

Public Infrastructure Towards Economic Growth in Bali Province

Desika Eka Fitri^{1*}, Wahyunadi²

Fakultas Ekonomi dan Bisnis Universitas Mataram

Corresponding Author: Desika Eka Fitri desikafitri7@gmail.com

ARTICLE INFO

Keywords: Economic Growth, Infrastructure, Fixed Effects Model (FEM)

Received : 18, October

Revised : 20, November

Accepted: 22, December

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ABSTRACT

If there is adequate and equitable infrastructure, people can access and carry out economic activities. If economic activities run well, economic growth will increase. This study uses a descriptive quantitative and associative approach to determine how public infrastructure contributes to the economic growth of Bali Province. The study covers all regencies and cities in Bali Province and uses secondary data through panel data regression analysis using the Fixed Effects Model (FEM). Hypothesis testing results show that the infrastructure components of roads, electricity, and markets have a significant influence on economic growth. However, the clean water infrastructure component does not have a significant effect. It is expected that the government pays special attention to infrastructure development that can help economic growth in terms of quantity and quality.

INTRODUCTION

The economic growth of a region is one of the indicators used to measure the success of economic development. It is also used as a basis for determining subsequent policies. Gross Regional Domestic Product (GRDP), which describes the total value of goods and services produced during one year, is used to measure economic growth in a region. When regional income and output increase, a region is considered to be experiencing economic growth (Mankiw, 2003). Solow in his neo-classical theory explains that three factors drive economic growth: technological improvements, increases in the quantity and quality of labor (workers) or population, increases in capital (savings and investment), and improvements in the quality of work. An increase in labor, capital, and technology will have a direct impact on the increase in output produced. According to Solow, capital can come from physical investment or the infrastructure sector (Sukirno, 2007).

One important component that can drive a country's economic growth is its infrastructure. One of the most popular tourist attractions in Indonesia is Bali, which requires adequate infrastructure to support economic activity, especially in the tourism sector which is the main driver of the economy in Bali Province. The availability of adequate infrastructure such as transportation systems, energy supply and good communication facilities can reduce transaction costs, facilitate the distribution of goods and can increase the attractiveness of Bali as a tourist destination (Sutrisno, A., & Wibowo, 2021). Therefore, the quality and management of infrastructure greatly affects economic growth in Bali Province. Economic growth in Bali Province for the last five years, namely from 2019 to 2023, has fluctuated which is influenced by various external factors such as tourism conditions and changes in economic policy, including the co-19 pandemic.

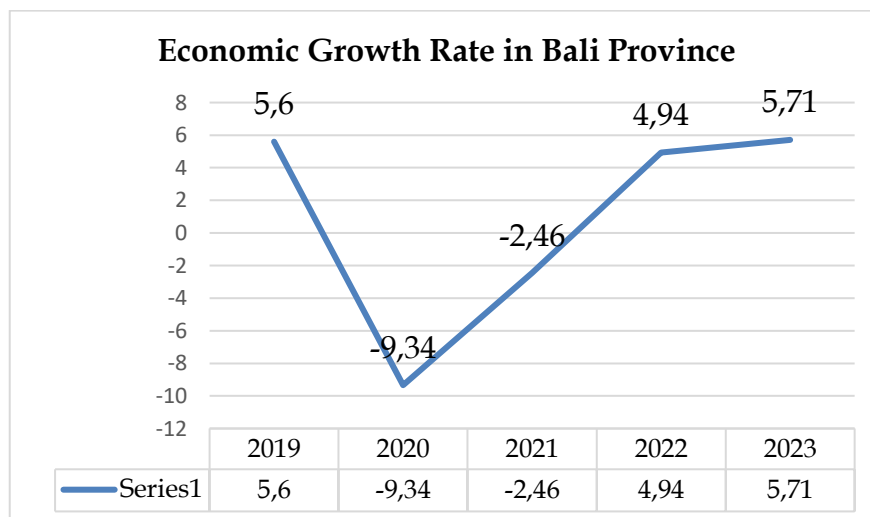


Figure 1. Economic Growth Rate of Bali Province in Percentage From 2019-2023

Source: Bali Provincial Statistics Agency (BPS)

From Figure 1 the economic growth rate of Bali Province seems to fluctuate; in the last five years, economic growth of 5.6% was recorded, but in 2020 and 2021 it decreased to -9.31% and -2.47% due to the covid-19 pandemic which limited the flow of tourists. Then in 2022 and 2023 the economic growth rate increased again due to the recovery after the covid-19 pandemic. One of the factors that support economic recovery is the role of adequate infrastructure in facilitating economic activities that are directly related to the tourism sector. The existence of adequate infrastructure will make it easier for people to carry out and carry out economic activities. Economic activities that run well allow economic growth to continue to increase (Wibowo, 2016).

Both directly and indirectly, infrastructure affects the economy of a region. The direct impact of infrastructure on the economy is the increase in output generated by infrastructure development. The indirect impact on the economy is an increase in economic activity that results in an increase in government and private capital and the ability to absorb labor, which in turn can result in increased output (Nuraini, 2019). To achieve the expected economic growth, the availability of infrastructure is very important. Based on the background description, economic growth can be influenced by infrastructure development. This study aims to determine how public infrastructure which includes roads, clean water, electricity, and market infrastructure affects the economic growth of regencies and cities in Bali Province both partially and simultaneously.

LITERATURE REVIEW

Economic Growth Theory

An increase in people's income in a region, which includes an increase in overall added value, is considered economic growth (Tarigan, 2012: 46). Regional income can reflect the returns to factors of production such as land, capital, labor, and technology. It can indicate the prosperity of the region. How large the transfer payments are, in addition to the value added generated, determines the prosperity of a region. If the level of economic income of a country continues to increase from year to year, the economic development of the country will increase.

Road Infrastructure

Economic development is strongly influenced by road infrastructure, both in cities and in rural areas. The infrastructure sector can create jobs that can absorb millions of people in Indonesia through various projects. Road infrastructure is also crucial for the flow of goods, services, people, money and information between market zones. Thus, this condition can reduce the price of goods and services, so that it can be reached by people whose income is still low (Iek, 2013). Public roads are divided into national, provincial, district, city and village roads, according to Law of the Republic of Indonesia No. 38/2004 on Roads and Government Regulation No. 34/2006 on Roads. Public roads can be categorized as good, moderate, damaged or severely damaged.

Clean Water Infrastructure

As clean water infrastructure is essential for human life, its provision should be a top priority in development. The physical properties of water that easily flow, evaporate, seep, and exit through certain media must be considered in clean water planning (Tri Wahyuni, 2009). The three main sectors of water use are domestic, agriculture, and industry. Water demand for domestic and agricultural irrigation will increase along with population growth. In the industrial sector, water use continues to increase due to economic development that focuses on industrialization.

Electricity Infrastructure

Electricity infrastructure is the most important infrastructure for economic growth. Electricity is one of the most important resources to support production and daily life. The electrical infrastructure used by the community reflects how much electrical energy utilization in supporting the regional economy to support productivity. The use of electrical energy plays an important role in increasing Gross Regional Domestic Product (GRDP), which has a direct impact on economic growth, because electricity is a major factor in the production process of the manufacturing sector (Amalia, 2007).

Market Infrastructure

Based on (Presidential Regulation of the Republic of Indonesia No. 112 Article 1, Year 2007) describes a market as a place where sellers and buyers of goods and services meet. Markets consist of permanent, semi-permanent, or no buildings depending on their location. Goods sold in the market may consist of various commodities (mixed) or even a particular commodity.

Conceptual Framework

Endogenous Growth Theory developed by (Paul Romer, 1990) and New Growth Theory explains that infrastructure is one important component that has the ability to encourage economic growth in the long run, because good infrastructure will increase production efficiency, reduce transaction costs and encourage investment which in turn will accelerate the rate of economic growth. With the availability of proper infrastructure, it can stimulate the growth of existing sectors in a region. The conceptual framework can be explained as follows based on the previous description.

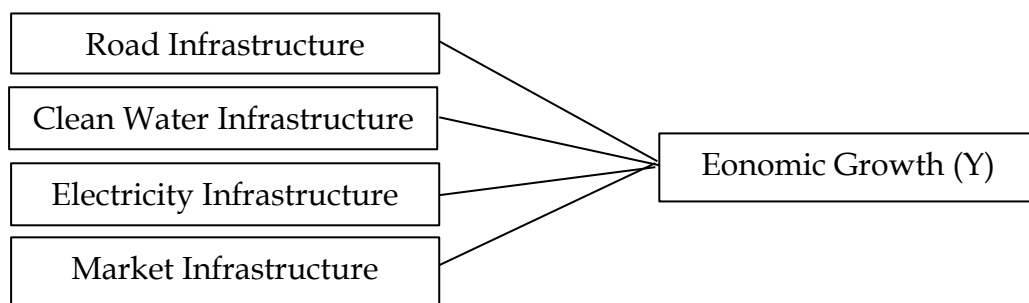


Figure 1. Conceptual Framework

According to (Sugiyono, 2014) the hypothesis of this study is as follows because this is a temporary hypothesis that still needs to be tested with data.

H1= Road infrastructure has a significant effect on economic growth in Bali Province

H2= Water infrastructure has a significant effect on economic growth in Bali Province

H3= Electricity infrastructure has a significant effect on economic growth in Bali Province

H4 = Market infrastructure has a significant effect on economic growth in Bali Province

METHODOLOGY

Quantitative methods are used in this research, which uses descriptive and associative approaches. The secondary data used in this study came from the Central Bureau of Statistics and the Bali Province Industry and Trade Office. The variables used consist of road infrastructure, clean water infrastructure, electricity infrastructure, market infrastructure and economic growth in Bali Province along with data from 9 districts / cities in Bali Province in the period 2019-2023. The analysis technique used is panel data regression analysis using the eviews 12 program. The panel data regression equation model for the sample is as follows:

$$Y_{it} = \beta_0 + \beta_1JLN_{it} + \beta_2LAM_{it} + \beta_3LTK_{it} + \beta_4PSR_{it} + \varepsilon_{it}$$

Dimana:

Y = Economic Growth (percent)

β_0 = Constant

$\beta_1, \beta_2, \beta_3, \beta_4$ = Regression Coefficient

JLN = Road length (km)

LAM = Clean water customers

LTK = Electricity sold (mwh)

PSR = Traditional market (unit)

i = Cross Section

t = Time series

ε = Error term

There are three models that can be selected to get the best panel data: Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). In the Chow test, the p-value is less than alpha, so the Fixed Effect Model is better than the Common Effect Model. In the Hausman test, on the other hand, if the p-value is less than alpha, then H0 is rejected.

RESEARCH RESULT

After conducting the Chow and Hausman tests, it can be concluded that the fixed effects model is the most suitable model for this study. The results of the Chow and Hausman tests with the Eviews program can be seen here.

Table 1. Chow Test and Hausma Test

Effects Test and Test Summary	Cross-Section Chi-square & Cross-section random	Model Terpilih
Chow Test	0.0017	FEM
Hausma Test	0.0001	FEM

Source: Eviews12 data processing results

Chow and Hausman test results can be seen with the Eviews program. With a Cross-section random probability value of 0.001 and a Chi-Square value of 0.0017, the p value is smaller than alpha (0.05), and H_0 is accepted. Fixed Effect and Self Effect Models are not comparable.

Estimation Results

The Fixed Effect Model estimation results are as follows, based on the technique used to select the estimation model.

Table 1. Fixed Effect Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-70.51203	23.31708	-3.024050	0.0049
JLN	0.000893	0.000356	2.511731	0.0173
LAM	0.081023	0.459618	0.176283	0.8612
LTK	0.067828	0.018509	3.664690	0.0009
PSR	0.709285	0.283930	2.498100	0.0178
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.427382	Mean dependent var	1.316667	
Adjusted R-squared	0.212650	S.D. dependent var	5.488852	
S.E. of regression	4.870408	Akaike info criterion	6.241084	
Sum squared resid	759.0678	Schwarz criterion	6.763008	
Log likelihood	-127.4244	Hannan-Quinn criter.	6.435652	
F-statistic	1.990308	Durbin-Watson stat	2.717285	
Prob(F-statistic)	0.059692			

Source: Eviews12 data processing results

Based on the processing estimation results shown in the table above, the panel data regression equation can be formulated as follows:

$$Y = -70.51203 + 0.000893 \text{ JLNit} + 0.081023 \text{ LAMit} + 0.067828 \text{ LTKit} + 0.709285 \text{ PSRit}$$

The interpretation of the panel data regression equation model results is as follows:

1. The constant β_0 value of -70.51203 means that if the variables JLN, LAM, LTK and PSR are equal to 0 then the value of variable Y is -70.51203 percent. In other words, the value of Y without road infrastructure, clean water infrastructure, electricity and market infrastructure is -70.51203 percent.
2. The JLN coefficient value of 0.000893 means that when the JLN variable increases by 1%, economic growth will increase by 0.000893 percent.
3. The LAM coefficient value is 0.81023, meaning that when the LAM variable increases by 1%, economic growth will increase by 0.81023 percent.
4. The LTK coefficient value is 0.67828, meaning that when the LTK variable increases by 1%, economic growth will increase by 0.67828 percent.
5. The PSR coefficient value is 0.709285, meaning that when the PSR variable increases by 1%, economic growth will increase by 0.709285 percent.

Hypothesis Test

Interpretation of the partial t hypothesis testing results, provided that if the prob value <0.05 then H_a is accepted, if the prob value > 0.05 , then H_0 is accepted, and H_a is rejected.

1. The t test results on the JLN variable obtained a probability value of 0.0173 <0.05 and the value of t count $2.511731 > t$ table 2.016692199, then H_0 is rejected and H_a is accepted. This means that the JLN variable has a significant effect on Y.
2. The t test results on the LAM variable obtained a probability value of 0.8612 > 0.05 and the value of t count $0.176283 < t$ table 2.016692199, then H_a is rejected and H_0 is accepted. This means that the LAM variable has no significant effect on Y.
3. The t test results on the LTK variable obtained a probability value of 0.0009 <0.05 and a t value of $3.664690 > t$ table 2.016692199, then H_0 is rejected and H_a is accepted. This means that the LTK variable has a significant effect on Y.
4. The t test results on the PSR variable obtained a probability value of 0.0178 <0.05 and a t value of $2.498100 > t$ table 2.016692199, then H_0 is rejected and H_a is accepted. This means that the PSR variable has a significant effect on Y.

Furthermore, do a joint interpretation of the results of testing the F hypothesis to see how the dependent variable affects the economic growth variable with a value of F count of $1.990303 < F \text{ table } 2.605975$ and a prob value of $0.059692 > 0.05$ then H_a is rejected and H_0 is accepted, meaning that the variables JLN, LAM, LTK, and PSR simultaneously or together have no significant effect. In this study the coefficient of determination or R^2 sebesar 0.427382 , meaning that the variable economic growth (Y) can be explained by the variable JLN, LAM, LTK and PSR by 42.73 the rest can be explained by other variables not included in the model.

DISCUSSION

Road Infrastructure on Economic Growth

Using the fixed effects model, the test results show that road infrastructure drives economic growth in Bali Province. This finding is in line with previous research findings by Putri (2017) and Saadatul Kamila (2020), who found that road infrastructure has a positive effect on economic growth. This result is consistent with the theory that roads have two functions. Roads promote economic growth by directing goods and services between places of production and marketing and vice versa. Conversely, roads also help reduce development disparities among regions. Therefore, road infrastructure development is the first step in regional development (Syafrizal, 2014).

Clean Water Infrastructure on Economic Growth

From the test results using the fixed effect model which shows, the number of clean water customers has a positive and insignificant effect on economic growth in Bali Province. Similar research results were conducted by (Suswita, I., Damanik, D., & Darasa Panjaitan, 2020) which stated that clean water infrastructure in Bali Province has no significant effect on the economic growth of Simalungun Regency, because most of the district / city communities in Bali Province still use groundwater or boreholes in their daily lives, so they are not affected by clean water infrastructure managed by PDAMs.

Electricity Infrastructure on Economic Growth

The test results conducted with the fixed effects model show that electricity infrastructure has a positive and significant impact on economic growth in Bali Province. Similar research results were conducted by (Suswita, I., Damanik, D., & Darasa Panjaitan, 2020) and (Tanveer A., and Manan, 2016) which stated, the relationship between electrical energy consumption and economic growth has a positive and significant effect. Electricity infrastructure is closely related to labor productivity, so increasing electricity consumption can increase income through increased labor productivity, because almost all activities today require electrical energy. This conclusion is in line with the Solow growth model, which states that economic growth is related to physical investment in electrical energy.

Market Infrastructure on Economic Growth

Test results using the fixed effects model show that market infrastructure has a positive and significant impact on economic growth in Bali Province. This finding is comparable to previous research (Afriyana et al., 2023), which found that market infrastructure has a positive impact on the economic growth of West Nusa Tenggara. Market infrastructure such as traditional markets plays an important role in the regional economy because it is a place for buying and selling activities that drive various economic sectors. According to (Barro, 1990) in the theory of endogenous economic growth, investment in infrastructure is the main key in driving economic growth in the long run. The availability of adequate market infrastructure plays an important role in supporting technological progress, innovation and increasing the effectiveness of the local economy.

CONCLUSIONS AND RECOMMENDATIONS

With the exception of clean water infrastructure, according to the study, road, electricity, and market infrastructure contribute partially and significantly to provincial economic growth. Simultaneously, all independent variables have no significant effect on economic growth in Bali Province. The coefficient of determination of this study is 0.427382 this indicates that the independent variable is able to explain the dependent variable by 42.73% the rest is explained by other variables not included in the model.

The central and local governments in Bali Province must pay special attention to the development of road infrastructure, clean water, electricity, and markets so that their quality and quantity benefit their people. Thus, economic growth in Bali Province will increase, which in turn will result in prosperity.

ADVANCED RESEARCH

In every research, there are limitations. These limitations can be external to the research, such as limited resources or time, which affect the researcher's ability to analyze the data being studied. Therefore, further research is needed to make this study better.

ACKNOWLEDGMENT

We would like to thank all parties in the Faculty of Economics and Business, especially the Head of the Department of the Faculty of Economics and Business, University of Mataram, for the opportunity given to carry out this research. We hope that the results of the study can contribute to the academic world and the government in formulating policies regarding the problem of uneven infrastructure development in the districts / cities of Bali Province.

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