ANALYSIS OF INFRASTRUCTURE DEVELOPMENT, GROWTH THE ECONOMY, AND POVERTY RATE IN THE PROVINCE WEST NUSA TENGGARA IN INDONESIA

Wahyunadi,[1], Hj. St. Maryam,[2,] H. Mansur Afifi [3]
University Of Mataram. Indonesia

ABSTRACT

The research aims to measure and analyze the effects of infrastructure development on economic growth and its contribution to reducing poverty levels in West Nusa Tenggara. The method of analysis used is quantitative analysis with regression method with panel data (pooled data). Estimation of model parameters that explain the effect of infrastructure variables on economic growth and poverty levels uses a simultaneous equation system with the Two-Stage Least Square (TSLS) method. Estimation of the economic growth model through simultaneous testing (F-test) shows that all exogenous variables in the model affect economic growth, the coefficient of determination (Adj R-Sqr) is 0.9712 with the F-count = 25.458 greater than the F-table = 3.93. The partial test results with the -t-test (t-test), show that the road infrastructure variable (JL), the Clean Water Infrastructure (AB) variable, and the Health infrastructure variable (PKM) have a significant effect on economic growth with a probability value of 0.0000. While the electricity infrastructure variable (LIS) probability value is 0.0466, this result explains partially the effect but is not significant at the 1% confidence level ($\alpha = 0.01$). Meanwhile, the labor variable (TK) has a significant effect on economic growth. The estimation results of the poverty model testing simultaneously show that all exogenous variables in the model affect poverty. where the coefficient of determination (Adj R-Sqr) is 0.7891 with the value of Fhit = 743.24 greater than Ftable = 4.10. The test results with the -t-test (t-test) show that the variable economic growth (GRDP) and the variable average length of schooling (RLS) significantly affect poverty reduction in West Nusa Tenggara. Meanwhile, unemployment (PGR) has significantly contributed to increasing poverty.

Keywords: Infrastructure, Economic Growth, Poverty.

1. INTRODUCTION

Infrastructure development is expected to boost economic performance in the regions so that it is expected to further reduce poverty levels. Poverty alleviation can be pursued in several ways. First, improving the rate of economic growth. Acceleration of economic growth can occur by increasing the efficiency of economic activity. Efficiency requires the support of adequate infrastructure capital to encourage the continuous improvement of the potential of each region. Second, the expansion of public access to infrastructure is part of the government's efforts to improve people's welfare. Availability of good infrastructure will increase people's income both directly and indirectly through the provision of health services, education, transportation, telecommunications, access to energy, clean water, and better sanitation conditions.

Infrastructure is often seen as increasing productivity and attracting business activities that can lower transportation and production costs and facilitate market access. However, some of these effects do not apply in the aggregate, given that infrastructure has to be paid for. The effect of infrastructure on output at the aggregate level may differ from its effect on total capital for some reasons. First, there may be significant economies of scale that differ from other investments. Second, network externalities can characterize infrastructure investment, linking regions. Third, infrastructure may have the effect of increasing competition, enabling increased market access, such as through lowering transportation costs.

Infrastructure is the driving force of economic growth so that it is seen as the locomotive of national and regional development. Mustika (2017) argues that the availability of infrastructure is considered important to encourage the economy because it supports increasing regional productivity. Maqin (2011) states that infrastructure development is a public service obligation, which is something that should be the government's obligation because infrastructure is the most important public infrastructure in supporting the economic activities of a region. Public goods have the characteristics that they can be enjoyed for free, are available in large quantities, and can be used by everyone (Pindyck & Rubinfield, 2012).

According to Todaro & Smith (2009), infrastructure are facilities that can facilitate economic and trade activities, such as communications, water networks, and energy supply systems. Meanwhile, Mankiw (2010) stated that infrastructure is an investment made by the government in the form of public capital such as roads, bridges, and sewer systems. Adequate infrastructure is needed to improve the economy of a region. Referring to the publication of the World Development Report (World Bank, 1994), infrastructure plays an important role in increasing economic growth where higher economic growth is found in areas with adequate levels of infrastructure availability.

When the state of infrastructure in an area is still lacking both in quantity and quality, it means that the blood economy is running in a very inefficient way. Very high logistics costs, leading to companies and businesses that lack competitiveness (due to high business costs). not to mention the emergence of social injustice, for example, it is difficult for some residents to visit health facilities, or it is difficult for children to go to school because the journey is too difficult or expensive.

Regions that have greater potential and wealth of natural resources tend to have high regional incomes compared to regions that have few resources. The same thing happened in West Nusa Tenggara Province, so that infrastructure development and the provision of public service facilities in each district/city area will also vary both in quantity and quality.

2. LITERATURE REVIEW

Endogenous Growth Theory

The neoclassical growth model argues that per capita output growth is driven by the level of technological development. Without technological developments, there can be no long-term growth. The causes of technological development are not identified in the Solow model, so the underlying causes of growth are not explained.

Endogenous growth theory seeks to correct the failure of the Solow model by explaining the causes of technological development (Mankiw et al., 1992.) It is called endogenous growth theory because it argues that the rate of technological development is determined by the growth process itself. Technological developments can spread across regions so that small economies can benefit from technological developments without having to rely on technology creation in their economies. Technology diffusion tends to occur rapidly at a cross-border level driven by the development of multinational corporations and communication systems.

The catch-up model of endogenous growth theory argues that technological development in a region will depend on how far the technological level of the region lags behind the most developed regions. The technology transfer function of this model states that the further the technological level of a region lags behind the most developed region, the faster its technological development will be.

The theory of endogenous growth initially developed in two branches of thought that rested on the importance of human resources as the main key in the economy, namely: 1). Thinkers who believe that knowledge stock is the main source for increasing economic productivity. 2). Thoughts that emphasize the importance of learning by doing and human capital with the introduction of new (external) things in the economy are the driving factors for increasing economic productivity.

The first thought was raised and developed by Romer (1986). In developing his theory, Romer places the stock of knowledge as one of the increasing factors of production, so that the growth rate can be continuously increased according to the ability of each country to increase and create knowledge stocks. Developed countries with the ability to create knowledge faster than poor countries will experience faster economic growth than poor countries. This at the same time rejects the convergence theory of neo-classical.

3. RESEARCH METHODS

Research Design

This research is a type of verification research that aims to examine economic theories related to the object of research by compiling relationships between variables based on the formulations in the hypothesis. Thus, this study will conduct hypothesis testing, namely analyzing the relationship between one variable (dependent variable) and some other variables (independent variable).

Research Area/Location

The unit of analysis in this study is 10 districts/cities in West Nusa Tenggara Province, considering that all districts/cities have different characteristics of regional potential and development policies with different priority scales.

Types And Sources Of Data

The type of data used in this study is quantitative data and secondary data in the form of time series data and cross-sectional data between districts/cities in the province of West Nusa Tenggara. The data used in this study is secondary data in the form of time series data and cross-sectional data. The data collection process is carried out by compiling a matrix of the necessary variables according to the analysis model.

The analytical method used is quantitative analysis with panel data regression (pooled data) which is a combination of time series data and cross-sectional data (Gujarati: 2003, Pindyk and

Rubinfeld: 1998). The estimation of model parameters uses a simultaneous equation system with the Two-Stage Least Square (TSLS) method. The panel data estimation process can be done with a fixed-effect model (Fixed Effect Model) and a random effect model (Random Effect Model) by first doing the Hausman Specification Test. The structural equations in the simultaneous model system in this study are:

Equation 1:

$$\ln PDRBL_{it} = \beta_{0it} + \beta_1 \ln JL_{it} + \beta_2 \ln LIS_{it} + \beta_3 \ln AB_{it} + \beta_4 \ln PKM_{it} + \beta_5 \ln TK_{it} + \mu_{1it}$$

Equation 2 :

$$\ln kMIS_{it} = \alpha_0 + \alpha_1 \ln PDRB_{it} + \alpha_2 \ln PGR_{it} + \alpha_3 \ln RLS_{it} + \mu_{2it}$$

Where :
PDRBL : Regional Economic Growth
JL : Road Infrastructure
LIS : Electricity Infrastructure.
AB : Clean Water Infrastructure
PKM : Health Infrastructure/PUSKESMAS
Kindergarten : Labor
KMS : Poverty Level
PGR : Unemployment Rate
RLS : Average Length of School
i : shows the area (cross-section), t : shows the time (time series)
μ1,2 : is error term
$\beta_{0,}$ α_0 is the intercept,
β_j is the estimated parameter, j = 1, 2, 3, ...6.
α_j is the estimated parameter , j = 1, 2, ………3.

4. RESULTS AND DISCUSSION

The results of the initial test with the Hausman test on the model showed a simultaneous bias. The full results can be followed in the following table below.

Table 1
Hausman Test Results (Setting the Simultaneous Criteria)

Model	Coefficient	Statistical Value (t-test)	p-value	Information
PDRB	1,03825	65,1193	0,0000	simultan
kMIS	1,00288	108,796	0,0000	simultan

Source: Data Processing Results
Note : GRDP : economic growth (GDP), Thursday : Poverty level

In the structural equation of the economic growth model, the p-value of the residual variable (resid) appears to be smaller than 0.05 or p-value <0.05. These results provide information that the residual variable is very significant so that it can be stated that the economic growth model (GDP) can be executed using a simultaneous equation approach. Likewise, the poverty model (kMIS), shows that the residual variable (resid) shows that its p-value is smaller than 0.05. This indication indicates that the residual variable in the poverty model is very significant so that this model is very reasonable to estimate with a simultaneous approach using the Two-Stage Least Square (TSLS) method.

Growth Model Estimation

Following the previous results which stated that all equations are simultaneous equations, the parameter estimation is carried out using the Two-Stage Least Square (TSLS) method while to meet the provisions in the data panel (pooled data) it will be used with a fixed-effect model. Thus the process of estimating the economic growth model (GDP) will be carried out using the Two-Stage Least Square (TSLS) method with a fixed effect.

Table 2
Estimation Results of the Economic Growth Model (TSLS)

Variabel	**Dependent Var. : lnPDRB**		
	Koefisien	**t-stat**	***p-value***
C	3.1015	42.86976	0.0000***
lnJL	0.0355	4.322401	0.0000***
lnLIS	0.0189	1.837528	0.0466*
lnAB	0.0343	-4.177113	0.0000***
lnPKM	0.0076	2.028999	0.0021**
lnTK	0.2890	8.691941	0.0000***
R-squared	0.99164		
Adjusted R-squared	0.97118		
S.E. of regression	0.12713		
Durbin-Watson stat	0.85566		

Source: Data Processing Results.

Note: (*) significant at critical value 10%, (**) significant at critical value 5%, (***) significant at Val 1%, ns : not significant. PDRBL: regional economic growth, JL: Road Infrastructure, LIS: Electricity Infrastructure, AB: Clean Water Infrastructure, PKM: Health Infrastructure/PUSKESMAS, TK ; Labor

The results of the estimation of the parameters of the economic growth model using the TSLS method and fixed effects show that the exogenous variables include: Road Infrastructure (JL),: Electricity Infrastructure (LIS), Clean Water Infrastructure (AB), Health Infrastructure/Puskesmas (PKM) and Manpower (Kindergarten) affects Economic Growth (GDP). Four of the five independent variables in the model showed a significant effect on growth (significant at the level of 1.00%). Road Infrastructure (JL) shows a regression coefficient of 0.0355 which means that if there is an increase in the ratio of roads by 1 unit, it will affect increasing economic growth in each region by 0.3 percent. Electricity Infrastructure (LIS) shows a positive influence and significantly affects economic growth with a regression coefficient of 0.0189. Meanwhile, Clean Water Infrastructure (AB) shows a regression coefficient of 0.0343 which means that if there is an increase in clean water supply services by 1 percent, it will have an impact on the economic growth of 3.4 percent.

Another variable that explains the economic growth variable is Health Infrastructure/Puskesmas (PKM) where the regression coefficient value is 0.0076, meaning that an increase in the number of puskesmas in each area by 1.00 percent will affect increasing economic growth by 0.7 percent. The variable labor (TK) shows a positive effect on economic growth with a regression coefficient of 0.2890, which means that every 1.00 percent increase in the number of workers involved in productive activities will increase economic growth by 28.9 percent.

When viewed from the value of the constant (C) as a representation of the conditions and characteristics of each region/province the results show a fairly sharp variation with a range between -0.0375 - 1.0654. This difference reflects the different characteristics of the region in various respects such as natural conditions (ownership of natural resources that are spread unevenly in each region), the quality of human resources in each region, the state of infrastructure and public facilities available as well as regional government development strategies and policies which are certainly not the same. in every area.

Hypothesis testing is intended to provide descriptions, interpretations, and conclusions based on the results of processed empirical data on the variables used in the economic growth model. This hypothesis test is an empirical test and evidence-based on research findings so that a recommendation can be made for policy making.

The statistical hypothesis of Economic Growth (GRDP) model:

Ho : $\alpha_i \leq 0$ (where, *i : 1,2,3,4,5,*)

Hi : $\alpha_i > 0$

Structural Model of Economic Growth:

lnPDRB = 5,101452 + 0,0355 lnJL + 0,0189lnLIS + 0,0343lnAB + 0,0076lnPKM + 0,2890lnTK

(0,0000)*** (0,0000)*** (0,0466)* (0,0000)*** (0,0021)** (0,0000)***

Adj R-Sqr = 0,9712; SE of Reg = 0,1271; **..............................**

Estimation of the parameters of the economic growth model through simultaneous testing (F-test) shows the results that all exogenous variables in the model affect economic growth. This is explained by the results of statistical tests where the coefficient of determination (Adj R-Sqr) is 0.9712 with a value of F-count = 25,458 which is greater than F-table = 3.93 and a probability of 0.0000, which means that 97.12 percent of the variation in economic growth is influenced by the five exogenous variables contained in the model while the remaining 2.88 percent is influenced by other variables.

Furthermore, the partial parameter estimation results were tested using the -t-test (t-test) to explain the partial ability of each exogenous variable to give effect/variant to economic growth based on the assumption of criteria various conditions of other variables. The test is carried out by comparing the t-count value obtained from exogenous variables with the t-table value (theoretical) or by looking at the probability of each variable in the model.

The test results show that the variable Road infrastructure (JL) has a probability value of 0.0000, thus it can be said that the variable significantly affects the critical value of 1.00% of economic growth. While the Electricity infrastructure variable (LIS) shows a probability value of 0.0466, this result explains that it partially affects economic growth and is significant at the 5% confidence level ($\alpha = 0.05$). While the Clean Water Infrastructure (AB) variable, the results of statistical tests show a probability value of 0.0000, meaning that this variable significantly affects economic growth at a critical value of 1.00%.

Other variables such as Puskesmas infrastructure (PKM), statistical test results show a probability of 0.0021, meaning that the Puskesmas infrastructure variable (PKM) has a significant effect on the critical value of 1% on economic growth. Labor (TK), the partial test results show a probability of 0.0000, meaning that the labor variable has a significant effect on the critical value of 1% on economic growth.

Referring to the hypothesis formulated previously, it turns out that partially the variables of Road infrastructure (JL), Electricity Infrastructure (LIS), Clean Water Infrastructure (AB), Health Infrastructure/Puskesmas (PKM) state Ho: rejected, meaning that these variables are influential and significant to economic growth. This result empirically proves that the higher the changes in the exogenous variables, the higher the economic growth in each region.

Poverty Model Estimation

The estimation of the parameters of the Simultaneous Poverty Equation (kMIS) model is carried out using the TSLS method, because the data used is panel data (pooled data), the estimation process is carried out using the fixed-effect method. The estimation results using the TSLS method with fixed effects can be seen in the table below this.

Table 3
Poverty Model Estimation Results (TSLS)

Variable	**Dependent Var. : lnkMIS**		
	Koefisien	**t-stat**	***p-value***
C	6.10452	42.86976	0.0000***
lnPDRB	-0.35493	4.322401	0.0001***
lnPGR	0.80983	1.837528	0.0239**
lnRLS	-0.51343	4.177113	0.0003***
R-squared Adjusted R-squared S.E. of regression Durbin-Watson stat	0.79265 0.77917 0.13686 0.64291		

Source: Data Processing Results.

Note: (*) significant at critical value 10%, (**) significant at critical value 5%, (***) significant at Val 1%, ns : not significant. kMIS: Poverty level, PDRBL: regional economic growth, PGR: Unemployment, RLS: Average Years of Schooling.

Based on the estimation results of the simultaneous equation model with the TSLS method, it shows that the factors of Economic Growth (GRDP), Unemployment (PGR), and Average Years of Schooling (RLS) have a significant influence on Poverty (MIS) in West Nusa Tenggara. Almost all exogenous variables in the model have a significant effect on the Poverty variable (kMIS).

The results of model estimation through simultaneous testing show that all exogenous variables in the model affect the endogenous variable Poverty (kMIS). This is explained by the coefficient of determination (Adj R-Sqr) of 0.7791, which means that 77.91 percent of the variation in investment is influenced by exogenous variables contained in the model while the remaining 23.09 percent is influenced by other variables.

The Economic Growth Variable of each region (GRDP) shows a negative effect on poverty (kMIS) with a regression coefficient of 0.3549, meaning that if there is an increase in the economic growth of 1 percent, it will affect reducing poverty by 3.5 percent. Different results are shown by the Unemployment variable (PGR) which has a positive influence on Poverty (kMIS) with a regression coefficient of 0.8098 meaning that an increase in the number of unemployed in each district/city by 1 percent will cause an increase in Poverty (kMIS) of 8, 09 percent while the variable Average Length of School (RLS) shows a negative effect on poverty (kMIS) with a regression coefficient of 0.51343 which means that an increase in the average length of schooling (RLS) of 1.00 percent will affect reducing poverty (kMIS) of 5.13 percent.

Hypothesis testing is intended to provide descriptions, interpretations, and conclusions based on the results of processed empirical data on the variables used in the model. This hypothesis test is an empirical test and statistical evidence based on research findings so that a recommendation for policy can be produced.

Poverty model statistical hypothesis (kMIS):

Ho : $\alpha_i \leq 0$ (where, *i : 1,2,3*)

Hi : $\alpha_i > 0$

$$\ln kMIS = 6{,}1045 - 0{,}3549 \ln PDRB + 0{,}8098 \ln PGR - 0{,}51343 \ln RLS$$

$$(0{,}0000)^{***} \quad (0{,}0001)^{***} \quad (0{,}0239)^{*} \quad (0{,}0003)^{***}$$

Adj R-Sqr = 0,78911; SE of Reg = 0,066287;

Based on the results of the estimation of model parameters through simultaneous testing, it shows that all exogenous variables (GRDP economic growth, PGR unemployment, and RLS Average Years of Schooling) in the model affect poverty. This is explained by the results of statistical tests where the coefficient of determination (Adj R-Sqr) is 0.7891 with a value of Fhit = 743.24 which is greater than Ftable = 4.10 which means that 78.91 percent of changes that occur in poverty are influenced by variables exogenous contained in the model while the remaining 21.09 percent is influenced by other variables.

The partial test of the parameter estimation results is carried out using the -t-test (t-test) to partially explain the ability of each exogenous variable to have an effect/variant on poverty based on the assumption of the clitoris paribus condition of other variables. The test is done by comparing the t-count value of the exogenous variables with the t-table value (theoretical). The test results show that the economic growth variable shows a probability value of 0.0001, meaning that the economic growth variable has a significant effect on reducing poverty in West Nusa Tenggara. Meanwhile, unemployment (PGR) shows positive results in influencing poverty with a probability value of 0.0239. This means that at the critical level of 5% or = 0.05 unemployment significantly contributes to increasing poverty. Meanwhile, the Average Length of Schooling (RLS) variable shows a probability of 0.0000 meaning that the variable has a significant negative effect so that it contributes to reducing poverty levels in West Nusa Tenggara. From the hypothesis that has been formulated previously, it turns out that partially the GRDP PGR and RLS variables state Ho: rejected, meaning that these variables have a significant effect on poverty.

5. CONCLUSION

Based on the description of the research results and discussion, some conclusions can be drawn as follows:

1. Road infrastructure (JL), electricity infrastructure (LIS), clean water infrastructure (AB), and health/puskesmas infrastructure (PKM) is proven to have a positive influence on economic

growth (GRDP). This is understandable because most of the infrastructure is to support the smooth running of the economy in the regions, especially to facilitate the flow of distribution of production factors, goods, and services.

2. Road infrastructure is an infrastructure that has the highest elasticity compared to other regional infrastructure. The elasticity of road infrastructure is 3.0. It is much larger than that of health/health center infrastructure.
3. Economic growth of districts/cities in West Nusa Tenggara effectively reduces poverty. This also means that the presence of local infrastructure can indirectly reduce poverty levels. Likewise, the variable average length of schooling can reduce the level of poverty.

REFERENCE

Adam, Antonis., dkk. 2008. *Fiscal Decentralization and Public Sector Efficiency: Evidence from OCED Countries.*

Afonso, Antonio, L. Schuknecht and V. Tanzi (2005). "*Public Sector Efficiency: An International Comparison", Public Choice*, 123 (3-4), 321 – 47

Bastian, Indra.2006. *Sistem Akuntansi Sektor Publik,* Edisi 2. Jakarta: Salemba Empat

Bird, R. and Rodriguez, E. R.. 1999. *Decentralization and poverty alleviation. International experience and the case of the Philippines*. *Public Admin*. Dev., 19: 299–319.

Chambers, 1988, R .1995. *Poverty and livelihoods: whose reality counts?* The Institute of Development Studies, University of Sussex, Falmer, Brighton BN19RE, UK

Hakimudin, Dimas Rizal, 2010, Analisis Efisiensi Belanja Kesehatan Pemerintah Daerah di Provinsi Jawa Tengah tahun 2005-2007.

Juanita. 2002. Kesehatan dan Pembangunan Nasional. Medan: Universitas Sumatera Utara

Kurnia, Akhmad Syakir, 2010. Model Pengukuran Kinerja dan Efisiensi Sektor Publik Metode Free Disposable Hull (FDH), *Jurnal Ekonomi Pembangunan*, Vol.11, No.1:1-20.

Kuznets S. 1955. Economic growth and income inequality. *The American economic Review* 45: 1-28

Lucas R.E. 1988. On The Mechanics of Economic Development. *Journal of Monetary Economics*, Vol. 22(1):3-42.

Machfud Sidik. 2002. *Format Hubungan Keuangan Pemerintah Pusat dan Daerah yang Mengacu pada Pencapaian Tujuan Nasional.* Dirjen PKPD DepKeu R.I. Jakarta.

Mankiw, Gregory., 2007. Makroekonomi Edisi Keenam. Erlangga, Jakarta.

Musgrave, Richard A. and Peggy B. Musgrave**.** 1989. *Public Finance in Theory and Practice.* Singapore, Mc. Graw-Hill Book Co.

OECD, 2008, Handbook on Constructing Composite Indicators: Methodology and User Guide.

Sen A, 1995. The political economy of targeting. Di dalam Van de Walle D, Nead K, editor. *Public Spending and The Poor.* Baltimore: The John Hopkins University Press.

Stiglitz, Joseph E. 2003. *Economics of the Public Sector*, Third Edition, Norton McGraw-Hill.

UN, 2007, Indicators of Sustainable Development: Guidelines and Methodologies

Von Braun, J. and U. Grote. 2002. *Does Decentralization Serve the Poor? In Managing Fiscal Decentralization ed. E. Ahmad, and V. Tanzi*. London and New York: *Routledge.*