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Economic Growth in Southeast Sulawesi: The Pivotal Role of Infrastructure (2010-2022)

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Abstract:

In recent years, Southeast Sulawesi has witnessed significant infrastructure development, which is expected to stimulate economic growth, attract investments, create job opportunities, and improve its residents' overall quality of life. This study seeks to analyze the effect of infrastructure on the economic growth of Southeast Sulawesi from 2010 to 2022. Utilizing secondary data, including the Gross Regional Domestic Product (GRDP) of Southeast Sulawesi and infrastructure indicators such as roads, water, and electricity, Employing a quantitative approach, specifically Multiple Linear Regression Analysis, this research aims to determine the effect of road, water and electricity infrastructure on economic growth in Sulawesi Tenggara. The findings indicate that when analyzed individually, road and electricity infrastructure significantly influence economic growth. Improved road networks facilitate heightened economic activity by promoting the movement of goods and services, enhancing regional connectivity, and improving accessibility. At the same time, electricity infrastructure proves vital in supporting various sectors and activities, thereby contributing to overall economic growth. Surprisingly, the individual analysis of water infrastructure reveals no significant impact on economic growth, possibly attributed to inefficiencies or ineffectiveness in project implementation or management. However, if the influence of road, water and electricity infrastructure is analyzed simultaneously, the impact is positive and significant on economic growth in Southeast Sulawesi. The synergistic presence of these infrastructure components plays a vital role in supporting economic development. Increasing connectivity, increasing accessibility, and simplifying production and distribution activities contribute to attracting investment, growing competitiveness, and ultimately encouraging the economic development of Southeast Sulawesi as a whole.

Keywords: *Economic Growth; Electrical Infrastructure; Road Infrastructure;Water Infrastructure*

1. Introduction

Every country, particularly developing nations, endeavors to achieve comprehensive development across all sectors to attain ideal economic growth. As a developing country, Indonesia is actively pursuing progress, particularly in the financial industry, focusing on improving societal welfare through widespread infrastructure development.

We agree that infrastructure has a vital role in the economy. Infrastructure facilitates the movement of goods and services, increases connectivity between regions, and provides a foundation for production and distribution activities. Good infrastructure conditions also play an essential role in attracting investment from within and outside the country and increasing a country's competitiveness in the global market. In this context, infrastructure includes transportation networks, energy, and clean water,

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supporting a nation's progress.

Southeast Sulawesi is one of Indonesia's provinces with abundant natural resource potential, including the agricultural, fisheries, mining, and tourism sectors. Despite its potential, sustained economic growth in this region is contingent on adequate infrastructure, as noted by Febiyansah et al. (2018). While generally positive, economic growth in Southeast Sulawesi has experienced fluctuations over the past 13 years, as BPS Provinsi Sulawesi Tenggara reported. Fluctuations in Gross Regional Domestic Product (GRDP) values are identified as influenced by the productivity of the region's economic sector. To address this issue, infrastructure development is recognized as a potential solution, aligning with the findings of World Bank research. (Palei, 2015)

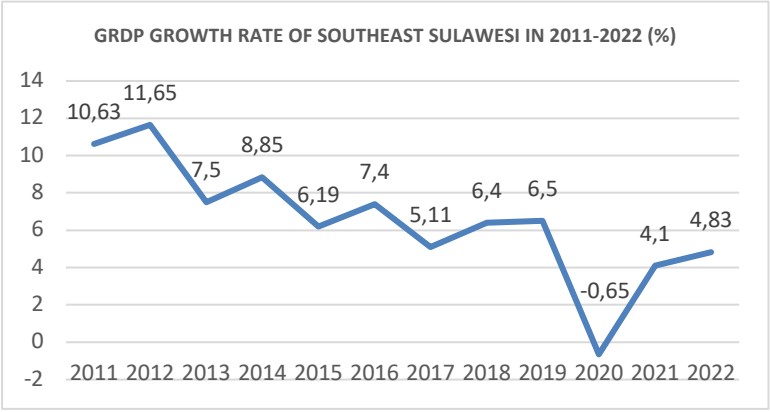

Figure 1. GRDP Growth Rate of Southeast Sulawesi in 2011-2022 (%)

Source: (BPS Provinsi Sulawesi Tenggara, 2023)

Recognizing the importance of sustained and inclusive economic growth in Southeast Sulawesi, recent years have witnessed significant infrastructure projects initiated by the government and related institutions. These projects, ranging from road construction to electricity network enhancements, such as the Trans Sulawesi road construction project, construction of Kendari-Toronipa tourist road, construction of Kendari Bay Bridge (Bahteramas Bridge), construction of the First Inter-Island Transmission in Sulawesi, which is an electricity network connecting Buton Island and Muna Island in Southeast Sulawesi, and project to prepare clean water facilities including improving sanitation facilities for districts that are included in the poor category, aim to strengthen connectivity, increase accessibility, and support economic growth in the region (Rahim et al., 2019)

This research seeks to investigate the influence of infrastructure development on the economic growth of Southeast Sulawesi from 2010 to 2022. The study aims to provide insights into these projects' effect on Southeast Sulawesi's economy by analyzing the trends, fluctuations, and correlations between infrastructure initiatives and economic

indicators.

The uniqueness of this research lies in its focused exploration of the specific impact of infrastructure development on the economic growth of Southeast Sulawesi. By delving into the intricacies of regional economic trends and infrastructure projects, this study contributes valuable insights for policymakers, researchers, and stakeholders involved in the ongoing development efforts in the region.

2. Theoretical Background

Economic Growth

There are many economic perspectives and theories about economic growth, including:

- The Harrod-Domar Growth Model
  The Harrod-Domar Growth Model is an economic theory that links investment with economic growth. This model suggests that the level of economic development of a country depends on the level of investment made in that economy. According to the Harrod-Domar Growth Model, there is a positive relationship between the level of investment and economic growth. The higher the level of investment, the higher the level of economic growth that can be achieved. This model also assumes the existence of a multiplier effect, where an increase in investment will trigger an increase in output and national income.(Masoud, 2014)

- The Neoclassical Growth Model
  Neoclassical Growth theory emphasizes the role of production factors such as labor, capital, and technology in determining long-term economic growth. This theory argues that economic growth depends on accumulating physical capital and technological progress. Growth in this theory is triggered by investment, which increases the existence of capital and the efficiency of using production factors. (Filipe Campante et al., 2021). Neoclassical theory is related to infrastructure development in the context of resource allocation and economic efficiency. Thus, Neoclassical Theory provides a conceptual framework that strengthens understanding of the importance of infrastructure development in achieving economic efficiency, increasing productivity, and encouraging long-term growth.

- Endogenous Growth Theory
  Endogenous Growth Theory focuses on the internal factors that drive long-term economic growth. This theory highlights the role of knowledge, innovation, and policy in driving economic growth. (Chukwuemeka, 2015) In Endogenous Growth Theory, infrastructure is considered one of the main determining factors in increasing economic productivity and innovation. Infrastructure development can support long-term economic growth.

The economic growth of a country is a phenomenon that reflects changes in the total value of gross domestic product (GDP) from year to year. (Sikdar, 2020) Economic

growth describes the health of a country's economy and how quickly a country's prosperity is growing. This can be seen from the increase in production of goods and services measured in monetary value.

The economic growth of a country is usually measured as a percentage of GDP, and the economic development of a region is generally calculated as a percentage of GDRP. When an economy grows, the country produces more goods and services. Factors that contribute to economic growth include investment, innovation, consumption, foreign trade, infrastructure, and government policy. (Sukirno, 2000).

Stable economic growth can create jobs, increase income, reduce poverty, and increase community welfare. It also allows governments to provide public services, improve infrastructure, and allocate resources to worthwhile projects.

Infrastructure

Infrastructure is an essential component in a region's development and economic growth. Good infrastructure can positively affect several aspects, especially the economic aspect. The positive impact of the financial element due to the availability of good infrastructure is increased investment and creating jobs, which will ultimately increase economic growth and improve people's welfare. Infrastructure has a significant contribution to economic growth in line with what was proposed by Sollow in the Exogeunes growth theory and Endogeunes growth theory (Khurriah & Istifadah, 2019)

Infrastructure facilitates the movement of goods and services, increases connectivity between regions, and provides a foundation for production and distribution activities. Infrastructure systems are vital in supporting the functions of social and economic systems in public life (Ferdy, 2015)

Good infrastructure conditions also play an essential role in attracting investment from within and outside the country and increasing a country's competitiveness in the global market. This is in line with what was stated by Barro (1990) that economic growth is influenced by two things: human resources and capital, both private capital and capital originating from the government, which is then used for infrastructure development.

Empirical Studies of Economic Growth and Infrastructure

Many types of infrastructure can affect economic growth. Road and electricity are two types of infrastructure that can affect the income of non-farm enterprises and employment, which can affect economic growth, based on Gibson & Olivia's (2010) research. Amairia & Amaira (2017) also examined other research using similar variables. The results show that transport infrastructure and investment in transport infrastructure in Tunisia significantly positively contribute to economic growth.

Apart from that, telecommunications infrastructure, including internet networks, is also an infrastructure that influences economic growth. This variable has been

researched by Kabaklarli & Atasoy (2019), who show that broadband infrastructure has positively impacted economic growth in 57 countries from 2001 to 2016. Bahrini & Qaffas (2019) also stated in their research that information and communications technology significantly impacts the economic growth of developing countries in the MENA and SSA regions.

Other public infrastructure researched by Rogowski et al. (2021), namely the postal system, impacts economic growth. The results show that the postal system contributes significantly to economic development. This research involves an analysis of the spread and distribution of postal systems in various countries from 1875 to 2007, as well as data on the location of post offices at the county level in the United States from 1850 to 2000. Port infrastructure and logistic performance are the types of infrastructure that can impact economic growth, according to research by Munim & Schramm (2018).

Hypothesis Development

The approach used to estimate the effect of infrastructure on economic growth is based on The Harrod-Domar growth model. The Harrod-Domar Growth Model is an economic theory that links investment with economic growth. This model suggests that the level of economic growth of a country depends on the level of investment made in that economy. The Harrod-Domar model is closely related to infrastructure development in the context of economic growth. Infrastructure development is a form of autonomous investment that can encourage economic growth. (Masoud, 2014) Thus, simultaneously, it can be hypothesized that:

H1 (a) = The infrastructure has a significant effect on the economic growth of Southeast Sulawesi

Many types of infrastructure can affect economic growth. Road and electricity are two types of infrastructure that affect the income of non-farm enterprises and employment that can increase economic growth, according to the research by Gibson & Olivia (2010). Novitasari et al. (2020) also examine several infrastructure and economic growth variables. The economic growth indicators are GDP, HDI, and HCI of poverty, and many economic infrastructure indicators such as road, sanitation, electricity, clean water, education facilities, medical facilities, and waste infrastructure. The result shows that roads, medical facilities, and waste infrastructure have a positive impact on GDP, while clean water has a negative effect on GDP. The types of infrastructure that positively impact economic growth are roads, sanitation, and education facilities.

Other research has used many different types of infrastructure, but this study will focus on the effect of basic infrastructure on GRDP as an indicator of economic growth. According to Gnade et al. (2016), basic infrastructure includes several infrastructures, including roads, water, and electricity. Thus, partially, it can be hypothesized that:

H1 (b) = The road infrastructure has a positive significant effect on economic growth in Southeast Sulawesi.

H1 (c) =The water infrastructure negatively affects economic growth in Southeast Sulawesi.

H1 (d) = The electricity infrastructure has a positive significant effect on economic growth of Southeast Sulawesi.

3. Methodology

This research uses quantitative approaches to analyze the influence of infrastructure on the economic growth of Southeast Sulawesi in 2010-2022. The secondary data is collected by documentation study from BPS Sulawesi Tenggara.

The data analysis method used is multiple linear regression analysis. Multiple linear regression aims to determine the influence of infrastructure on the economic growth of Southeast Sulawesi in 2010 – 2022, either partially or simultaneously. This method is suitable for this research because the data used is time series data with more than one variable. The regression method provides estimates of statistical parameters that can provide information about how much infrastructure impacts economic growth. Statistical significance testing also helps determine whether the relationship is significant. This method is also helpful in determining the extent of the contribution of infrastructure compared to other factors (Stock & Watson, 2015)

The dependent variable used in this research is economic growth, while the independent variable is infrastructure variable, which consists of road, water, and electrical infrastructure as the indicators. These three variables are appropriate indicators to use because they constitute the basic infrastructure of the economy. Another reason why we use these three variables is because (1) road length is an essential indicator of transport infrastructure. A good road network can improve connectivity between regions, facilitate the movement of goods and people, and support economic activity; (2) water consumption shows the level of community access to clean water infrastructure. Good clean water infrastructure positively impacts public health and sectors such as agriculture and industry, and (3) electricity consumption reflects the level of access and use of electrical energy in an area. Adequate energy infrastructure can support industrial and business activities, increase productivity, and create jobs.

Operational Definition

Y = Economic Growth using GRDP data based on constant prices for all districts and cities in Southeast Sulawesi in 2010-2022

X1 = Road Infrastructure using Road length (km) data of district/city roads in Southeast Sulawesi from 2010-2022

X2 =Water Infrastructure using water consumption data according to the number of clean water customers to districts/cities in Southeast Sulawesi 2010-2022

X3 = Electrical Infrastructure using Electricity consumption data according to the number of electricity customers of districts/cities in Southeast Sulawesi 2010-2022

Logs are applied in the data regression process to account for differences in the units of each research variable. So, the following equation is created:

$$LogY_{it} = \beta_0 + \beta_1 LogX1_{it} + \beta_2 LogX2_{it} + \beta_3 LogX3_{it} + e_{it}$$

Information:

Y :Economic Growth (Gross Regional Domestic Product/GRDP)

β_0 : Constant

$\beta_1 \ldots 3$: Coefficients X1, X2, X3

$i \ldots t$: Province and year

X1 : Road Infrastructure (km)

X2 : Water Infrastructure (number of customers)

X3 : Electrical Infrastructure (number of customers)

e : error term

4. Empirical Findings/Result

Before carrying out multiple linear regression data analysis, it is necessary to carry out several classic assumption tests, which are prerequisite tests that must be fulfilled in regression analysis, including the Normality Test, Multicollinearity Test, Autocorrelation Test, Heteroscedasticity Test, and Linearity Test.

- Normality test

One of the classic assumption tests as a prerequisite that must be met in regression analysis is the normality test. The following are the results of the normality test using the Eviews10 device:

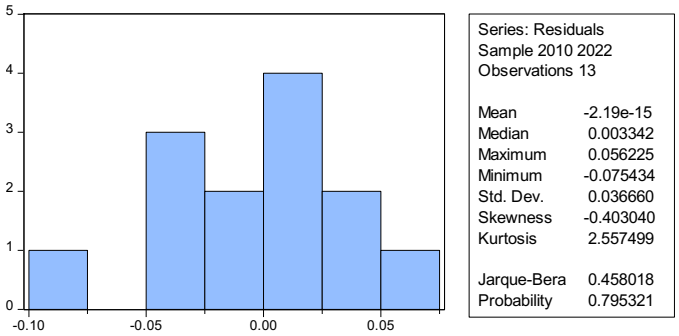

Figure 2. Normality test result

Source: Data Processing Result

It is known that the Jarque-Bera Probability value is 0.7953 (> 0.05), so it can be concluded that the data is normally distributed or the assumption of the data normality test has been met.

- Multicollinearity Test

The multicollinearity test is a part of the Classic Assumption Test in Multiple Linear Regression Analysis. A good regression model should not have a high correlation between independent variables. The method to detect multicollinearity symptoms in this research uses the VIF (Variance Inflation Factors) method. The following are the results of the multicollinearity test using the Eviews10 device:

Table 1. Multicollinearity Test Result

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	4.274653	31011.02	NA
LOG(X1)	0.083627	53041.08	7.460512
LOG(X2)	0.016329	31409.55	1.254498
LOG(X3)	0.006914	7905.751	6.829462

Source: Data Processing Result

It is known that the VIF value of the independent variables included in the model is 7.4605 (< 10.00), so it can be concluded that the data does not have symptoms of multicollinearity or that the assumptions of the multicollinearity test have been fulfilled.

- Autocorrelation Test

The autocorrelation test is a part of the classic assumption test in regression analysis. A good regression model should pass the autocorrelation test. The method used to detect the symptoms of autocorrelation in this research is the Lagrange Multiplier autocorrelation test (LM Test). The autocorrelation test can also be called the Breusch-Godfrey test. The following are the results of the autocorrelation test using the Eviews10 device:

Table 2. Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.463093	Prob. F(2,7)	0.6473
Obs*R-squared	1.519068	Prob. Chi-Square(2)	0.4679

Source: Data Processing Result

The heteroscedasticity test is a part of the classical assumption test in regression analysis. A good regression model should pass the heteroscedasticity test. The White test is an alternative method for heteroscedasticity besides the Glesjer test or the

Breuscch Pagan Godfrey test. The following are the results of the heteroscedasticity test using the Eviews10 device:

Table 3. Heteroskedasticity Test: White

F-statistic	1.467807	Prob. F(7,5)	0.3476
Obs*R-squared	8.744584	Prob. Chi-Square(7)	0.2715
Scaled explained SS	3.263888	Prob. Chi-Square(7)	0.8596

Source: Data Processing Result

It is known that the Probability Chi-Square value is 0.2715 (> 0.05), so it can be concluded that the heteroscedasticity test assumptions have been met or passed the heteroscedasticity test.

- Linearity Test

The linear relationship can be positive or negative. The linearity test is one of the prerequisite tests in regression analysis. The method used in the linearity test on Eviews is the Ramsey Test. The following are the results of the heteroscedasticity test using the Eviews10 device:

Table 4. Linearity Test

	Value	df	Probability
t-statistic	1.912018	8	0.0922
F-statistic	3.655813	(1, 8)	0.0922
Likelihood ratio	4.892726	1	0.0270

Source: Data Processing Result

It is known that the probability F-statistic value is 0.0922 (>0.05), so it can be concluded that the linearity test assumption has been met.

Multiple Linear Regression Analysis

Regression analysis is used to determine the effect of the independent variable on the dependent variable. Multiple linear regression aims to assess the influence of infrastructure on economic growth in Southeast Sulawesi, either partially or simultaneously. The following are the results of multiple linear regression analysis using Eviews10:

Table 5. Multiple Linear Regression

Dependent Variable: LOG(Y)
Method: Least Squares
Date: 11/19/23 Time: 01:41
Sample: 2010 2022
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.702254	2.067523	3.241682	0.0101
LOG(X1)	0.766875	0.289183	2.651870	0.0264
LOG(X2)	-0.049828	0.127785	-0.389935	0.7057
LOG(X3)	0.404435	0.083148	4.864067	0.0009

R-squared	0.976761	Mean dependent var	18.13639
Adjusted R-squared	0.969015	S.D. dependent var	0.240484
S.E. of regression	0.042332	Akaike info criterion	-3.238909
Sum squared resid	0.016128	Schwarz criterion	-3.065078
Log likelihood	25.05291	Hannan-Quinn criter.	-3.274639
F-statistic	126.0932	Durbin-Watson stat	1.353241
Prob(F-statistic)	0.000000		

Source: Data Processing Result

Based on the results of the regression analysis, the following regression model equation was obtained:

$$LogY = 6.7022 + 0.7668LogX1 - 0.0498LogX2 + 0.4044LogX3$$

A constant value of 6.7022 means that if the independent variable increases by one unit on average, the dependent variable will increase by 6.7022. The regression coefficient value of variable X1(road infrastructure) has a positive (+) value of 0.7668, so it can be interpreted that if variable X1 (Road Infrastructure) increases by one percent, then variable Y (Economic Growth) will increase by 0.7668 percent and vice versa. The regression coefficient value of variable X2 (Water Infrastructure) has a negative (-) value of 0.0498, so it can be interpreted that if variable X2 (Water Infrastructure) increases by one percent, then variable Y (Economic Growth) will decrease by 0.0498 percent and vice versa. The regression coefficient value of variable X3 (Electricity Infrastructre) has a positive (+) value of 0.4044, so it can be interpreted that if variable X3 (Electricity Infrastructre) increases by one percent, then variable Y (Economic Growth) will increase by 0.4044 percent and vice versa.

Analysis of T-Test Results

Variable X1 (road infrastructure) has a t-statistical value of 2.6518 with a probability (significance) value of 0.0264 (< 0.05), so it can be concluded that variable X1 (road infrastructure) has a significant positive effect on variable Y (Economic Growth). Variable X2 (Water Infrastructure) has a t-statistic value of -0.3899 with a probability (significance) value of 0.7057 (>0.05), so it can be concluded that variable X2 (Water Infrastructure) has no significant effect on variable Y (Economic Growth). Variable X3 (Electricity Infrastructre) has a t-statistic value of 4.8640 with a probability (significance) value of 0.0009 (< 0.05), so it can be concluded that variable X3 (Electricity Infrastructre) has a significant effect on variable Y (Economic Growth).

Analysis of F Test Results

It is known that the F-statistic value is 126.0932 with a Prob (F-statistic) value of 0.0000 (<0.05), so it can be concluded that Infrastructure as the Independent variable (X) simultaneously has a significant positive effect on Economic Growth as the Dependent Variable (Y).

Analysis of Coefficient of Determination Test Results

It is known that the Adjusted R-squared value is 0.9690, so it can be concluded that the contribution of the influence of the Independent Variable to the Dependent Variable simultaneously is 96.9%. Meanwhile, the remaining 3.1% is influenced by other variables outside this research.

5. Discussion

Economic Growth of Southeast Sulawesi

Southeast Sulawesi is a province in the southeastern part of Sulawesi Island. Southeast Sulawesi comprises 13 districts and cities spread across the mainland and islands. The economic growth of a region can be reflected in the value of Gross Regional Domestic Product (GRDP) each year. (Muniarty et al., 2022) The economic growth of Southeast Sulawesi in the last 13 years has increased from year to year, which can be seen from the GRDP value of Southeast Sulawesi Province in 2010 - 2022; however, in 2020, the GRDP of Southeast Sulawesi experienced a decline, but the decline that occurred

was not significant. The following is a graph of the GRDP of Southeast Sulawesi GRDP for 2010 – 2022:

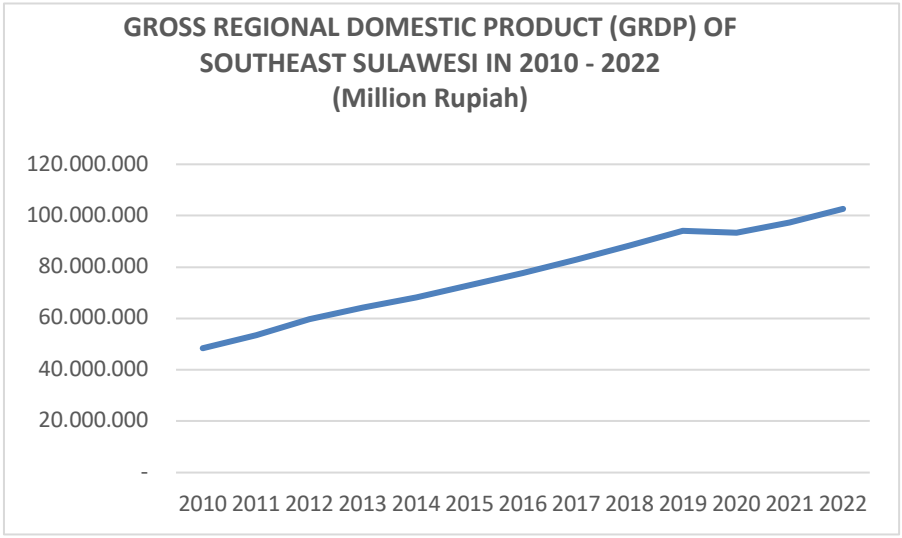

Figure 3. Gross Regional Domestic Product (GRDP) of Southeast Sulawesi in 2010 – 2022

The graph shows that the GRDP of Southeast Sulawesi in 2010 was 48,401,152 million rupiah, which then increased from year to year until it reached 102,657,944 million rupiah in 2022. The GRDP of Southeast Sulawesi in 2020 was 93,445,720 million rupiahs, which experienced a decrease from the previous year, with the GRDP value in 2019 being 94,053,524 million rupiahs. The decline in GRDP was 0.65% in 2020. The reduction in GRDP occurred due to the COVID-19 pandemic in 2020, which decreased economic activity due to movement restrictions (lockdown) in almost all regions.

The economic growth rate of Southeast Sulawesi can be determined based on the GRDP growth rate. The GRDP growth rate of Southeast Sulawesi has fluctuated over the last 13 years and shows a downward trend from year to year. The following is a graph of the GRDP growth rate for Southeast Sulawesi:

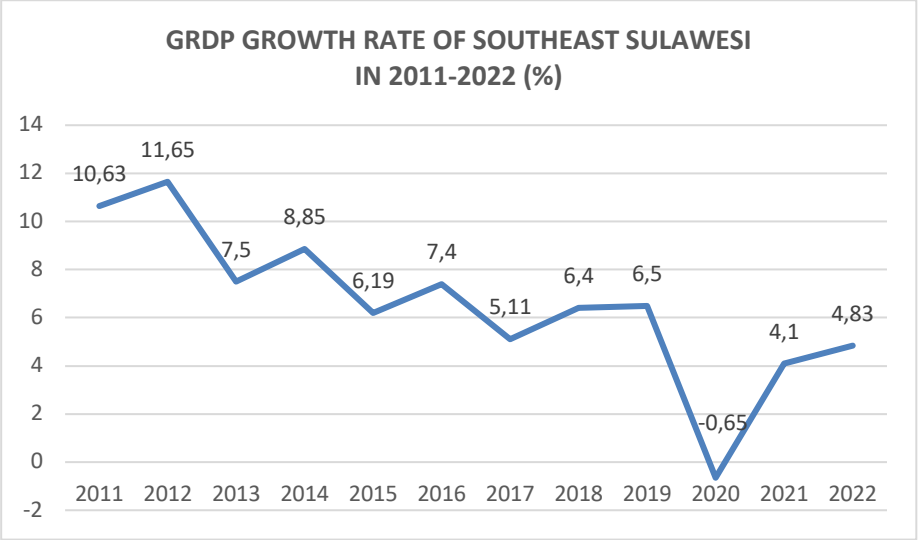

Figure 4. GRDP Growth Rate of Southeast Sulawesi in 2011 - 2022

It can be seen that the GRDP growth rate of Southeast Sulawesi was above 10 percent in 2011 and 2012. However, the GRDP growth rate never reached 10 percent in the following years until now. The economic growth rate declined to -0.65 due to the COVID-19 pandemic in 2020. The Covid 19 pandemic in 2020 resulted in a decline in economic activity in the form of decreased consumption, hampered supply chains, increased unemployment due to several businesses closing or going bankrupt, etc.

The instability of economic growth over the past 10 to 20 years has not only occurred in Indonesia, especially in Southeast Sulawesi, but has also occurred in several developing Asian countries. According to Mishra et al. (2013), one of India's main obstacles to achieving high economic growth is inadequate infrastructure, so investment in this sector needs to be increased. It also happened in Nigeria from 2000 to 2014, and there was a significant decline in economic growth; one of the reasons, according to Fatai et al. (2016), was a lack of investment in infrastructure, which could be a factor inhibiting economic growth in Nigeria.

Sustainable economic growth is the primary goal of every government responsible for its people's welfare. One of the policies that regional governments can take to increase the economic growth rate is rising government expenditure, which focuses on infrastructure development. In their research, Ahuja & Pandit (2020) stated that increasing government spending can boost economic growth in various developing countries. Apart from increasing government spending, the government needs to increase investment, especially investment in infrastructure. This statement by the Harrod-Domar economic growth model states that economic growth can be triggered through increased investment. (Masoud, 2014). Robust and quality infrastructure has been recognized as a critical driver of economic growth at various levels. Economic

growth and sustainable economic development will also be achieved with sustainable infrastructure development. (Thacker et al., 2019)

Infrastructure Conditions in Southeast Sulawesi

Infrastructure is an essential component in a region's development and economic growth. Good infrastructure can positively affect several aspects, especially the economic aspect. The positive impact of the financial element due to the availability of good infrastructure is increased investment and creating jobs, which will ultimately increase economic growth and improve people's welfare. In this research, we will discuss in more depth the condition of basic infrastructure in Southeast Sulawesi Province, including Road, Water, and Electrical infrastructure. These three things have a significant influence on the economy of a region.

- Road infrastructure

Road infrastructure has a huge role in facilitating economic sustainability. With adequate road infrastructure, connectivity and accessibility between regions will be easy and fast. The impact of good roads on the economy can facilitate the movement of goods, services, and labor from one place to another, which can expand the market for business people and open up investment opportunities. Based on the level of government authority, road infrastructure in Southeast Sulawesi is divided into three authorities: roads under state authority, roads under provincial authority, and roads under district/city authority. In this research, the road variable used is the total length of roads in all districts and cities in Southeast Sulawesi over the last 13 years. The following is the length data for Southeast Sulawesi Province for 2010 – 2022:

Table 6. The Length of Roads in Southeast Sulawesi in 2010-2022

Year	Length of Roads (Km)
2010	9704
2011	9822
2012	10012
2013	10420
2014	10622
2015	10985
2016	12315
2017	12573
2018	12797
2019	12954
2020	12783
2021	12864
2022	12491

Source: (BPS Provinsi Sulawesi Tenggara, 2023b)

The length of roads in Southeast Sulawesi has generally increased. It can be seen that the total length of roads in Southeast Sulawesi was 97,024 km in 2010, then 12 years later, the size of roads increased to 12,491 km in 2022, which means that the additional road length in Southeast Sulawesi e was 2,787 km in 12 years.

Based on this phenomenon, road construction in Southeast Sulawesi is increasing yearly. After carrying out the regression analysis by T-test, the results showed that road infrastructure significantly influenced economic growth in Southeast Sulawesi. Roads are an essential infrastructure that is very important for the economy. This aligns with previous research conducted by Banerjee et al. (2012), who found that transportation access positively impacts economic performance in several regions in China. In this research, the transportation accessibility variables studied are roads, trains, and river networks. The same thing also happens in Tunisia, and transportation infrastructure, especially roads, plays a vital role in economic growth in Tunisia. (Amairia & Amaira, 2017) Munawaroh & Haryanto (2021) also stated in their research that roads have a significant positive effect on the economic growth of Papua Province.

- Water Infrastructure

Clean water is a basic need that must be fulfilled in our lives. Access and infrastructure to adequate clean water sources play a significant role, not only in the economic aspect but most notably in the sustainability of human life. Clean water is fundamental in daily needs such as drinking, cooking, bathing, and sanitation. Apart from that, the need for access to clean water, which is used for irrigation, is also huge in the agricultural sector. Adequate sources of clean water in the farm sector can increase agricultural output to maintain food security, ultimately providing the foundation for a strong economy. In this research, the condition of water infrastructure in Southeast Sulawesi is shown through data on the number of drinking water customers. Southeast Sulawesi's drinking water customer categories consist of 5 categories: household, social, commercial, industrial, government agencies, and unique. The following is data on the number of drinking water customers in Southeast Sulawesi for 2010 – 2022:

Table 7. The Number of Drinking Water Customers in Southeast Sulawesi for 2010-2022

Year	Number of Drinking Water Customers
2010	10989606
2011	11854636
2012	10730218
2013	11572407
2014	11840042
2015	11070599
2016	11273562
2017	13278382

2018	15126375
2019	11882398
2020	13082046
2021	9917874
2022	11531755

Source: (BPS Provinsi Sulawesi Tenggara, 2023)

There is a fluctuation in the number of water customers in Southeast Sulawesi based on the condition of the number of water customers shown in the table above. The highest number of drinking water customers in the last 13 years was 15126375 in 2018, but 3 years later, there was a significant decline, with the number of customers being 9917874 in 2021. The number of customers decreased to 5208501 in that period. This raises the question of whether the decline in customers in 2021 is due to less than optimal service, such as irregular water supply, poor water quality, or inadequate water infrastructure, such as pipe damage. This will be studied further in the following research.

After conducting the regression analysis using the T-test, the water infrastructure variable does not significantly influence economic growth in Southeast Sulawesi. Previous researchers in other regions of Indonesia also studied this. One of the studies conducted by Novitasari et al. (2020) in DKI Jakarta, West Java, and Banten province shows that there are infrastructure variables that have a positive and negative effect on GDP and HDI. Of the several types of infrastructure studied, clean water is the only infrastructure variable negatively influencing GDP. In contrast, this variable does not affect HDI, where GDP and HDI are indicators of the economic growth used in this study.

- Electrical Infrastructure

Electrical infrastructure is also one of the basic infrastructures which also plays a vital role in an economy. Apart from providing social benefits for the community, electrical infrastructure also dramatically impacts the sustainability of economic activities. Suitable and adequate electrical infrastructure can encourage industrial and business growth. This can reduce the obstacles for companies in carrying out their activities, increase their productivity due to the use of advanced machines and technology, and open up investment opportunities because electricity is an essential factor that investors consider in determining their operational location.

PT PLN Nusantara Power, as an electricity supplier in Sulawesi Tenggara, has seven customer service units under the authority of UP3 Kendari, including ULP Unaaha, ULP Kolaka, ULP South Konawe, ULP Bombana, ULP North Kolaka, ULP Wua-wua and ULP Benu-benua. In this research, the condition of electrical infrastructure in Southeast Sulawesi is shown through data on the number of electricity customers. Electricity is distributed to customers in various sectors, including household,

business, industrial, social, general, and special services. The following is data on the number of electricity customers in Southeast Sulawesi for 2010 – 2022:

Table 8. The Number of Electricity Customers in Southeast Sulawesi for 2010-2022

Years	Number of Electricity Customers
2010	140786
2011	197483
2012	190819
2013	215759
2014	231292
2015	246050
2016	272332
2017	304482
2018	349406
2019	390982
2020	427833
2021	460395
2022	489772

Source: BPS Sulawesi Tenggara

The number of electricity customers in Southeast Sulawesi has increased yearly. This shows a yearly increase in power and electricity network in Southeast Sulawesi. Based on data from BPS Sulawesi Tenggara, the household sector has the most extensive customer distribution in Southeast Sulawesi. It will reach 62.21%, followed by the business sector at 21.40% of the total number of electricity customers in 2022.

Electricity consumption has increased from year to year; based on the results of regression analysis using the T-test, the results show that electricity consumption significantly positively affects economic growth in Southeast Sulawesi. According to research conducted by Tang & Tan (2013), electricity consumption in Malaysia also positively impacts economic growth.

6. Conclusions

This research aims to identify the influence of infrastructure on economic growth in Southeast Sulawesi. Several infrastructure indicators include road, water, and electricity infrastructure, while GRDP indicates economic growth. Based on this research, infrastructure development significantly influences economic growth in Southeast Sulawesi. Good infrastructure facilitates the movement of goods and services, improves connectivity between regions, and provides the basis for

production and distribution activities. Adequate infrastructure also plays a vital role in attracting investment from within and outside the country and increasing a country's competitiveness in the global market.

The results of multiple linear regression analysis show that partial road and electricity infrastructure significantly influence economic growth. In contrast, water infrastructure does not influence economic growth in Southeast Sulawesi. Simultaneously, however, road, water, and electricity infrastructure significantly affect economic growth in Southeast Sulawesi.

Overall, recognizing the positive effect of road and electrical infrastructure on economic growth in Southeast Sulawesi should guide policymakers and developers to prioritize strategic planning, investment, and maintenance in these areas. By doing so, they can create an enabling environment for sustained economic development, job creation, and improved living standards in the region. However, water infrastructure does not affect economic growth so that further research might explore this relationship in more detail or under different conditions. The limitation of this study is using only three infrastructure variables and not considering other variables outside infrastructure. Further research could also involve a more comprehensive analysis by considering other infrastructure variables besides infrastructure that can influence economic growth in Southeast Sulawesi, such as government policy, social and cultural aspects, and external factors that influence the economy of Southeast Sulawesi.

References:

Ahuja, D., & Pandit, D. (2020). Public Expenditure and Economic Growth: Evidence from the Developing Countries. *FIIB Business Review: Sage Journal*, *9*(3), 228–236.

Amairia, R., & Amaira, B. (2017). Transport Infrastructure and Economic Growth: New Evidence from Tunisia an ARDL Bounds Testing Approach. *Journal of Infrastructure Development*, *9*(2), 98–112.

Bahrini, R., & Qaffas, A. A. (2019). Impact of Information and Communication Technology on Economic Growth: Evidence from Developing Countries. *Economies*, *7*(1).

Banerjee, A., Duflo, E., & Qian, N. (2012). On the Road: Access to Transportation Infrastructure and Economic Growth in China. *National Bureau of Economic Research*.

Barro, R. J. (1990). Human Capital and Economic Growth. *American Economic Review*, *98*(5).

BPS Provinsi Sulawesi Tenggara. (2023a). *Provinsi Sulawesi Tenggara dalam Angka Tahun 2023*.

BPS Provinsi Sulawesi Tenggara. (2023b). *Statistik Transportasi Provinsi Sulawesi Tenggara 2010—2023*.

Chukwuemeka, O. (2015). An Over View of Endogenous Growth Models: Theory and Critique. *International Journal of Physical and Social Sciences*, *5*(3).

Fatai, O. O., Omolara, Y. J., & Taiwo, A. B. (2016). Infrastructure Finance and Development in Nigeria. *Arabian Journal of Business and Management Review*, *3*(12).

Febiyansah, P. T., Susanto, H., Susanto, H., Nadjib, M., Firmansyah, Adam, L., Firmansyah, Cahyono, B. D., & Sabilla, K. (2018). The Role of Economic Infrastructure in Regional Development: Strategy to strengthen tourism economic zones' supporting system. *Journal of Indonesian Social Sciences and Humanities (JISSH)*, *8*(1), 2656–7512.

Ferdy Posumah. (2015). Pengaruh Pembangunan Infrastruktur Terhadap Investasi di Kabupaten Minahasa Tenggara. *Jurnal Berkala Ilmiah Efisiensi*, *15*(2).

Filipe Campante, Federico Sturzenegger, & Andrés Velasco. (2021). *Advanced Macroeconomics: : An Easy Guide*. LSE Press.

Gibson, J., & Olivia, S. (2010). The Effect of Infrastructure Access and Quality on Non-Farm Enterprises in Rural Indonesia. *Elsevier*, *38*(5), 717–726.

Gnade, H., Blaauw, D., & Greyling, T. (2016). The Impact of Basic and Social Infrastructure Investment on Economic Growth and Social Development in South Africa's Urban and Rural Municipalities. *ERSA: Economic Research Southern Africa*.

Kabaklarli, E., & Atasoy, B. S. (2019). Broadband Infrastructure and Economic Growth: A Panel Data Approach For Selected Countries. *DIEM: Dubrovnik International Economic Meeting*.

Khurriah, H., & Istifadah, N. (2019). The Role of Infrastructure in Indonesia's Economic Growth. *International Journal of Advances in Scientific Research and Engineering (IJASRE)*, *5*(7).

Masoud, N. (2014). A contribution to the theory of economic growth: Old and New. *Journal of Economics and International Finance*, *6*(3).

Mishra, A. K., Narendra, K., & Kar, B. P. (2013). Growth and Infrastructure Investment in India: Achievements, Challenges, And Opportunities. *Economic Annals*, *58*(196).

Munawaroh, S., & Haryanto, T. (2021). Development of Infrastructure And Economic Growth of Papua Province. *Media Trend: Berkala Kajian Ekonomi dan Studi Pembangunan*, *16*(1), 19–31.

Muniarty, P., Anggraini, Y., Fadliyanti, L., Amalia, F., Widayati, T., Aisyah, H., Nyoman, I. A., Yuliastuti, Rejekiningsih, T. W., Malau, N. A., Nur, T. P. T., & Hayati. (2022). *Teori Ekonomi Mikro dan Makro*. PT Global Eksekutif Teknologi.

Munim, Z. H., & Schramm, H.-J. (2018). The impacts of port infrastructure and logistics performance on economic growth: The mediating role of seaborne trade. *Journal of Shipping and Trade*, *3*(1). https://doi.org/DOI 10.1186/s41072-018-0027-0

Novitasari, F., Drestalita, N. C., & Maryati, S. (2020). The impacts of infrastructure development on economic growth (case study: DKI Jakarta, Banten Province

and West Java Province). *IOP Conference Series: Earth and Environmental Science*. https://doi.org/doi:10.1088/1755-1315/592/1/012017

Palei, T. (2015). *Assessing the Impact of Infrastructure on Economic Growth and Global Competitiveness*. *23*, 168–175.

Rahim, M., Armin, Suriadi, L. O., & Arwaddin, M. (2019). Infrastructure's Effect on Economic Growth in Southeast Sulawesi. *Trikonomika*, *18*(1), 8–12.

Rogowski, J. C., Gerring, J., Maguire, M., & Cojocaru, L. (2021). Public Infrastructure and Economic Development: Evidence from Postal Systems. *American Journal of Political Science*, 1–17.

Sikdar, S. (2020). *Principles of Macroeconomics*. OUP India.

Stock, J. H., & Watson, M. W. (2015). *Introduction to Econometrics*. Pearson.

Sukirno, S. (2000). *Makro Ekonomi Modern: Perkembangan Pemikiran dari Klasik hingga Keynesian Baru*. Raja Grafindo Pustaka.

Tang, C. F., & Tan, E. C. (2013). Exploring the nexus of electricity consumption, economic growth, energy prices and technology innovation in Malaysia. *Elsevier*, *104*, 297–305.

Thacker, S., Adshead, D., Fay, M., Hallegatte, S., Harvey, M., Meller, H., O'Regan, N., Rozenberg, J., Watkins, G., & Hall, J. W. (2019). Infrastructure for Sustainable Development. *Nature Sustainability*, *2*, pages324-331.