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The influence of infrastructure development on the GRDP of Mataram City

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Abstract

The purpose of this study was to analyze telecommunications infrastructure, roads, clean water, and electricity that have a significant effect both partially and simultaneously on the GRDP of Mataram City in 2012-2021. In this study using associative method with a quantitative approach. The analytical method used in this study is multiple regression analysis with hypothesis testing and using the t test (partial test), F test (simultaneous test), test the coefficient of determination (R²) with a significant level of 5% and classical assumption testing. The partial results of the study show that telecommunication and road infrastructure have no significant effect on GRDP, while clean water and electricity infrastructure have a significant effect on GRDP. Simultaneously, it shows that telecommunication infrastructure, roads, clean water, and electricity have a positive and significant relationship to GRDP. The value of the coefficient of determination (R²) of 95.6% is influenced by the dependent variable (Y) while the rest is influenced by other variables outside the model. Based on the econometric reference test in this study, there was no deviation from the classical assumptions.

Keywords: Infrastructure, Economic Growth, Economic Development

Introduction

Economic development is generally attached to the context of study in a change that occurs in a country, in which the form of change that occurs is planned and result-oriented. National development aims to improve the welfare of people's lives for the better, in this case the role of the government as a development mobilizer is needed to support and encourage improvements in people's welfare and economic growth in a country.

Good economic growth proves that there can be an increase in people's economic activity, but if growth in an area shows bad results, it can be proven that the area has experienced a decline in its economic activity. The government of a country can immediately fall and rise based on the level of economic growth it achieves in national statistical records (Tadaro, 1998: 123), so the government must try to build better economic growth.

One indicator to look at the country's economic performance is the Gross Regional Domestic Product (GRDP) which can display the amount of economic growth that has been achieved each year. The amount of this GRDP shows the potential or capacity of a country which is influenced by the amount of economic productivity that can encourage the availability of adequate facilities and infrastructure for the welfare of society. GRDP is the total added value of goods and services resulting from economic activities in a region. Apart from that, GRDP can also evaluate and see the performance of economic development in that region if something goes wrong in development.

One of the factors that encourage or hinder economic growth is infrastructure development. Infrastructure development is an important aspect in accelerating the composition or means of national development, because infrastructure development can stimulate the business world to invest in direct investment so that it can enhance growth which aims to improve people's welfare. Infrastructure has an impact on the economy in two ways, namely direct impact and indirect impact.

The direct impact of having infrastructure on the economy is increasing output with increasing infrastructure, while the indirect impact is being able to encourage an increase in economic activity which will increase capital for both the private sector and the government and can absorb labor which results in increased output (Winanda, 2016).

The development of economic growth in Mataram City is influenced by several factors, including the development of telecommunication infrastructure, roads, clean water, and electricity. In the era of globalization, the role of telecommunications infrastructure in the City of Mataram is very important and can be an indicator of the progress of a nation, especially during the Covid-19 pandemic where all people are urged not to leave their homes so that the role of telecommunications here is very important to facilitate community activities both in the world the world of work and education. Road infrastructure is the most important means of community needs. The government has built road infrastructure in such a way that aims to meet the needs of the people of Mataram City which can make it easier for people to travel safely and comfortably, because if the road conditions are inadequate it will cause traffic jams, air pollution, wastage of fuel and so on.

Apart from that, the Mataram City government is also building clean water infrastructure for the needs of the community which will be used daily, because clean water is one of the basic needs of the community. Public health will be vulnerable if clean water is not fulfilled, therefore the Mataram City government must focus on the need for clean water to improve public health status. The other infrastructure provided by the government is electricity infrastructure. The availability of electricity can increase the progress of a more modern technology which can utilize a machine technology that is supported by electricity so that it can increase or increase more output and can speed up carrying out a production process.

Provision of adequate infrastructure for access that will be used by the community can support the economy of a region to run smoothly, one way to fulfill community access is by continuing to improve better infrastructure development. Based on this phenomenon, researchers are interested in examining the effect of infrastructure development on GRDP in the city of Mataram. With this there is a formulation of the problem, namely how much influence the infrastructure development has on the Gross Regional Domestic Product (GDP), either partially or simultaneously. The research uses time series data analysis and uses a time period of 10 years (2012-2021).

Literature Review

Economic Development

Economic development is a process in which Real National Income increases in the long term and if the rate of increase in national income is greater than the rate of population growth, real per capita income will increase (Darwin, et al 2022) ^[16]. The concept of economic development includes four important elements, namely:

1. Development is a process. This concept means that there is a stage that must be lived by the whole community or its people. It is the same as individuals who are just born, do not immediately become adults, but to become adults must go through each stage of growth. Each stage of development towards a just, prosperous and prosperous condition must be passed

2. Development is an increase in per capita income. Development is a form of business in order to increase.
3. Per capita income of each country. In achieving this, it requires the activeness and involvement of the entire community, government, and other elements in a country. With an increase in per capita income, social welfare will be achieved.
4. Increase in Per Capita Income in the Long Term When per capita income increases relatively in the long term, it means that the economy is considered to be developing. Of course, an increase in per capita income does not always have to show an increase when unexpected things arise, such as disasters, natural disasters, conflict problems and political turmoil so that the economy experiences a recession or setback. Even though this is only temporary, the most important thing is that the average economy has increased every year.
5. Refinement of the Institutional System Improvements to the institutional system can be seen from two sides, namely improvements to the rules of the game or the "rule of the games" in formal and non-formal regulations as well as improvements to the organization as "players" of the rules made (Fitri, et al. 2022).

Economic growth

Economic growth is a change that occurs continuously and shows economic performance in a region, economic growth is also an increase in aggregate national income or an increase in output in a certain period. The existence of economic growth is an indication of the success of regional development because economic growth is a process of increasing production capacity in an economy continuously or continuously over time so as to produce increasing levels of national income and output (Todaro et al, 2006).

Gross Regional Domestic Product (GRDP)

Gross Regional Domestic Product (GRDP) is an indicator to see the economic condition of a region in a certain period and as the gross added value of all goods and services that have been created or produced by the domestic territory of an area arising from various economic activities of the community in a certain period regardless of whether the factors of production are owned by residents or non-residents.

GRDP is a picture of the overall economy in an area where the regional economy is an increase in the income of the community or the population as a whole, namely an increase in all added value that occurs in the region and is usually carried out by calculating the current price value, but to see further every year then must be expressed in real form, which means it is formed at constant prices (Tarigan, 2005:46).

Infrastructure

Infrastructure has an important role in driving the performance of economic growth, the role of this infrastructure can connect various centers of economic activity with a buffer area. Based on Presidential Regulation Number 42 of 2005 concerning the Committee for the Acceleration of Infrastructure Provision, it describes several types of infrastructure whose provision must be regulated by the government, namely transportation and communication infrastructure, road infrastructure, irrigation infrastructure, drinking water and sanitation infrastructure, telematics infrastructure, electricity infrastructure, and infrastructure transportation of oil and natural gas. The classification of

infrastructure above is categorized as basic infrastructure, because it is needed by the wider community so it needs to be regulated by the government regarding its provision.

Three main reasons are very important in infrastructure development according to economic integration, namely first, the availability of initial or new infrastructure development is very important in the development of economic growth. Second, the large availability of infrastructure development facilitates investment and trade activities. Third, full attention in terms of improving development can anticipate economic infrastructure between countries (Friawan, 2008).

Relationship between Infrastructure and GRDP

Telecommunications infrastructure, roads, clean water and electricity have an important role as a support for other sectors in developing the economy of a region. According to Adam (2014) several types of infrastructure that need to be developed to support economic growth and selected as a priority in the PPP (Public Private Partnership) scheme are transportation (sea ports, rivers or lakes, airports, rail networks and train stations), roads (toll roads and toll bridges), irrigation (canals carrying raw water), drinking water (raw water intake buildings, transmission networks, distribution networks, drinking water treatment plants), wastewater (wastewater treatment plants, collection networks and main networks) and waste facilities (transportation and disposal sites), telecommunications (telecommunication networks), electricity (power generation, transmission and distribution), oil and natural gas (oil and gas processing, storage, transportation, transmission or distribution).

From a theoretical point of view, the role of infrastructure in economic growth has evolved from a standard Solow style model in which infrastructure is an additional factor of production to an endogenous growth model in which infrastructure helps increase total factor productivity. This approach allows the decomposition of output growth into capital contributions (eg Non-infrastructure and Infrastructure), labor and productivity growth (Mankiw et al, 1992).

Research Methods

Types of research

The type of research that will be used in this study is research with a quantitative approach. Quantitative research emphasizes testing theories through measuring research variables with numbers and analyzing data using statistical procedures. In this study the method used is the associative method, because the associative method is a study that seeks the relationship between one variable and another. Research time starts in December 2022 until completion. In this study using four independent variables (va independent) namely telecommunications infrastructure (X1), road infrastructure (X2), clean water infrastructure (X3), electricity infrastructure (X4), and one dependent variable (the dependent variable), namely GRDP (Y). The type of data used in this study is Time Series data, while the data sources obtained are from the Central Statistics Agency (BPS) for Mataram City and NTB Province, the PUPR Office for Mataram City, and the Mataram branch of PT Perusahaan Listrik (Persero).

Variable Operational Definitions

1. Gross Regional Domestic Product (GRDP) is the added amount produced by all economic units or goods and services businesses in a certain area. The GRDP used in this study is the GRDP at constant prices (PDRB ADHK) for the City of Mataram from 2012-2021, data obtained from the BPS City of Mataram.
2. Telecommunication infrastructure is a physical structure that underlies a communication network as a support or driver in facilitating long-distance communication. The data used in this study is the number of customers cable telephone and internet (units) in Mataram City from 2012-2021, data obtained from Mataram City BPS.
3. Road Infrastructure is a public road in a secondary road network system that connects between service centers and inner cities that can be easily passed by the community. The data to be used in this research is the length of roads according to good and moderate road conditions (km) in Mataram City from 2012-2021, data obtained from Mataram City BPS and Mataram City PUPR Service.
4. Clean water infrastructure is a basic human right for survival, because clean water is the main thing in guaranteeing the feasibility and health of humans. In this study the data used is the amount of clean water distributed (m²) in Mataram City from 2012-2021, data obtained from Mataram City BPS.
5. Electricity infrastructure is one of the energy used by the community in meeting the needs of a production or consumption. In this study the data used is the amount of electricity sales (Kwh) in the city.

Mataram from 2012-2021, data obtained from PT Pertamina Electricity (Persero) Mataram Branch

Data Analysis Procedures

The data analysis method used to determine whether the independent variable has an effect on the dependent variable, in this study will use multiple linear regression analysis. Multiple linear analysis is a regression consisting of more than one independent variable (independent variable), the variable model of this study is as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + e$$

Where:

Y = GRDP (Rupiah)

β_0 = Intercept or Constant

β_1 = Regression Coefficient of Telecommunications Variables

β_2 = Road Variable Regression Coefficient

β_3 = Clean Water Variable Regression Coefficient

β_4 = Regression Coefficient of Electrical Variable

X1 = Telecommunications (SST)

X2 = Road (Km)

X3 = Clean Water (m²)

X4 = Electricity (Kwh)

e = error term (interference error)

Research results and Discussion
Development of PDRB Mataram City

Table 1: Gross Regional Domestic Product at the Constant Price of the City of Mataram (Rupiah) from 2012-2021

Tahun	PDRB ADHK (Billion Rupiah)
2012	8.476,04
2013	9.149,73
2014	9.890,46
2015	10.678,17
2016	11.533,90
2017	12.464,41
2018	13.082,00
2019	13.811,86
2020	13.049,72
2021	13.476,13

Source: BPS City of Mataram

From the table above it can be seen that ADHK GRDP in Mataram City always increases every year, but in 2020 GRDP has decreased. This was due to the occurrence of Covid-19 which hit the City of Mataram so that it had an impact on the economy which experienced a contraction of -5.50%. From the production side, the deepest contraction occurred in the transportation and warehousing category, namely -34.12%, followed by the accommodation and food and drink category at -32.09%, and construction at -22.30%. As a result of this contraction, it has caused a shift in the economic structure in the category of GRDP preparation Development of Telecommunications Infrastructure in the City of Mataram

Table 2: Number of Cable Telephone and Indihome Subscribers in the City of Mataram (SST) 2012-2

Year	Total
2012	48.079
2013	49.417
2014	60.389
2015	69.034
2016	63.883
2017	53.174
2018	31.447
2019	35.945
2020	36.000
2021	32.500

Source: BPS City of Mataram

Based on the data above, the number of landline telephones from year to year continued to decrease from 48,079 to 160 subscribers. Development of Mataram City Road Infrastructure.

Table 3: Length of Roads According to Road Conditions in the City of Mataram (km), from 2012-2021

Year	Condition road(km)
	Good
2012	256,45
2013	277,21
2014	277,21
2015	211,96
2016	286,25
2017	286,25
2018	292,80
2019	292,80
2020	332,23
2021	334,03

Source: BPS City of Mataram

The table above shows an increase in the length of roads in good condition that occurred from 2015-2021, namely 122.07 km, this increase was due to roads being vital means in supporting the development of a region. However, in 2018 and 2019 there was no additional road length, and roads that were heavily damaged did not decrease. The large number of road constructions will facilitate the process of mobility of goods and services from one place to another.

The Development of Clean Water Infrastructure in the City of Mataram

Table 4: Number of Customers and Distributed Water (m³) in 2012-202

Tahun	Distributed water (m2)
2012	15.527.415
2013	15.815.036
2014	16.067.914
2015	16.487.710
2016	18.314.915
2017	17.265.248
2018	17.115.288
2019	18.017.944
2020	17.659.602
2021	17.365.714

Source: BPS City of Mataram

In 2012 - 2016 the distributed water has increased, but in 2017 - 2021 the distributed water is unstable, namely up and down. If the development of clean water infrastructure can be increased, it will encourage and increase productivity in agriculture. Development of Mataram City Electrical Infrastructure

Table 5: Number of Customers and Electricity Sold (Kwh) in Mataram City in 2017-2021

Year	Consumer
2012	511.672
2013	627.478
2014	672.097
2015	731.129
2016	784.407
2017	865.849
2018	976.208
2019	1.092.068
2020	1.153.015
2021	1.257.301

Source: PT. Electricity Company (Persero) Mataram Branch Area

The use of electricity is an important thing in increasing GRDP, because it is needed as the main factor in supporting production process activities in the manufacturing sector (Maqin, 2011). According to the data above, it shows that from year to year the amount of electricity sold or electricity usage is increasing from 731,058,030 in 2012 to 1,602,636,334 in 2021, this is due to an increase in the number of electricity customers, namely around 745,629 units from 2012 - 2021

Data Analysis and Discussion

The following is the result of multiple linear regression estimation using SPSS and produces the following regression equation:

Table 6: SPSS Processed Results

Model		Coefficients ^a						
		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.738E-15	.089		.000	1.000		
	Telekomunikasi (X1)	-.205	.176	-.205	-1.164	.297	.284	3.523
	Jalan (X2)	-.352	.224	-.352	-1.573	.177	.175	5.701
	Air Bersih (X3)	.459	.167	.459	2.753	.040	.317	3.151
	Listrik (X4)	.769	.231	.769	3.328	.021	.165	6.061

a. Dependent Variable: PDRB (Y)

Based on the table above, the results of the multiple linear regression equation are:

$$Y = 1.738E-15 - 0.205X1 - 0.352X2 + 0.459X3 + 0.769X4$$

t test (Partial Test)

1. The Effect of Telecommunications Infrastructure on GRDP

Based on the results of research and calculations of multiple linear regression tests, partially the telecommunication variable (X1) has no significant effect on GRDP. This is shown based on the results of the regression with a tcount of -1.164 which is smaller than ttable, which is equal to 2.571 and a significance value of 0.297 is greater than 0.05. The result of the regression coefficient is negative, which is -0.205, this indicates that the increase in telecommunication infrastructure causes the GRDP to decrease. This means that in this case according to what happened in the field conditions, the telecommunication customer process has not been able to improve

2. Effect of Road Infrastructure on GRDP

Based on the results of research and calculations of multiple linear regression tests, partially the road variable (X2) has no significant effect on GRDP. This is shown based on the results of the regression with a tcount of -1.573 which is smaller than the ttable which is equal to 2.571 and a significance value of 0.177 greater than 0.05. The result of the regression coefficient is negative, which is -0.352. This indicates that the increase in road infrastructure means that GRDP decreases. Road infrastructure as a link between production centers and marketing areas, so that it has the potential to improve a regional economy. However, according to what happened in the field conditions, in terms of the flow of the long road process, it has not been able to increase GRDP

3. The Effect of Clean Water Infrastructure on GRDP

Based on the results of research and calculations of multiple linear regression tests, partially the clean water infrastructure variable (X3) has a positive value and has a significant influence on GRDP. This is shown based on the results of the regression with a tcount of 2.753 greater than ttable which is equal to 2.571 and a significance value of 0.040 less than 0.05. The results of the regression coefficient are positive, which is equal to 0.459. This shows that improving clean water infrastructure will increase GRDP. This means that this clean water infrastructure is an important part of basic infrastructure which can have an impact in encouraging production and consumption which can increase economic productivity. This research is in line with previous research, namely research from Andi (2020) and Liana et al (2020) where the results of their research indicated that Clean water infrastructure has a significant positive effect on GRDP.

4. Effect of Electrical Infrastructure on GRDP

Based on the results of research and calculations of multiple linear regression tests, partially the electricity infrastructure variable (X4) has a positive value and has a significant influence on GRDP. This is shown based on the results of the regression with a tcount value of 3.328 greater than ttable which is equal to 2.571 and a significance value of 0.021 less than 0.05. The results of the regression coefficient are positive, which is equal to 0.769. This shows that the increase in electricity infrastructure will increase GRDP. This is related to the population in the city of Mataram which has increased every year, if the population increases, the number of customers will also increase, this is because electricity is an important part of community activities. This research is in line with previous research conducted by Anita (2019), Liana (2020), and Putri (2021) with the results of the research namely electricity infrastructure has a significant positive effect on GRDP.

F test (Simultaneous test)

Table 7: F Test Results (Simultaneous Test)

F-Statistik	Signifikansi
27,138	0,001

Sumber: data sekunder olahan SPSS

Simultaneously the independent variables (telecommunication, roads, clean water and electricity) have an influence on the dependent variable (GRDP) in the city of Mataram which can be seen in the Fcount value of 27.138 greater than the Ftable of 5.19 or a significance value of 0.001 less than 0.05, this means that the infrastructure of telecommunications, roads, clean water and electricity when tested together will affect GRDP. Determination coefficient test R2 (R-Square)

Table 8: Test Results for the Coefficient of Determination

R-Square
0,956

Based on the table above, it shows that the coefficient of determination R2 or R-Square is 0.956 (95.6%), this shows that all the independent variables in the model, namely telecommunications, roads, clean water, and electricity, are only able to explain the effect of 95, 6% of the dependent variable (GRDP) and the remaining 0.044 or 4.4% is explained by other variables not included in this model.

Classic assumption test

Normality test

From the graphic image processed by SPSS 23, there are dots spread around the line and follow the diagonal line, meaning that the data in this study are normally distributed and have

fulfilled the normality test.

Multicollinearity Test

In table 6 the results of the multicollinearity test in research with a 10-year time period (2012-2021) in the City of Mataram obtained the VIF values of the four independent variables, namely telecommunications (X1) of 3.523, roads (X3) of 5,701, clean water (X3) of 3,151, and roads (X4) of 6,061. As for the tolerance value on the independent variables, namely telecommunications by 0.284, roads by 0.175, clean water by 0.317, and electricity by 0.165. In this case it can be concluded that the VIF value on the independent variable is less than 10.00, and the tolerance value is more than 0.100, so that in this study it can be said that there is no multicollinearity between independent variables or is free from multicollinearity tests.

Heteroscedasticity Test

From the image processed by SPSS 23 it can be seen that there are dots that do not form a clear pattern and these dots spread above and below the number 0 on the Y axis, so it can be concluded that in the analysis of this study there were no symptoms of heteroscedasticity.

Autocorrelation Test

Table 9: Autocorrelation Test Results

Durbin Watson
1,998

Sumber: data sekunder olahan SPSS 23

The DW value of the output is 1.998, to see the DL and DU values, namely in the DW table with a significant 5% (0.05), n (amount of data) = 10, and k (amount of independent variables) = 4. So that a DL value of 0.3760 and DU of 2.4137, while the value of 4-DL is 3.6240 and 4-DU is 1.5863. With the decision that $DL (0.3760) < DW (1.998) < DU (2.4137)$ or $4-DU (1.5863) < DW (1.998) < 4-DL (3.6240)$, it means that the test autocorrelation is not certain or cannot be decided whether to avoid autocorrelation problems or not.

Conclusions and Recommendations

Conclusion

This study aims to examine the effect of infrastructure development on GRDP with the independent variables namely telecommunications, roads, clean water, and electricity, while the dependent variable is the GRDP of Mataram City with a period of 10 years (2012-2021). Based on the results and discussion that has been described in the previous chapter, it can be concluded as follows:

1. Based on the results of multiple linear regression research, telecommunications and road infrastructure partially have no significant effect on the PDRB of Mataram City in 2012-2021. Meanwhile, clean water and electricity infrastructure partially have a significant effect on the GRDP of Mataram City in 2012-2021.
2. Based on the results of the F test that the independent variables, namely telecommunication infrastructure, roads, clean water, and electricity simultaneously have a significant influence on the GDP of Mataram City in 2012-2021.

Suggestion

Based on the conclusions described above, the authors

provide the following suggestions:

1. Telecommunications infrastructure, roads, clean water and electricity are an important part of driving a performance of economic growth in a region or region, so the government should be able to encourage and provide special attention to the development of the infrastructure so that later it will have an impact on welfare for the community and be able to increase economic growth which will have an impact on the GRDP of Mataram City
2. For entrepreneurs, a constructive facility such as the availability of raw materials must have good connecting access so that these activities are not hampered so that they can run smoothly as expected and have competitiveness with other businesses. Therefore telecommunication infrastructure, roads, clean water, and electricity play an important role in the sustainability of an entrepreneur's economic activity which will later increase the GRDP of Mataram City
3. To achieve quality economic growth, a policy is needed that is able to encourage infrastructure to help increase the GRDP of Mataram City, and the benefits of increased infrastructure can be felt by the people of Mataram City because the increased GRDP will be offset by economic growth which is related to people's welfare.

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