.

B. Classical Assumption Test

1) Multicollinearity Test

To assess whether the independent variables in a regression model are intercorrelated, a multicollinearity test is conducted. The test evaluates the tolerance value. A tolerance value higher than 0.8 implies that multicollinearity does not affect the study's independent variables.

Table 6. Multicollinearity Test

Correlation		
	LogRLS	**LogTPT**
LogRLS	1.000000	0.595204
LogTPT	0.595204	1.000000

Source: Eviews 12 processed data results, 2025

The multicollinearity test results presented in Table 6 reveal that all coefficient values for the independent variables are under 0.9, suggesting that the model applied in this research does not exhibit multicollinearity problems.

C. Hypothesis Testing

Hypothesis testing serves to evaluate whether the regression coefficients obtained in this research have a meaningful effect on the dependent variable.

1) T Test (Partial Test)

The t test examines the partial influence of each independent variable on the dependent variable. A probability below 0.05 indicates a significant effect, while a probability above 0.05 indicates no significant effect.

Table 7. T Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.129458	1.820233	5.015545	0.0000
LOGRLS	3.162250	0.821266	3.850455	0.0003
LOGTPT	-0.221722	0.078047	-2.840858	0.0061

Source: Eviews 12 processed data results, 2025

Based on the table above, the results of the study are as follows:

a. For the RLS variable, the probability value from the t statistic is 0.0003. Since this value is smaller than α = 0.05, the test rejects H0 and does not reject H1. Consequently, the RLS variable exerts a partial effect on the GRDP variable.

b. For the TPT variable, the probability value from the t statistic equals 0.0061. Since this value is lower than α = 0.05, H0 is rejected and H1 is not rejected. This means the TPT variable has a partial and statistically significant effect on the GRDP variable.

Table 7 shows the regression model equation as follows:

$$LogY = 9.129458 + 3.162250LogRLS - 0.221722LogTPT$$

A regression coefficient of 3.162250 was found for RLS, showing that each 1 percent increase in RLS produces a 3.162 percent increase in GRDP when other variables are held constant. On the other hand, the open unemployment rate carries a coefficient of -0.221, indicating that a 1 percent rise in TPT brings about a 0.0221 percent reduction in GRDP under the assumption that other variables remain unchanged. The constant term (α), at 9.129, represents the GRDP value that exists independent of the influence of RLS and TPT.

2) F Test

The F test examines the combined impact of all independent variables on the dependent variable. An F probability that is less than 0.05 confirms a significant joint relationship, whereas a probability greater than 0.05 implies that no significant collective effect exists.

Table 8. F Test

F-statistic	13.35633
Prob(F-statistic)	0.000015

Source: Eviews 12 processed data results, 2025

Table 8 reports an F Statistic of 13.35633 and a probability value of 0.000015 from the F test. Because the probability is less than 0.05 (0.000015 < 0.05), H1 is not rejected. This leads to the conclusion that simultaneously, both RLS and the Open Unemployment Rate have a significant influence on Central Sulawesi Province's GRDP.

3) Coefficient of Determination Test (R^2)

The coefficient of determination, known as R squared, measures the extent to which the independent variables explain the dependent variable. A value near 1 indicates that the model offers a strong explanation, while a value near 0 points to weak explanatory capability.

Table 9. Coefficient of Determination Test (R^2)

R-squared	0.301114
Adjusted R-squared	0.278570

Source: Eviews 12 processed data results, 2025

As presented in Table 9, the coefficient of determination test reveals an Adjusted R Squared value of 0.278570, meaning that RLS and the Open Unemployment Rate combined account for 27.86 percent of the variation observed in GRDP across Regencies and Cities in Central Sulawesi Province during 2019 to 2023. The remaining 72.14 percent is attributable to other variables outside the scope of this study.

4.2. Discussion

4.2.1. Effect of Average Years of Schooling on GRDP of Central Sulawesi Province

According to the t test results for partial effects, the probability value of the Average Years of Schooling variable on GRDP is 0.0003, which falls below the 0.05 threshold. This finding indicates that Average Years of Schooling has an effect on GRDP in Central Sulawesi Province from 2019 to 2023. The RLS regression coefficient stands at 3.162250. A 1 percent increase in RLS produces a 3.162 percent increase in GRDP, with other independent variables held constant. Since the regression coefficient is positive, a larger RLS value leads to a higher GRDP. Hence, the influence of RLS on GRDP is positive.

Average Years of Schooling (RLS) has a positive and significant effect on Gross Regional Domestic Product (GRDP) or the economic growth of Central Sulawesi Province, because education improves the quality of human resources, work productivity, and the ability of the community to work, which ultimately increases economic output and welfare. The positive relationship between RLS and GRDP is due to the fact that education is a means of preparing human resources for development. The economy of Central Sulawesi is meaningfully affected by this variable because a person's rising educational attainment expands the human capital stock, subsequently accelerating economic growth. The government should further improve education in the region by providing scholarships or strategies that will attract public attention to improve their education (Average Years of Schooling) in order to further improve the quality of human resources and increase GRDP.

The mechanism of this influence is affected by the Improvement of Human Resource Quality. A higher RLS means the population has better knowledge and skills, making them

more productive. Productivity Increase: Quality human resources can improve efficiency and innovation, driving GRDP growth. Unemployment Reduction: Higher education opens wider employment opportunities, reduces unemployment, and increases community income, which correlates with higher GRDP. Welfare Improvement: Economic improvement from quality human resources improves community welfare, which is also part of development.

These findings align with Sukirno (2016) argument that the Human Development Index, which incorporates Average Years of Schooling, holds a crucial role in modern economic development. When human development is strong, production factors can be utilized to their fullest potential. A sufficiently high level of human development enhances economic growth performance through the population's capabilities. This improvement leads to greater productivity and creativity among community members. As productivity and creativity rise, people can absorb and manage resources essential for economic growth, a reality that is captured in the real GRDP value (Sukirno, 2016).

This research lends further support to the idea that average years of schooling serves as a key driver of regional economic growth in Indonesia. According to Widarni and Bawono (2021), enhancing human capital through education leads to sustained increases in Indonesia's economic growth over the long run, as it raises both labor productivity and economic efficiency. Likewise, Triatmanto et al. (2023) found that human capital holds a vital role in fostering economic growth through changes to economic structure and improvements in labor quality.

In addition, the study by I. F. Sari (2022) shows that education and human capital indicators contribute significantly to the increase of GRDP per capita in Indonesia through the mechanism of increasing productivity and regional competitiveness. V. K. Sari (2023) established that education has a positive and significant impact on regional economic growth in Indonesia, demonstrating that the accumulation of human capital remains a central determinant of GRDP at the regional level. Ramdhan (2021) also confirmed that human capital is instrumental in boosting the total factor productivity (TFP) of Indonesian industry, which indirectly contributes to strengthening regional economic growth. Collectively, these findings suggest that education continues to be one of the foremost drivers of GRDP at the regional level, although the extent of its impact may differ based on the structural characteristics found within each region.

Although Average Years of Schooling (RLS) has a positive effect on GRDP, its impact has not been fully even across all regions in Central Sulawesi Province. In industry-based areas such as Morowali Regency, economic growth is more driven by large industrial activities based on natural resources, especially nickel processing, which tends to be capital intensive. This condition causes the increase in GRDP not to always be in line with the increase in the average years of schooling of the local community, because most of the skilled workforce still comes from outside the region, resulting in a gap between local education improvement and industrial labor needs.

Meanwhile, in Palu City, which has a relatively higher level of education compared to other regions, the increase in RLS has also not been fully able to drive economic absorption optimally. This is caused by the limited availability of formal jobs as well as a mismatch between the competence of education graduates and the needs of the labor market. In addition, the condition of post-disaster economic recovery has also affected the slow absorption of educated labor, so that the contribution of RLS to economic growth has not been maximized.

In the endogenous growth theory pioneered by Lucas (1988), it is also explained that savings and human resources are important for economic growth. Therefore, endogenous

growth theory holds that the role of investment in physical capital and human capital influences long run economic growth as well. Here, human resources may act as a contributing factor (Kuncoro, 2015).

4.2.2. Effect of Open Unemployment Rate on GRDP of Central Sulawesi Province

The t test conducted to assess partial effects shows a probability of 0.0061 for the open unemployment rate in its relation to GRDP. Given that this figure is lower than 0.05, the open unemployment rate is confirmed to have an effect on GRDP in Central Sulawesi Province across the 2019 to 2023 period, with the corresponding regression coefficient recorded at -0.221722. Under the condition that all other independent variables stay fixed, a 1 percent increase in unemployment causes a 0.222 percent decrease in GRDP. The negative coefficient shows that a higher open unemployment rate is associated with a lower GRDP. Thus, the effect of the unemployment variable on GRDP is negative in direction. Lisnawati and Nihayah (2025) shows that the relationship between GRDP and unemployment can be bidirectional, where unemployment does not only affect GRDP, but GRDP growth can also reduce unemployment through an increase in labor demand. This indicates the potential for endogeneity in the relationship between the two variables, so that the estimated effect may reflect a simultaneous interaction between economic growth and labor market conditions.

The findings of this research indicate that the Open Unemployment Rate (OUR) has a negative and significant impact on GRDP in Central Sulawesi Province. This result aligns with recent empirical studies asserting that unemployment serves as a key indicator of inefficiency within the labor market, which in turn reduces regional economic output (Suparman & Muzakir, 2023). This condition shows that the higher the unemployment rate, the greater the production capacity that is not optimally utilized in the regional economy.

Theoretically, this negative relationship can be explained through the concept of labor market slack, where high unemployment reflects the low utilization of productive labor, thereby decreasing aggregate output (Minah & Sekaringsih, 2023). Under this condition, the decrease in household income causes a weakening of aggregate consumption, which in turn affects the decrease in production activity and GRDP.

The negative and significant effect of the Open Unemployment Rate (OUR) on GRDP in Central Sulawesi Province suggests that as unemployment climbs, economic growth weakens due to reduced purchasing power and suboptimal productivity. At its core, this occurs because unemployment lowers the contribution of productive labor, thereby holding back GRDP growth.

This negative relationship is created when purchasing power falls, where the unemployed have no income so demand for goods and services decreases, thereby hampering economic growth. Low productivity occurs because human resources are not fully utilized, leading to a decline in overall economic efficiency. From a structural perspective, Adryan (2025) confirms that one of the main causes of high unemployment is skills mismatch, namely the incompatibility between labor skills and the needs of the modern labor market (Radhyanti et al., 2023). This phenomenon is relevant to the condition in Central Sulawesi, especially in industrial areas such as Morowali which experience high labor demand that cannot entirely be met by local labor. In addition, an increase in unemployment can also worsen socioeconomic conditions through an increase in the poverty rate which ultimately puts pressure on regional economic stability. Ilham et al. (2023) also found that unemployment has a significant effect on the variation of regional economic growth in Indonesia through a panel data approach across various provinces. This shows that unemployment dynamics have an important role in determining GRDP performance at the regional level.

The study's results are consistent with Arthur Okun's work, as reported in Mankiw (2006). Okun's Law describes how unemployment and economic growth are connected. The law is based on observations of US GDP figures. Okun's Law states that real GDP is negatively affected by the unemployment rate. An increase of one percentage point in unemployment causes GDP to fall by 2 percent. This demonstrates a negative effect between unemployment and economic growth. Furthermore, earlier studies by Oktaviantoro (2018) and Yusuf (2019) lend support to these findings, showing that unemployment negatively but not significantly affects GRDP. However, the relationship between unemployment and GRDP in empirical practice can be more complex than theoretical assumptions, because economic growth does not always result in a comparable absorption of labor, which is influenced by the regional economic structure.

Setiawana et al. (2024) shows that the effect of GRDP on unemployment is significantly negative, but the strength of that effect strongly depends on the regional economic structure. Regions with developing industrial and service sectors tend to have higher labor absorption elasticity compared to regions that depend on the extractive sector.

The study by Gunawan and Hidayati (2024) also found that GRDP growth is not always followed by an increase in labor absorption, especially in regions dominated by the capital intensive sector. This phenomenon is known as jobless growth, where economic output increases without being accompanied by a significant increase in job opportunities. This condition is relevant in the context of extractive industry-based regions such as Central Sulawesi. This phenomenon shows that an economic structure that relies on the capital intensive sector tends to create an imbalance between output growth and job creation, so that the impact of economic growth on the reduction of unemployment becomes limited.

In the context of Central Sulawesi Province, the open unemployment rate is also influenced by structural conditions in each region. Morowali Regency as an industrial area experiences high labor demand, but it cannot always be absorbed by local labor due to a skills gap. On the other hand, Palu City as an urban center still faces unemployment among educated labor due to the limited availability of formal jobs as well as an economic recovery process that has not been fully stable. This condition of interregional disparity reinforces the explanation that unemployment continues to have a negative impact on GRDP in Central Sulawesi Province.

This research lends support to the findings of Rahmawati et al. (2024), which indicate that Gross Regional Domestic Product has a negative and significant influence on poverty in Central Sulawesi, whereas Total Population and the Open Unemployment Rate (OUR) demonstrate a positive but insignificant influence. From this, it follows that GRDP serves to reduce poverty in Central Sulawesi Province, while Total Population and OUR have not, based on these results, managed to reduce poverty. This indicates that a growing population does not help curb poverty, and additionally, rising poverty figures tend to worsen poverty conditions further in Central Sulawesi Province.

5. Conclusion

Based on the analysis and discussion carried out, this study finds that, from 2019 to 2023, Average Years of Schooling had a positive influence on GRDP in Central Sulawesi Province, with human development contributing meaningfully to improved productivity. The study also finds that open unemployment had a negative influence on GRDP within the same timeframe, meaning that as unemployment rises, GRDP growth tends to slow down or decrease. Given these outcomes, the author puts forward several suggestions, among them

that the Central Sulawesi Provincial Government keep working to raise the Human Development Index by introducing policies that promote equal human development across regions, allowing economic growth to take place in every area. It is further suggested that the provincial government cultivate economic sectors with the capacity to employ a substantial workforce, thereby contributing to a reduction in unemployment.

6. References

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