

The Impact of Infrastructure Development on Economic Growth Regencies/Cities in West Nusa Tenggara Province 2014-2023



Nova Awalita Ramdani¹, Emi Salmah², Muhammad Dzul Fadli³

^{1,2,3}Faculty of Economics and Business, University of Mataram

ABSTRACT: This study aims to analyze the impact of infrastructure development on economic growth. The development of infrastructure will be explored in the form of road infrastructure, education infrastructure, health infrastructure, and water infrastructure on the economic growth of Regencies/Cities in West Nusa Tenggara Province in 2014-2023. This research was conducted with an associative quantitative approach using secondary data from the Central Statistics Agency of West Nusa Tenggara Province. The analysis of data uses panel regression with a Fixed Effect Model (FEM) approach processed through STATA 14 software. The results of the study show that the development of road infrastructure does not impact economic growth. Meanwhile, the development of education infrastructure and health infrastructure has a positive impact on economic growth, and the development of water infrastructure has an impact but has a negative value on the economic growth of Regencies/Cities in West Nusa Tenggara Province in 2014-2023.

KEYWORDS: Infrastructure, Roads, Education, Health, Water, GRDP

INTRODUCTION

Developed countries have successfully passed all stages towards sustainable economic growth by themselves and countries that are still in the precondition stage only need to follow a certain number of development principles to achieve a society with sustainable economic growth (Todaro & Smith, 2011). According to Arsyad (2015), indicator that can be used to analyse the economic development is by looking at its economic growth. Economic growth refers to an increase in Gross Domestic Product (GDP) without considering changes in the economic structure or the rate of population growth.

Solow in neoclassical growth theory assumes that there are three main factors that are the source of economic growth, namely increasing the workforce, increasing capital and technological progress. In this model physical, investment such as infrastructure is included in the category of capital whose existence can increase productivity for production factors so that it can generate economic growth (Mankiw, 2009).

Infrastructure according to the World Bank in Santian et al. (2019) is categorized into three types. First, economic infrastructure includes physical facilities that provide services for economic activities such as production and consumption such as roads, bridges, ports, airports, dams, irrigation canals, power grids, telecommunications, drinking water, sanitation, and gas. Second, social infrastructure includes facilities that improve the quality of life of the community and support human development such as education services, health services, housing, and recreational facilities. Third, administrative infrastructure or institutions that include law enforcement, administrative control and coordination as well as culture.

Currently, the acceleration and equitable distribution of infrastructure development throughout Indonesia is still the main focus of the central government and local governments, especially West Nusa Tenggara Province. West Nusa Tenggara Province has 10 Regencies/Cities, each of which has superior potential in various sectors such as tourism, agriculture, mining, marine and fisheries. To encourage the development of these sectors, the West Nusa Tenggara Provincial Government has established a Regional Medium-Term Development Plan (RPJMD). One of them is through accelerating development and equitable distribution of infrastructure to encourage the development of various sectors so that it can increase regional economic growth (Kausar, 2018).

Economic growth in West Nusa Tenggara Province can be seen in the growth rate of Gross Regional Domestic Product (GRDP) at the basis of constant price in 2010 according to business fields in West Nusa Tenggara Province 2014-2023 in the following figure:

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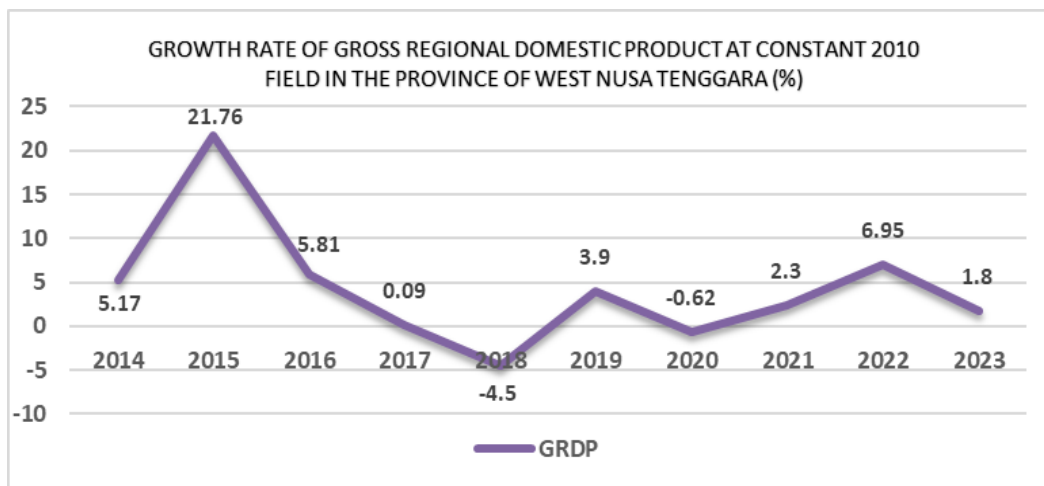


Figure 1. Growth Rate of ADHK 2010 GRDP in NTB Province in 2014-2023

Source: BPS NTB Province (2024)

Figure 1 shows that the economic growth rate of Gross Regional Domestic Product based on 2010 constant prices in 2014-2023 tends to decline. In 2014, the growth rate was 5.17%. Then, in 2015 it showed a positive growth direction from the previous year and was the highest growth rate for the last 10 years, which was 21.76% due to the increase in the production of metal ore concentrates. In 2016 and 2017, the growth rate decreased by 5.81% to 0.09% due to a decline in the mining and quarrying sector. In 2018, there was a very drastic decline of -4.5% due to the occurrence of an earthquake which resulted in a slowdown in economic activity. In 2019, growth increased by 3.9%. However, in 2020 it again experienced a decrease of -0.62% due to the Covid-19 pandemic which disrupted economic activities. In 2021 and 2022, growth will increase from 2.3% to 6.95%. Growth declined again in 2023 by 1.8% due to a decline in mining and quarrying activities, especially copper, as well as agricultural and forestry activities (BPS NTB Province, 2014-2023).

According to Solow-Swan's theory, one way to overcome the growth rate of Gross Regional Domestic Product (GRDP) which tends to decline is through the accumulation of physical capital, including an increase in infrastructure development. Infrastructure development in several aspects such as road infrastructure, education infrastructure, health infrastructure, and water infrastructure in West Nusa Tenggara Province over the past 10 years can be seen in the following figure:

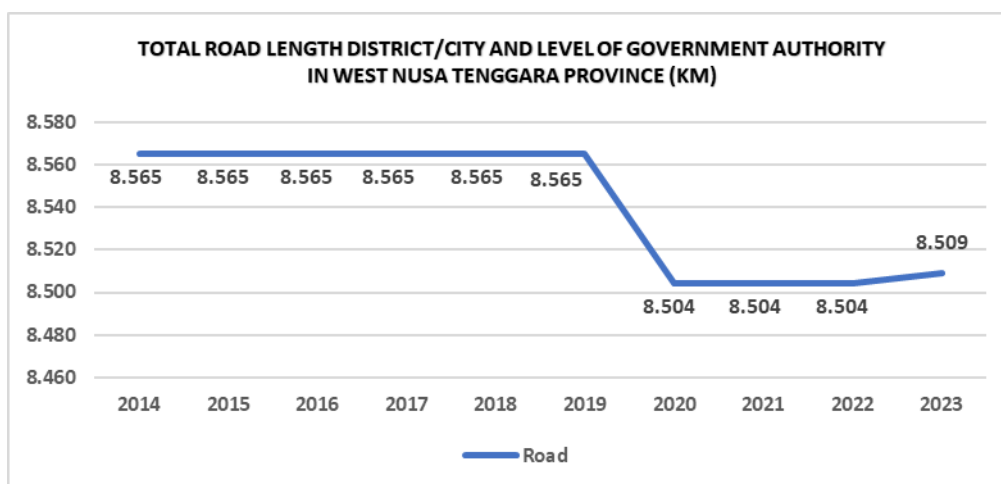


Figure 2. Road Infrastructure Based on Government Authority Level in NTB Province in 2014-2023

Source: BPS NTB Province (2024)

Figure 2 shows the development of road infrastructure development seen from the length of the road according to the government's authority tends to decrease. The length of the road in 2014-2019 has not changed. However, in 2020 there was a drastic decrease from the previous year along 8,565 km to 8,504 km. The year 2023 has experienced a slight increase. Differences in road length are usually caused by changes in the way data is measured or processed, resulting in differences in available road length reports (Kundiharto, 2023).

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In addition, the development of educational infrastructure development in West Nusa Tenggara Province in the last 10 years can be seen in the following figure:

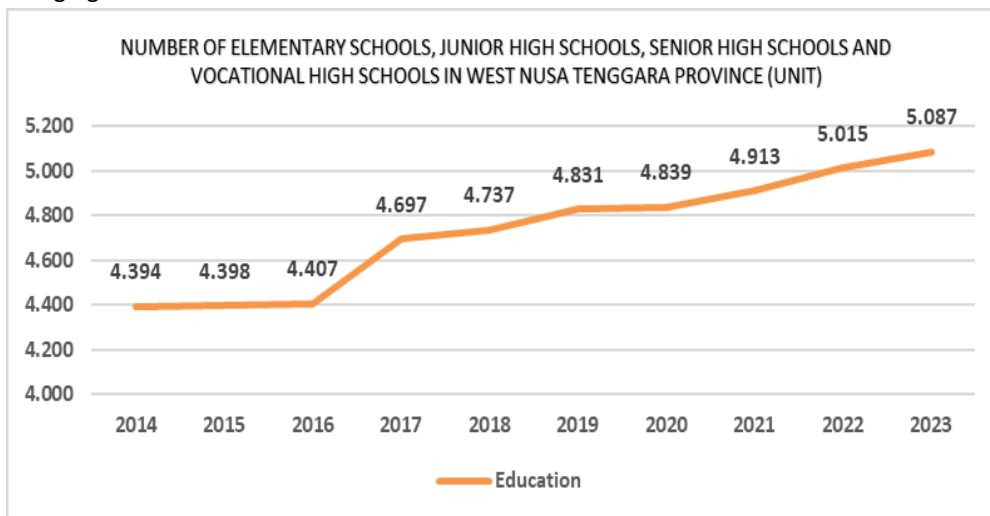


Figure 3. Development of Educational Infrastructure in NTB Province in 2014-2023

Source: Processed from BPS NTB Province data (2024)

Figure 3 shows the development of educational infrastructure which is a combination of the number of Elementary Schools, Junior High Schools, Senior High Schools and Vocational High Schools which are increasing every year. The drastic increase occurred in 2017 from 4,407 units in the previous year to 4,697 units due to an increase in the budget for the education sector provided by the West Nusa Tenggara Provincial government and the launch of educational infrastructure development programs such as "Smart Village" (BPS NTB, 2017).

Then, regarding the development of health infrastructure development in West Nusa Tenggara Province over the past 10 years, it can be seen in the following figure:

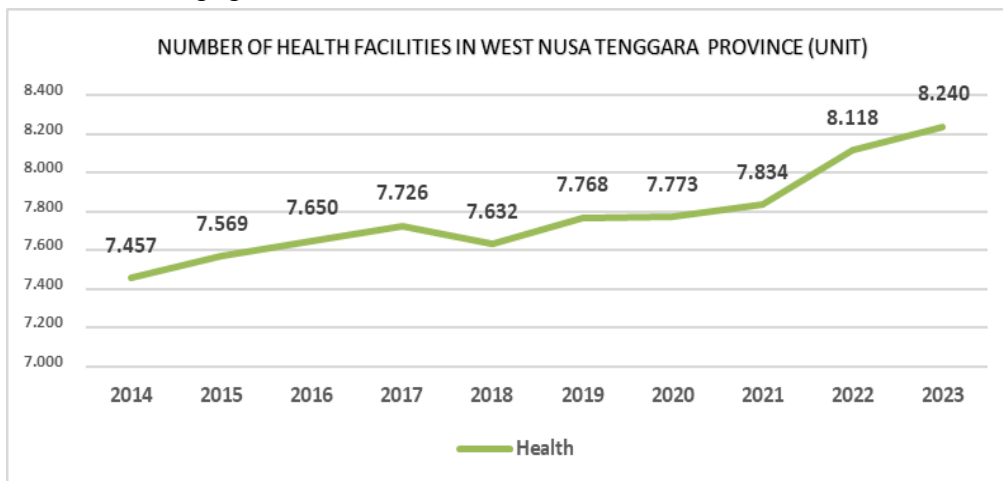


Figure 4. Development of Health Infrastructure in NTB Province in 2014-2023

Source: Processed from BPS NTB Province data (2024)

Figure 4 shows that the development of health infrastructure can be seen in the number of health facilities such as hospitals, special hospitals, primary clinic health centers, and integrated service post have increased throughout 2014-2017. In 2018, there was a decrease from the previous year, which was 7,726 units to 7,632 units. This is due to the occurrence of the earthquake which caused some buildings to be unusable so that health facilities did not operate. Then, in 2019-2023 health infrastructure continues to improve (Ministry of PUPR, 2019).

Furthermore, regarding the development of water infrastructure development in West Nusa Tenggara Province over the past 10 years, it can be seen in the following figure:

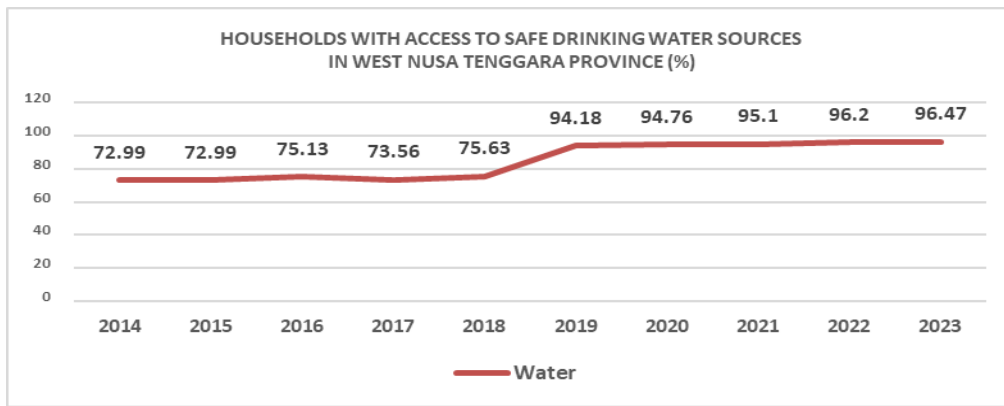


Figure 5. Development of Water Infrastructure in NTB Province in 2014-2023

Source: BPS NTB Province (2024)

Figure 5 shows that the development of water infrastructure based on the percentage of households that have access to decent drinking water sources in 2014-2018 continues to increase every year. In 2019, it experienced a drastic increase from the previous year of 75.63% to 94.18%. In 2020-2023, access to decent drinking water will continue to increase. The increase in access to decent drinking water is due to the fulfillment of access to water services in various regions in the Drinking Water Supply System (SPAM) program through the Housing and Settlement Office (Disperkim NTB, 2023). Equitable and quality infrastructure development is expected to encourage economic growth in a region. However, available data shows that although infrastructure development continues to increase, the growth of Gross Regional Domestic Product (GRDP) actually shows a downward trend. This condition is not in line with Solow-Swan's economic growth theory which explains that infrastructure development can be one of the main factors in increasing economic growth. Previous research has not examined infrastructure incompletely. For reference, a study by Sarifah et al., (2020) entitled "Analysis of the Influence of Road Infrastructure, Electrical Infrastructure, Health Infrastructure and Education Infrastructure on the GRDP of the Purwomanggung Strategic Area 2010-2018". This study uses variables including GRDP, road infrastructure, electricity infrastructure, health infrastructure, and education infrastructure. Then, another study conducted by Afriana et al., (2023) entitled "Analysis of the Impact of Infrastructure Development on Inclusive Economic Growth in Regencies and Cities in NTB Province in 2016-2021". This study uses the variables of the Inclusive Economic Development Index (IPEI), road infrastructure, electricity infrastructure, water infrastructure, and education infrastructure. This study wants to combine the variables that have been used in previous research variables, namely GRDP, road infrastructure, educational infrastructure, health infrastructure and water infrastructure. Therefore, it is necessary to conduct a more in-depth analysis to find out how the impact of infrastructure development on the economic growth of districts and cities in West Nusa Tenggara Province over the past 10 years. Thus, this study aims to analyze the impact of infrastructure development on the economic growth of Regencies/Cities in West Nusa Tenggara Province in 2014-2023.

LITERATUR RIVIEW

Economic Growth

Tarigan, (2012) explained that economic growth is the process of improving an economy to produce goods and services from time to time. Economic growth is usually measured using indicators through Gross Domestic Product (GDP) at the national level and Gross Regional Domestic Product (GDP) at the regional level. There are several main factors that affect economic growth such as labor, capital accumulation and technological advancement. This is based on the theory of economic growth put forward by several experts as follows:

1. Adam Smith's Theory

Adam Smith emphasized the importance of division of labor and capital accumulation. Capital accumulation is needed to increase capital stocks that allow for a more effective division of labor so that it can increase productivity. With the increase in capital as well as labor, the total output will increase (Jhingon, 2012).

2. Solow-Swan Theory

Mankiw (2009) explained in Solow's growth model on the production function states that physical capital and labor can affect the output level of an economy. Mathematically, the production function can be formulated as:

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$$Y = F(K, L).$$

Where Y is the total output, F is the function, K represents physical capital and L represents labor.

3. Harrod-Domar Theory

As explained by Romer (1996) in Fadlli (2019) physical capital has an important role in increasing the accumulation of certain types of capital, which can ultimately encourage an increase in output in the future. Mathematically, this relationship can be described through the following production function:

$$Y = F(A, K, L, H)$$

Where Y represents the total output, F is the production function, A describes the level of technological development, K indicates physical capital, L symbolizes the total workforce, and H refers to human capital.

Gross Regional Domestic Product (GRDP)

According to Suparmono, (2018) the Gross Regional Product (GRDP), it can describe the potential and condition of the economy of a region through all gross added value produced by all economic units in a region in a certain period. GDP includes income from production factors such as land, labor, capital and entrepreneurship. According to the production approach, GDP can be calculated based on the total value of goods and services produced from each economic sector in a certain period which is formulated as follows:

$$Y = \{(P1 \times Q1) + (P2 \times Q2) + (P3 \times Q3) + \dots + (Pn \times Qn)\}$$

Where Y is the GRDP, P represents the unit price of a product, and Q describes the number of products produced.

Infrastructure Development

Infrastructure plays an important role in development, not only as a driver of the economic sector, but also has an impact on various other aspects such as education, social, and regional accessibility (Ministry of PUPR, 2022). Infrastructure according to The World Bank in Santian et al., (2019) is grouped into three types. First, economic infrastructure includes physical facilities that provide services for production and consumption activities such as roads, bridges, ports, airports, dams, irrigation canals, power grids, telecommunications, drinking water, sanitation, and gas. Second, social infrastructure includes facilities that improve the quality of life of the community and support human development such as educational services, health services, housing, and recreational facilities. The third administrative infrastructure includes law enforcement, administrative control and coordination as well as culture. The types of infrastructure used in this study are:

1. Road Infrastructure

Roads are included in the economic infrastructure in land transportation which includes connecting buildings and traffic support facilities. Based on Law Number 2 of 2022, public roads are classified into national roads, provincial roads, district roads, city roads, and village roads which aim to increase efficiency, productivity and transportation connectivity that can encourage economic growth (Ministry of PUPR, 2022).

2. Education Infrastructure

Educational infrastructure is part of social infrastructure that plays an important role in improving the quality of human resources. Educational infrastructure such as schools is expected to be a forum for a person to absorb technology and develop his capacity for the realization of sustainable development and growth (Fadlli et al., 2019a). Each educational unit is required to provide facilities to meet educational needs in accordance with the growth and development of physical potential, intellectual, social, emotional, and psychiatric potential. Thus, the government needs to play a role in providing educational facilities and infrastructure to improve the quantity and quality of human resources (BPS Indonesia, 2023).

3. Health Infrastructure

Health infrastructure is a means and infrastructure that plays a supporting role in the provision of health facilities that aim to provide easy access to health services to the public so that they can increase the productivity of human resources (BPS NTB, 2024). According to Fadlli et al., (2019b) good health services in providing information can prevent the spread of diseases, especially infectious diseases due to externalities caused, the role of the government is needed to ensure that all citizens get access to health services through equitable infrastructure development.

4. Water Infrastructure

Drinking water is a basic human need that must be met. According to the Ministry of PUPR (2022), drinking water is household water that can be drunk directly and meets health standards, either through processing or without processing. With the increase in population and human activities, the need for drinking water continues to increase, affecting the quality and quantity of water resources. Therefore, a good drinking water supply system (SPAM) is needed. SPAM is a facility and

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infrastructure designed to provide decent drinking water to meet the needs of the community for a clean, healthy and productive life.

Impact of Infrastructure Development on Economic Growth

Infrastructure has an important role in the development of a region, especially in supporting economic growth. The quality and quantity of infrastructure affects various aspects of development. In the short term, infrastructure development can create jobs in the construction sector so as to reduce unemployment and increase income. Then, in the medium term, infrastructure serves to increase efficiency and productivity, which in turn can reduce the production costs of other economic sectors. Meanwhile, in the long term, the availability of infrastructure also helps improve the mobility of goods and services and reduce investment costs, all of which can encourage more stable and sustainable economic growth (Ministry of PUPR, 2022).

Public Goods

According to Ridwan & Nawir (2021) Infrastructure is part of public goods. Public goods are goods whose use does not run out even though they are used by many individuals and there are no restrictions on accessing them. Infrastructure that is included in the category of public goods is highways, water management facilities, educational facilities, health facilities, public internet network infrastructure and so on. If the infrastructure as a public good is not managed properly, such as uneven access and a decrease in water quality, it will add negative externalities that can hinder and worsen social problems and reduce economic growth. Thus, there is a need for the role of the government in the management of public goods through policies that support the provision and maintenance.

Conceptual Framework

According to Sugiyono (2013), The conceptual framework is a model that explains the relationship between research variables that are arranged based on relevant theories. In this study, the conceptual framework is described as follows:

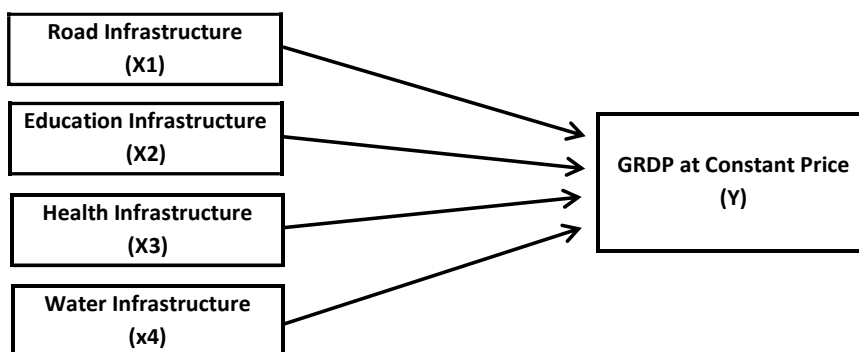


Figure 6. Conceptual Framework

Based on the conceptual framework above, there are several factors that function as independent or unbound variables, namely road infrastructure (X1), educational infrastructure (X2), health infrastructure (X3) and water infrastructure (X4). Meanwhile, the variable that is not free or bound is economic growth with the GDP indicator on the basis of constant prices (Y).

Hypothesis

Based on the selected variables, it is hypothesized that the variables of road infrastructure, education infrastructure, health infrastructure and water infrastructure have a direct relationship with economic growth which can be formulated as follows:

1. The development of road infrastructure is believed to influence the economic growth of Regencies/Cities in West Nusa Tenggara Province.
2. The development of educational infrastructure is believed to influence the economic growth of Regencies/Cities in West Nusa Tenggara Province.
3. The development of health infrastructure is believed to influence the economic growth of Regencies/Cities in West Nusa Tenggara Province.
4. The development of water infrastructure is believed to influence the economic growth of Regencies/Cities in West Nusa Tenggara Province.

RESEARCH METHODS

Type of Research

This study employs a quantitative approach using an associative method. Grounded in the philosophy of positivism, quantitative research focuses on investigating a defined population or sample, with data collected through research instruments

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and analyzed statistically to evaluate predetermined hypotheses. The associative method seeks to accurately identify and describe the relationships between two or more variables. (Sugiyono, 2013).

Location and Time of Research

This study was conducted in 10 Regencies/Cities in West Nusa Tenggara Province based on the consideration that the growth of Gross Regional Domestic Product on the Basis of Constant Prices in 2010 According to Business Fields in West Nusa Tenggara Province (NTB) fluctuated. The research was conducted from 2014 to 2023 in accordance with the availability of data to avoid the same research.

Technical Data Collection

In meeting the needs of research, it is necessary to collect data on the object to be researched. The data collection technique carried out in this study is using documentation studies through the internet network in the form of websites, articles, and publications from the Central Statistics Agency (BPS).

Types and Data Sources

The type of data used in this study is secondary data. According to Sugiyono, (2013) secondary data, it is a source of data that is not obtained directly from the research subject, but from existing data sources and collected and processed by researchers or other parties. Secondary data in this study are sourced from books, journals, articles, literature, and other references relevant to the research topic. The data sources used in this study are:

1. Economic growth, measured using the indicator of Gross Regional Domestic Product (GRDP) at Constant 2010 Prices by Business Fields (in millions of rupiah), is derived from the publication series "West Nusa Tenggara Province in Figures 2015-2024" issued by the Central Statistics Agency of West Nusa Tenggara Province.
2. Road Infrastructure Development based on Road Length by Regency/City and Government Authority Level in West Nusa Tenggara Province (km), 2014-2023 is sourced from the statistical table on the website of the Central Statistics Agency of West Nusa Tenggara Province.
3. The development of educational infrastructure, measured by the number of elementary schools, junior high schools, senior high schools, and vocational high schools in each Regency/City in West Nusa Tenggara Province (in unit count), is sourced from the "West Nusa Tenggara Province in Figures 2015–2024" publication, specifically from the education chapter issued by the Central Statistics Agency of West Nusa Tenggara Province.
4. Health Infrastructure Development based on the Number of Hospitals, Special Hospitals, Health Centers, Primary Clinics and Posyandu by Regency/City in West Nusa Tenggara Province in unit units sourced from the publication catalog "West Nusa Tenggara Province in Figures 2015-2024" in the health chapter published by the Central Statistics Agency of West Nusa Tenggara Province.
5. Water Infrastructure Development Based on the Percentage of Households Having Access to Decent Drinking Water Sources by Regency/City in West Nusa Tenggara Province, 2014-2023 which is sourced from the statistical table from the Central Statistics Agency of West Nusa Tenggara Province.

Identification and Classification of Variables

This study uses GRDP on the basis of constant price (Y), road infrastructure (X1), education infrastructure (X2), health infrastructure (X3), and water infrastructure (X4). The classification of variables, namely the independent variable or the unbound variable (X) in this study consists of 4 (four) quantitative data, namely Road Infrastructure, Education Infrastructure, Health Infrastructure and Water Infrastructure. Meanwhile, the non-free variable or the bound variable (Y) is GRDP on the basis of Constant Prices in Regencies/Cities in West Nusa Tenggara Province.

Variable Operational Definition

Sugiyono (2013) states that the operational definition is the property of an object that has a certain variation determined by the researcher. The operational definition used in this study is as follows:

1. Economic Growth based on the GRDP indicator in this study is GRDP on the Basis of Constant Prices 2010 According to Business Fields in Million rupiah in 2014-2023 in Regencies/Cities in West Nusa Tenggara Province.
2. Road Infrastructure in this study is the number of road lengths according to the authority of Regencies/Cities in Kilometers (Km) in 2014-2023 in Regencies/Cities in West Nusa Tenggara Province.
3. The educational infrastructure in this study is the number of schools combined between the number of elementary schools, junior high schools, high schools, and vocational high schools in the unit of 2014-2023 in districts/cities in West Nusa Tenggara Province.

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- Health Infrastructure in this study is the number of health facilities combined between the number of Hospitals, Special Hospitals, Health Centers, Primary Clinics, and Health Centers in units in 2014-2023 in Regencies/Cities in West Nusa Tenggara Province.
- Water Infrastructure in this study is the distribution of households that have access to decent drinking water sources in percentage units (%) in 2014-2023 in Regencies/Cities in West Nusa Tenggara Province.

Data Analysis Methods

This study uses panel data regression analysis. According to Gujarati (2012) the panel data, it is a combination of cross-section data and cross-time data (*time series*). In general, the regression equation of panel data can be written as follows:

$$\text{Log}(Y_{it}) = \alpha + \text{Log}(\beta_1 X_{1it}) + \text{Log}(\beta_2 X_{2it}) + \text{Log}(\beta_3 X_{3it}) + \text{Log}(\beta_4 X_{4it}) + e$$

where: Log = Logarithm, Y = GDP on the basis of Constant Price, α = Constant, β = Intercept, X₁ = Road Infrastructure, X₂ = Education Infrastructure, X₃ = Health Infrastructure, X₄ = Water Infrastructure, e = error, I = Regency/City, and t = Year

Model Estimation Methods

In the regression analysis of panel data, there are three estimation methods used to process data that have a combination structure between time series and cross section data. Namely, Common Effect Model (CEM), Fixed Effect Model (FEM) and Random Effect Model (REM).

Selection of Estimation Model

Selection of estimation model to determine which model is the most suitable in this study, several statistical tests are required to be performed, namely chow test is used to select to choose between CEM or FEM. Then, the Hausman test is used to select to choose between REM or FEM and Lagrange Multiplier test is used to select to between CEM or REM.

Statistical Test t

The t-test is employed to assess the influence of individual independent variables on the dependent variable while keeping other independent variables constant. An independent variable is considered to have a significant effect on the dependent variable if the probability value of the t-statistic is less than 0.05. Conversely, if the t-statistic probability exceeds 0.05, the independent variable is deemed to have no significant effect on the dependent variable.

Statistical Test F

The F-test is utilized to evaluate the combined effect of all independent variables on the dependent variable. If the calculated F probability is less than 0.05, it indicates that the independent variables collectively have a significant influence on the dependent variable. On the other hand, if the F probability exceeds 0.05, it suggests that the independent variables together do not significantly affect the dependent variable.

Coefficient of Determination (R^2)

The coefficient of determination (R^2) is used to evaluate how well the model explains the variability of the dependent variable based on the independent variables. The R^2 value ranges from 0 to 1, with values closer to 1 indicating a stronger explanatory power of the independent variables for the dependent variable. Conversely, lower R^2 values closer to 0 suggest that the independent variables have limited ability to explain the dependent variable.

Classical Assumption Test

In the regression of panel data with the fixed effect model, not all classical assumption tests are conducted, only multicollinearity and heteroscedasticity tests are performed (Basuki & Yuliadi, 2015).

a. Multicollinearity Test

The multicollinearity test is conducted to detect the existence of strong correlations between independent variables within a regression model. This is assessed using the Variance Inflation Factor (VIF), where the model is deemed free from multicollinearity if the VIF value is less than 10.

b. Heteroscedasticity Test

The heteroskedasticity test is employed to identify whether the variance of residuals differs across observations in the regression model. Using the Breusch-Pagan test, the model is deemed free from heteroskedasticity if the chi-squared probability value is greater than 0.05.

RESEARCH RESULTS AND DISCUSSION

Gross Regional Domestic Product at Constant Prices in West Nusa Tenggara Province

The Gross Regional Domestic Product (GRDP) at Constant 2010 Prices for Regency/City business sectors in West Nusa Tenggara Province exhibited an increasing trend from 2014 to 2023. The GRDP data for these regions can be observed in the following figure:

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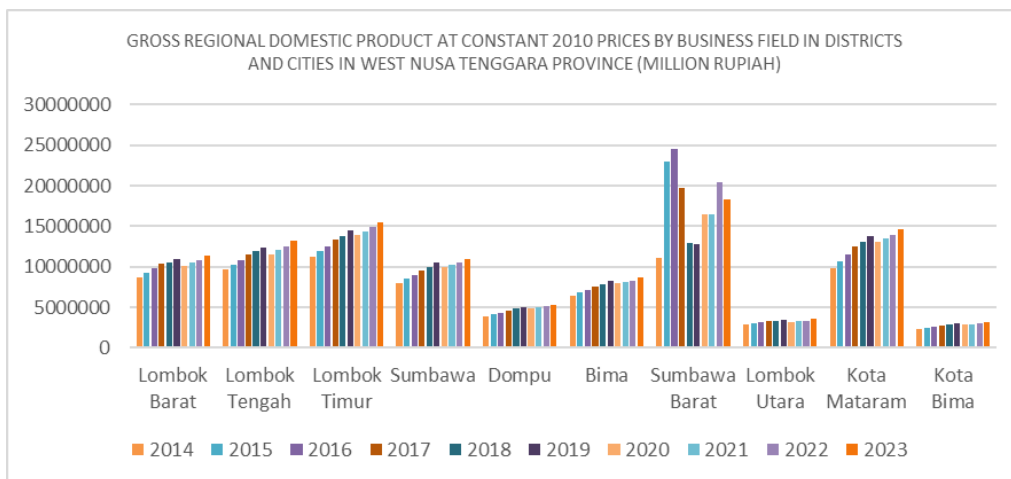


Figure 7. GDP on the Basis of 2010 Constant Prices of Regencies/Cities in NTB Province in 2014-2023

Source: Processed from BPS NTB Province Data (2024)

Figure 7 shows that the gross regional domestic product on the basis of constant prices in Regencies/Cities in NTB Province continues to increase even though in 2020 it decreased due to the occurrence of Covid-19 which disrupted economic activities. Among other regencies/cities that continue to experience an increase in GDP, West Sumbawa Regency actually has a fluctuating GDP but has the highest contribution because it is dominated by the mining sector. In contrast, Bima City recorded the lowest Gross Regional Domestic Product due to dependence on the primary sector, which grew relatively slowly.

Infrastructure in West Nusa Tenggara Province

Quantitative infrastructure development in Regencies/Cities in West Nusa Tenggara Province during 2014-2023 looks varied. This is due to several factors such as the number of population area, geographical characteristics, potential sectors and population density. Some of the infrastructure developments spread across Regencies/Cities in West Nusa Tenggara Province can be seen in the following figure:

a. Road Infrastructure

The development of road infrastructure according to the level of authority of the Regency/City government in West Nusa Tenggara Province during 2014-2023 can be seen in the following figure:

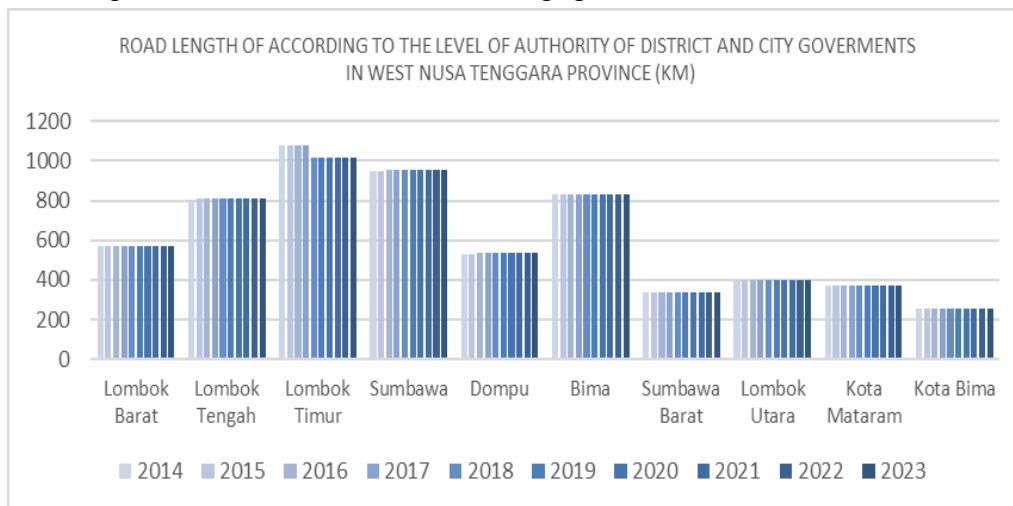


Figure 8. Road Length According to the Level of Authority of Regency/City in NTB Province in 2014-2023

Source: BPS NTB Province (2024)

Figure 8 shows that in general, the length of roads according to the level of authority of the Regency/City government is relatively stable during 2014-2023. This shows that there is a change in the length of the road but the change is not so big. Changes in road length are usually caused by the measurement of road length sometimes affected by data collection methods. Thus, changes in the way data is measured or managed can cause differences in the length of available roads. In addition, the image also shows that there is a difference in road length between districts/cities caused by differences in area

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and road infrastructure needs in each region such as East Lombok Regency has the longest road because it has a large area and a more scattered settlement pattern so that it requires access between longer areas so that it can increase mobilization. On the other hand, Bima City has the shortest road because it is a small city with a limited area and economic activities only occur in a few areas so that the length of the road there is adjusted to the needs (Kundiharto, 2023).

b. Educational Infrastructure

The development of educational infrastructure based on the number of schools in Regencies/Cities in West Nusa Tenggara Province during 2014-2023 can be seen in the following figure:

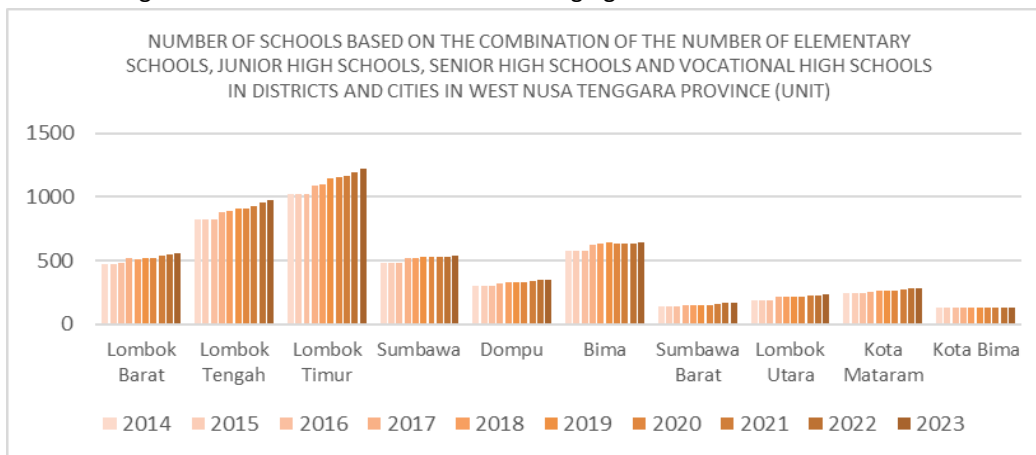


Figure 9. Number of Schools in Regencies/Cities in NTB Province in 2014-2023

Source: Processed from BPS NTB Province Data (2024)

Figure 9 shows that in general, the number of schools based on the combination of the number of elementary schools, junior high schools, high schools and vocational high schools in Regencies/Cities shows an increase from 2014-2023. However, there is a difference in the number of schools between Regencies/Cities in NTB Province. East Lombok Regency has the largest number of schools because it has a large enough population and a large area so it requires more school infrastructure in various locations that allow easy access for students. Meanwhile, Bima City has the least number of schools because it has a small population and a limited area, so it requires a smaller number of schools in order to create a more efficient provision of educational infrastructure (BPS NTB, 2017).

c. Healthcare Infrastructure

The development of health infrastructure based on the number of health facilities in Regencies/Cities in West Nusa Tenggara Province during 2014-2023 can be seen in the following figure:

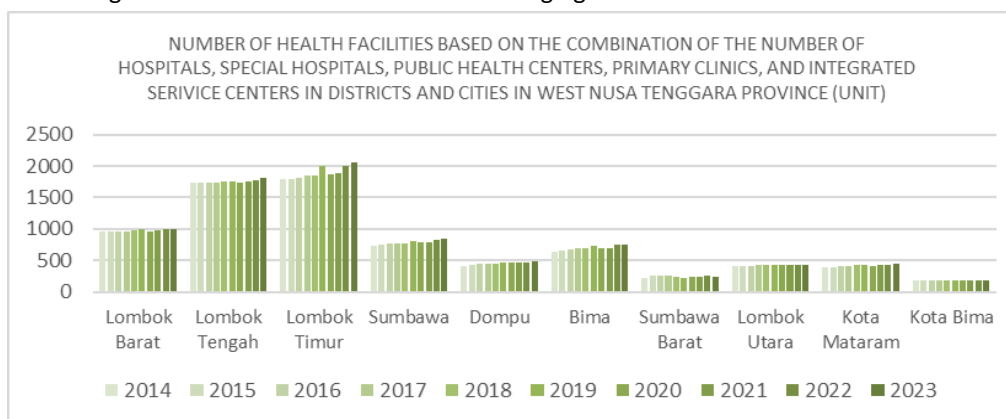


Figure 10. Number of Health Facilities in Regencies/Cities in NTB Province in 2014-2023

Source: Processed from BPS NTB Province Data (2024)

Figure 10 shows that the number of health facilities based on the combined number of hospitals, specialty hospitals, community health centers, primary clinics, and integrated service centers in almost all districts and cities shows an increasing trend from 2014-2023. This increase shows that health facilities in Regencies/Cities in West Nusa Tenggara Province are increasingly prioritized. However, there is a difference in the number of health facilities between Regencies/Cities in West Nusa Tenggara Province. East Lombok Regency has the most health facilities because it has a larger population so it needs

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more health facilities so that it can serve the needs of the community equally. Meanwhile, Bima City has the least number of health facilities because it has a smaller population, so the health facilities provided tend to be fewer compared to areas that have a larger population, so that the provision of more efficient health facilities is created (BPS NTB Province, 2019).

d. Water Infrastructure

The development of Water Infrastructure based on the percentage of household distribution that has access to decent drinking water in Regencies/Cities in West Nusa Tenggara Province during 2014-2023 can be seen in the following figure:

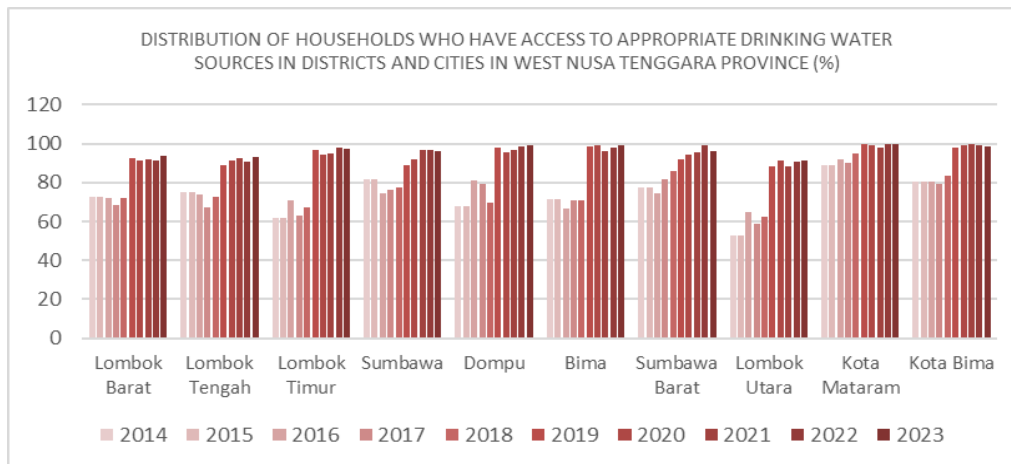


Figure 11. Distribution of Households with Access to Proper Drinking Water Sources in 2014-2023

Source: BPS NTB Province (2024)

Figure 11 shows that the distribution of households that have access to decent drinking water in Regencies/Cities in West Nusa Tenggara Province seems to tend to fluctuate due to the impact of the dry season that affects water availability. In addition, rapid population growth and urbanization can also increase the demand for drinking water. Then from the figure above, it also shows that there is a difference in the number of distributions between households in Regencies/Cities in West Nusa Tenggara Province. Mataram City with the largest number of households that have access to decent drinking water sources is due to having an easy-to-reach area so that access to distribution is easier to control. On the other hand, North Lombok Regency has the least access due to the geographical conditions of the area which are not easy so that its distribution takes longer (Disperkim NTB, 2023).

Based on the acquisition of data on all variables, namely Gross Regional Domestic Product on the Basis of Constant Prices in 2010 according to the business field as a dependent variable and road infrastructure, education infrastructure, health infrastructure, and water infrastructure as independent variables in 2014-2023 processed using STATA 14 software, the following research results were found:

Model Selection Test Results

To determine the most appropriate model among the Common Effect Model, Fixed Effect Model, and Random Effect Model, the model selection was performed using the Chow test, Hausman test, and Lagrange Multiplier test. The results of these model selection tests are presented in the following table:

Table 1. Model Selection Test Results

Testing	Probability	Hypothesis	Selected Model
Chow Test	0.0000	H0 Rejected	Fixed Effect Model (FEM)
Hausman Test	0.0003	H0 Rejected	Fixed Effect Model (FEM)

Source: STATA 14 Data Processing Results

Interpretation of model selection results as follows:

- The results of the chow test show a probability value smaller than 0.05 ($0.0000 < 0.05$). This means that the model chosen is Fixed Effect Model (FEM) rather than Common Effect Model (CEM).
- the results of the Hausman test show a probability value smaller than 0.05 ($0.0003 < 0.05$). This means that the model chosen is Fixed Effect Model (FEM) rather than Random Effect Model (REM).

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c. The results of the Chow test and Hausman test show that the selected model is Fixed Effect Model (FEM), so the Lagrange Multiplier (LM) test was not carried out because this test aims to choose between the Common Effect Model (CEM) and Random Effect Model (REM).

The results of the model selection estimation show that the best model estimation is the Fixed Effect Model (FEM). So, to see the influence of variables of road infrastructure, education infrastructure, health infrastructure and water infrastructure on economic growth with the best model results, namely the Fixed Effect Model (FEM), can be seen in the following table:

Table 2. Results of Fixed Effect Model (FEM) Approach Model Estimation

Variable	Coefficient	Std. Error	t	p > t	F	p > F	R-sq
LOG(ROAD)	.4942663	.7273633	0.68	0.499			
LOG(EDUCATION)	.4874533	.2024357	2.41	0.018			
LOG(HEALTH)	2.658546	.2127509	12.50	0.000	69.41	0.0000	0.7635
LOG(WATER)	-.1425105	.0710786	-2.00	0.048			
C	-6.499454	4.919381	-1.32	0.190			

Source: STATA 14 Data Processing Results

Based on the results of the output in table 2, the results of the panel data regression equation seen from the coefficient value are obtained as follows:

$$\text{LOG (GDP)} = - 6.49 + 0.49 (\text{ROAD LOG}) + 0.48 (\text{EDUCATION LOG}) + 2.65 (\text{HEALTH LOG}) - 0.14 (\text{WATER LOG})$$

t- statistics test results

The t-statistical results in this study with the t-value of table 1.985251 where $df=100-4-1=95$ ($df=n-k-1$) for $\alpha = 0.05$, namely:

- Road infrastructure has a prob value. t-statistics greater than 0.05 ($0.499 > 0.05$) or t-count values smaller than t-tables ($0.68 < 1.985251$) show that road infrastructure development does not have a impact on the economic growth of regencies/cities in West Nusa Tenggara Province.
- Educational infrastructure has a prob value. t-statistics are smaller than 0.05 ($0.018 < 0.05$) or t-count values are greater than t-tables ($2.41 > 1.985251$) show that educational infrastructure has a impact on the economic growth of regencies/cities in West Nusa Tenggara Province.
- Health infrastructure has a prob value. The t-statistic is smaller than 0.05 ($0.000 < 0.05$) or the t-count value is greater than the t-table ($12.50 > 1.985251$) shows that health infrastructure has a impact on the economic growth of regencies/cities in West Nusa Tenggara Province.
- Water infrastructure has a prob value. t-statistics smaller than 0.05 ($0.048 < 0.05$) or t-count values greater than t-tables ($2.00 > 1.985251$) show that health infrastructure has a impact on the economic growth of regencies/cities in West Nusa Tenggara Province.

F-statistical test results

Prob value the F-statistic is smaller than 0.05 ($0.048 < 0.05$) or the t-count value is greater than the t-table ($69.4 > 2.467493623$) shows that the development of road infrastructure, education infrastructure, health infrastructure, and water infrastructure together has a impact on economic growth in Regencies/Cities in West Nusa Tenggara Province.

Determination Coefficient (R²)

The results of this study show that the development of road infrastructure, education infrastructure, health infrastructure and water infrastructure in 2014-2023 shows a considerable impact on the economic growth of Regencies/Cities in West Nusa Tenggara Province. This is shown by the R-Squared value of 76.35% and the remaining 23.65% influenced by other variables outside this study.

Results of Classical Assumption Testing

In the regression of panel data with the fixed effect model, not all classical assumption tests are conducted, only multicollinearity and heteroscedasticity tests are performed. The results of the multicollinearity test and heteroscedasticity test are as follows:

a. Results of the Multicollinearity Test

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Based on the results of the multicollinearity test using the Variance Inflation Factor (VIF), with the criterion that VIF values should be < 10 , it indicates that the model meets the requirements for the multicollinearity test. The results of the multicollinearity test can be seen in the following table:

Table 3. Multicollinearity Test Results using VIF

Variable	VIF	1/VIF	Mean VIF
LOG (ROAD)	1.52	0.656380	1.27
LOG (EDUCATION)	1.24	0.805382	
LOG (HEALTH)	1.19	0.842347	
LOG (WATER)	1.14	0.873734	

Source: STATA 14 Data Processing Results

b. Results of the Heteroscedasticity Test

Based on the results of the heteroscedasticity test, the obtained probability value is greater than χ^2 ($0.4597 > 0.05$), indicating that the model is free from heteroscedasticity. The results of the heteroscedasticity test can be seen in the following table:

Table 4. Results of the Heteroscedasticity Test using Breusch-Pagan

Variable	Hypothesis	Chi ²	Probability
Fitted Values of LOG GRDP	H0 Constant Variance	0.55	0.4597

Source: STATA 14 Data Processing Results

The Impact of Road Infrastructure Development on Economic Growth

The hypothesis testing results indicate that the development of road infrastructure does not have an impact on economic growth, measured by the Gross Regional Domestic Product (GRDP) at Constant 2010 Prices across business fields in Regencies/Cities in West Nusa Tenggara Province from 2014 to 2023. These findings align with the results of research conducted by Afriyana (2023); Ferdian & Satrianto, (2022); Rediansyah et al., (2023); Sugiarto & Subroto, (2019); Suswita et al., (2020); Syahputra et al., (2021) showing that the development of road infrastructure does not have an impact on economic growth. However, it is different from the results of research conducted by Elburz & Cubukcu, (2021); Hulu & Wahyuni, (2021); IMP & Handayani, (2018); Kamaruddin et al., (2021); Liu et al., (2022); Rachman et al., (2024) Santian et al., (2019) which shows that the development of road infrastructure has an impact on economic growth.

The Impact of Educational Infrastructure Development on Economic Growth

The hypothesis testing results show that the development of educational infrastructure has a positive impact on economic growth, as measured by the Gross Regional Domestic Product (GRDP) at Constant 2010 Prices across business fields in Regencies/Cities in West Nusa Tenggara Province from 2014 to 2023. These findings align with the slow growth theory, which suggests that the accumulation of physical capital, such as educational infrastructure contributes to economic growth. The results of this study are consistent with previous research conducted by Ferdian & Satrianto, (2022); IMP & Handayani, (2018); Sarifah et al., (2020) which shows that the development of educational infrastructure has an impact on economic growth. However, in contrast to the results of research conducted by Afriyana, (2023); Pane et al., (2021); Rediansyah et al., (2023); Sugiarto & Subroto, (2019) those who show that the development of educational infrastructure does not have an impact on economic growth

The Impact of Health Infrastructure Development on Economic Growth

The hypothesis testing results show that the development of health infrastructure has a positive impact on economic growth, as reflected by the Gross Regional Domestic Product (GRDP) at Constant 2010 Prices across business sectors in Regencies/Cities in West Nusa Tenggara Province from 2014 to 2023. These findings are in line with the slow swan theory, which suggests that the accumulation of physical capital, such as health infrastructure, is essential for fostering economic growth. The results are also consistent with previous research conducted by Hulu & Wahyuni, (2021); Lotuwa et al., (2023); Pane et al., (2021); Rediansyah et al., (2023); Sarifah et al., (2020) which shows that the development of health infrastructure has an impact on economic growth. However, in contrast to the results of research conducted by Sugiarto & Subroto, (2019); Weya & Lubis, (2022) those who show that the development of health infrastructure does not have an impact on economic growth.

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The Impact of Water Infrastructure Development on Economic Growth

The hypothesis testing results show that the development of water infrastructure has a negative impact on economic growth, as reflected by the Gross Regional Domestic Product (GRDP) at Constant 2010 Prices across business fields in Regencies/Cities in West Nusa Tenggara Province. This is because, according to GRDP statistics, water infrastructure tends to provide limited contributions unless supported by other more productive sectors. Additionally, water infrastructure is still largely managed by the private sector, resulting in cost burdens that must be shouldered by the community. These findings align with previous research conducted by Arumsari & Hutajulu, (2020) which shows that water infrastructure has a negative impact on economic growth. However, research conducted by Afriyana et al., (2023); IMP & Handayani, (2018); Syahputra et al., (2021) which shows that water infrastructure has a positive impact on economic growth. Meanwhile, in contrast to the results of research conducted by Maciulyte-Sniukiene & Butkus, (2022); Rediansyah et al., (2023); Suswita et al., (2020) those who show that the development of water infrastructure does not have an impact on economic growth.

CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the results of analysis and discussion on the impact of road infrastructure development, education infrastructure, health infrastructure and water infrastructure on the economic growth of Regencies/Cities in NTB Province in 2014-2023, it can be concluded that road infrastructure does not have an impact on economic growth. Meanwhile, education infrastructure and health infrastructure have an impact and have a positive value on economic growth and water infrastructure has an impact but has a negative value on the economic growth of Regencies/Cities in West Nusa Tenggara Province.

SUGGESTION

Based on the results of the research conducted, there are several suggestions that can be recommended as follows:

1. This research is only able to explain the impact of infrastructure development on economic growth in general without explaining its impact to various sectors. The next researcher is advised to use I-O analysis tools by involving the Input-Output table. This approach is considered to be able to provide a more comprehensive picture regarding the impact of infrastructure development on economic growth to various sectors.
2. This research only uses infrastructure development in quantity. Therefore, further research is recommended to include quality infrastructure development data. This is because the results of the study show that the development of road infrastructure does not have a significant impact on economic growth. By considering the quality data of road infrastructure development, it is hoped that it can produce new hypotheses that are more relevant.
3. This study shows that the development of education and health infrastructure has a significant impact so that the regency/city governments in West Nusa Tenggara Province are expected to prioritize budget allocation for the development and improvement of education and health infrastructure.

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