

## **The Impact of Socioeconomic, Government Expenditure and Transportation Infrastructures on Economics Development: The Case of West Timor, Indonesia**



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### **ABSTRACT**

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Socioeconomic, government expenditures, and transportation infrastructures, such as roads and ports, play a critical role in the economic development of poor and deprived regions. These factors are as catalysts for increasing economic output and enhancing people's living standards in these regions. This study of West Timor, Indonesia, aimed to examine the impact of Socioeconomic, government expenditure, road, and port infrastructure on economic growth. This study analyzed panel data from a cross-section of six regencies/municipality in the West Timor region from 2002 to 2020. The analytical method used in this research is the fixed effect model (FEM) and the random effect model (REM). We found that human development, government expenditure on personnel and capital expenditure, urbanization, and district roads positively impacted economic growth, while expenditure on goods and services has a negative impact on economic growth. In contrast to district roads, national roads adversely impact economic growth due to triggering backwash and leakage of the regional economy. Therefore, human development, government expenditure, and infrastructure development to encourage the local economy of underdeveloped areas in the country's border areas must consider the needs of local communities in increasing their productivity.

## **1. INTRODUCTION**

Economic growth is a major goal for the development of every country. The realization of prosperity is also observed from indicators of economic growth through improving the quality of infrastructure and human capital [1-8]. Research on the impact of transportation infrastructure development was conducted by Auscher in 1989 [9-13]. These studies also confirmed the growing controversy over whether transportation infrastructure development is becoming a more important option and has a more positive impact on development than options for development in other sectors. Improper infrastructure development will result in regional imbalances [6]. The results of other studies show that due to certain conditions, some forms of transportation infrastructure can have a negative impact on economic growth [1, 7, 14].

According to Barro and Martin [15], the Solow model of economic growth explains the income of aggregate capital and labor. Whereas capital reduces marginal returns, long-term growth is explained by population growth and technological advances. This general model has been including several variables, particularly government expenditure (infrastructure), human capital, protection of property rights, and market distortions, which increase the rate of output growth.

Economists studying growth are increasingly turning to

endogenous growth models. These models are characterized by the assumption of constant return to scale. According to this, the Solow model only predicts convergence after controlling for the determinants of the steady-state, a phenomenon which can be called conditional convergence. Barro and Martin [15] developed empirical applications in the presence of an endogenous growth theory model, arguing that the government contributes to production when it is driven by the flow of productive expenditure (infrastructure), that can prevent the completion of private sector capital returns, increasing the marginal product of private sector capital. In turn, this increases the rate of economic growth. The influence of infrastructure development on economic growth is a model for endogenous economic growth. Gunnar Myrdal proposed a regional growth theory in 1957 with a much higher explanatory power than the convergence hypothesis proposed by Barro and Martin [15]. Myrdal explained the backwash and spread effects to describe the challenges of developing the eastern region of Germany as an underdeveloped region relative to the wealthier regions of western Germany [16]. The backwash effect was also observed between urban and rural areas in China in the research of Chen and Partridge [17].

The term backwash is often referred to as "polarization" or "parasitic," and the term spread is often used as an alternative to or in conjunction with the terms "trickle-down," "filtering," and "diffusion". The backwash effect is defined as a result of

changes in the surrounding area in the form of economic expansion, such as migration, capital movements, trade, and other social relations. Countries with low developmental growth rates have low spread effects [18].

According to Gu et al. [19] that at the beginning of the construction of a road corridor there will be a backwash effect that is greater than the spread effect. The backwash effect will be smaller when the spread effect continues to increase as a result of the development of growth centers. The spreading effect will exceed the backwash effect when the development gap between the growth center and the surrounding area gradually narrows. According to Peón et al. [20] that road construction in rural areas of Galicia (Spain) spreads or backwash effects occur simultaneously in economic activity. The opening of new roads has an impact on population growth, employment and business finance. It has a positive impact on the transportation and manufacturing sectors, while for retail and hotel companies it has a negative impact.

Sheppard [21] emphasized that backwash is a consequence of migration, financial capital flows, and commodity trading returns to more prosperous trading partners. The results of free trade between regions only strengthen this cumulative causality process by further catalyzing growth in developed regions at the expense of disadvantaged regions [22]. The vicious circle of poverty in poor areas resulting from a backwash effect that is greater than the spread effect [23].

The development approach that emphasizes macroeconomic development tends to ignore the development gaps between regions. Investment and capital are absorbed and concentrated in urban areas and development centers, while hinterland areas remain underdeveloped. Development gaps create inefficiencies and suboptimal economic systems. Development centers have accumulated added value, whereas the hinterland areas are weak due to the excessive dredging of capital (backwash). We emphasize the importance of a shift in the development paradigm in spatial development, especially when dealing with the growth pole strategy of the trickle effect to the hinterland (the impact of the drop to the back area) so that the net effect does not cause a massive backwash effect. This causes one area to become more advanced while another area will be increasingly neglected [24].

The concentration of capital and human capital in a particular area (growth point) is at the expense of the surrounding area, which is why the backwash effect reduces the level of economic development as growth never occurs. The spread effect is larger than the backwash effect in the developed areas. In contrast, the backwash effect is greater than the scatter effect in less-developed areas [19, 20].

According to Dell and Olken [25], as part of the construction of road and port infrastructure construction during the Dutch colonial era in Indonesia, in 1830, transportation infrastructure (roads) in Java was built for military purposes and economic exploitation. During the Dutch rule of the island of Java, the road infrastructure was built to transport refined sugar to the port. The Netherlands made a huge investment in this project and thus expected a huge return on profits. Therefore, the road infrastructure was built to extract Indonesia's natural capital to the Netherlands. Several experts [26] noted that the road connecting the municipal of Jakarta and Surabaya is the center of bipolar growth in Java. The road on the island of Java changed the urban development of the North Coast of Java as a road that adapted the indigenous orientation to trading activities. It even stimulated new markets for rice as a new industrial activity.

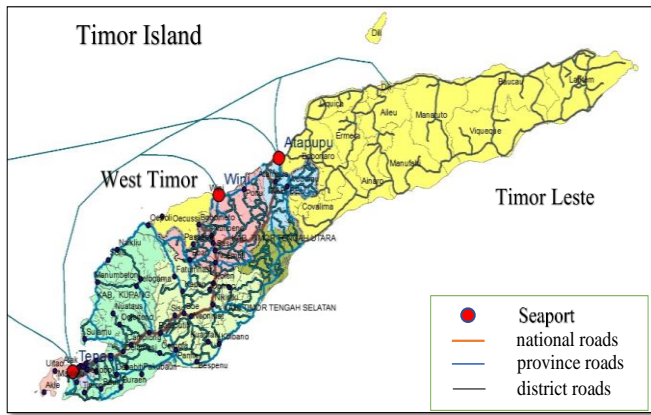
The regional disparity has always been a challenge due to regional imbalances. Regional imbalances are visible between Java and the area outside Java, between the western and eastern regions, and urban and rural regions of Indonesia, which are rich in natural resource potential. Therefore, since 1999, the government has promoted a decentralization policy with the aim of (1) increasing the welfare of the population, (2) increasing the quality of public services, and (3) strengthening competitiveness to reduce poverty and increase justice in society.

The decentralization policy, especially in the financial sector, has been promoted to encourage the growth of innovative programs for poverty alleviation in the regions and reduce the gap among regions in Indonesia [27]. During the reign of Jokowi-Jusuf Kalla, decentralization was strengthened by a development program called Nawacita. One of the programs, "The development in remote areas of Indonesia,". Development in the periphery and marginal areas is expected to encourage the realization of the basic development goals as stated by Todaro and Stephen [28] that the importance of fulfilling the components of sustenance, self-esteem, and freedom. This is expected to be realized in the remote potential areas in eastern Indonesia, which has been less developed in many aspects. West Timor is one of the remote and less developed regions in the eastern part of the Indonesian, which is still low in human capital, development funding support and a deficit in transportation infrastructure development.

The development in West Timor has increased since implementing the decentralization policy in 2001 and has grown significantly in recent years. The infrastructure should be for security purposes and prosperity. Meanwhile, the problems faced in the state-border region and less developed areas include sporadic settlements, hilly topography, isolation of areas with economic potential, poverty, and limited infrastructure and public service facilities (infrastructure). Economic problems, among others, are due to the low socioeconomic base with the availability of adequate infrastructure. It has not yet been seen that regional economic development and transportation infrastructure are integrated with national economic policies. There are several indications that the infrastructure development budget is minimal. Meanwhile, existing transportation infrastructure is less effective and contradictory in supporting economic activities in the West Timor region. Therefore, this study aimed to examine two important factors in assessing regional economic growth in West Timor: assessing the impact of social changes and government expenditure on economic growth and assessing the impact of road and port infrastructure growth on economic growth.

## 2. OVERVIEW OF WEST TIMOR – INDONESIA

Indonesia is the largest archipelagic country globally, comprising 17,508 islands, with a population of approximately 270.2 million in 2020. Indonesia consists of 34 provinces with 514 autonomous regencies and municipalities. These conditions cause the socioeconomic conditions of the regions in Indonesia to vary widely. West Timor, part of the NTT, shares land borders with Timor Leste and sea borders with Australia (Figure 1). This region consists of six regencies/municipalities, namely Kupang regency, Kupang municipal, South Middle Timor regency, North Middle Timor regency, Belu regency, and Malaka regency.



Source: BPS, Regional Agency of Planning and Development East Nusa Tenggara Province, analyzed in 2020

**Figure 1.** Map of West Timor, Indonesia

This research was carried out when the first Covid hit the world and in Indonesia there were Covid-19 outbreaks since March 2020, which had a tremendous impact on the economy. Therefore West Timor, one of Indonesia's poorest and least developed regions with low fertility rates was affected by covid so that economic growth was -0.35 compared to the national economy growing -2.07. West Timor had a percentage of poor people in 2020 of 18.80% (two-fold of the national poverty rate). The general socioeconomic conditions in West Timor can be seen in Table 1 below.

**Table 1.** Socioeconomic conditions in West Timor in 2020

Description	2020		
	Indonesia	NTT Province	West Timor Region
Total Population (Person)	270,203,920.00	5,325,370.00	1,935,245.00
Area (Km <sup>2</sup> )	1,910,931.00	47,932.00	14,732.00
Population Density (Person/Km <sup>2</sup> )	87.27	111.10	131.36
Human Dev't Index (HDI)	71.94	65.19	65.40
Economic growth (%)	-2.07	-0.83	-0.35
Per capita GRDP (US \$)	3,870.00	2,172.00	1,069.00
Poor population (%)	13.20	20.09	18.80
National road length (Km)	47,052.00	2,650.00	397.30

Sources: Indonesia, NTT/regency/municipal statistics bureaus (BPS) (2003-2021), processed 2022.

The government budget for infrastructure development in West Timor only amounts to 3.15% of the GRDP. The ideal budget for infrastructure should be 7%-10% of the GRDP. In general, Indonesia has a very serious infrastructure deficit, and its infrastructure budget is not comparable to that of neighboring countries, such as Thailand and Vietnam, which have allocated more than 7% of their GDP to infrastructure, whereas China allocates 10% to 12% of its GDP to infrastructure [29-31].

The increase in infrastructure development budget is not proportional to the rate of infrastructure damage due to a decrease in the quality of infrastructure every year and damage due to disasters and other natural conditions. The average road conditions are as follows: roads in good condition 54.16%,

roads in moderate condition 12.63%, roads in damaged conditions, and with severely damaged conditions 32.22%. The average loading rate of goods/cargo is still bigger than that of goods/cargo.

### 3. METHODS

Growth theory is used as a framework that introduces the idea of an exogenous and endogenous growth model. Barro and Martin [15] developed empirical applications in the presence of an endogenous growth theory model. Endogenous growth models without convergence effects generate constant returns to production capital. Barro and Martin [15] argued that the government contributes to production when driven by a flow from productive (infrastructure) expenditure, which can prevent resolving private sector returns on capital, increasing the marginal product capital of the private sector, and this in turn increases growth. The influence of infrastructure development on economic growth is a model for endogenous economic growth. Experts propose that the absence of convergence has been considered a supporter of the endogenous growth theory [32].

According to Mankiw et al. [8], endogenous models are also important, as they can provide a true explanation of technological changes worldwide. Islam [32] followed up on the results of studies by Mankiw *et al.*, by applying the panel data approach. The panel data regression equation used in the convergence study was a dynamic panel data model with individual (country) effects. The main focus was on the convergence problem based on the empirical growth data. Mankiw et al. [8] used a linear model to ascertain the determinants of growth. This study was followed by another empirical study to examine many variables as determinants of growth. The number of variables continues to increase due to the use of more complex growth regressions in the form of dynamic panel data equations. The finding of convergence is generally regarded as evidence supporting the Solow–Cass–Koopmans model.

Barro and Martin [15] interpreted capital in broadly, including population size and human capital and the availability of physical capital or land, human capital with educational proxies, and remoteness and topographical proxies in the data. Kodongo and Ojah [3] added the variable access to infrastructure and quality of infrastructure, considering the widening infrastructure deficit in Africa. According to Vidyattama [33], five regressions or technical estimates can be applied in the search for determinants of provincial growth in Indonesia using dynamic panel estimates. Panel estimation is an appropriate technique to maintain the existence of a variable that eliminates bias by introducing individual effects, also known as fixed effects. However, random effect estimation, an engineering panel estimate, does not eliminate bias as the error term still contains individual effects and will maintain a biased estimation result if there is a correlation between the individual effects and the independent variables.

The framework of thought below is the basis for the discussion that economic growth in West Timor can lead to convergence or divergence and a trickle-down or backwash effect. The vicious circle of poverty can occur in poor areas if the backwash effect is greater than the spread effect [23], as shown in the research framework in Figure 2.

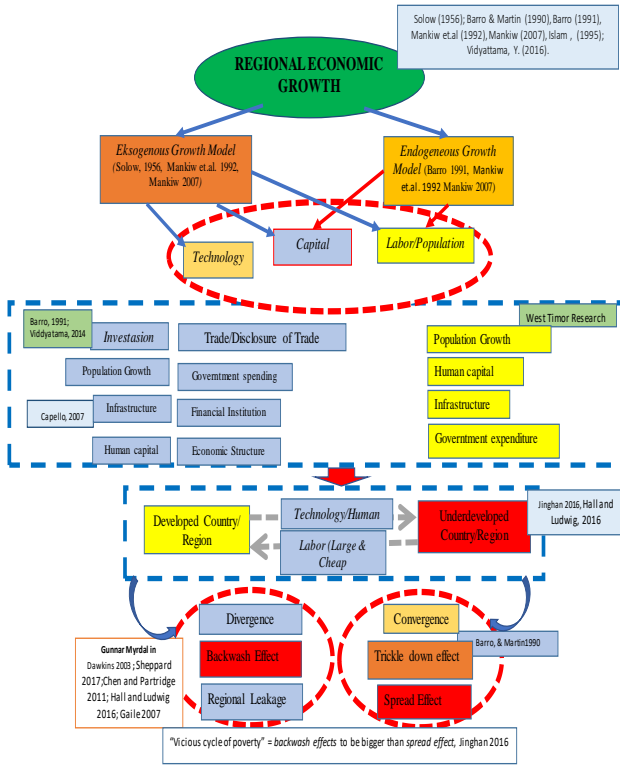


Figure 2. Economic growth framework of West Timor

#### 4. ANALYSIS

This study used an analysis unit of regencies and municipality in the West Timor region, covering 2002 to 2020. It also included new proxies for the road infrastructure of national, provincial, and district roads, seaport proxies, and proxy rates of poverty and migration. We collected cross-sectional data for six regencies and municipalities. The data collection period relates to the period after the implementation of decentralization in Indonesia in 2001.

Based on references to the analysis models and analytical tools used in previous studies, the analysis of this study built an econometric equation of the production function  $F(K, L) = Y(K, L)$  with  $Y$ : gross domestic product (GDP);  $K$ : stocks of physical capital and human capital, and  $L$ : labor. Islam [25] used this equation to measure how fast poor regions catch up with richer regions. The benefits of using this estimation with panel data are that (i) the problem of omitted variables can be controlled, especially regarding differences in initial technology levels between regions; (ii) endogeneity problems and measurement errors can be resolved using a dynamic data panel. However, due to time constraints and the smaller amount of data for the cross-section of six regencies/municipalities in West Timor, which exceeded the data collection year, which was 19 years, this study considered using static panel data.

The economic growth reflected by the regional GDP occurs due to the resultant effect, namely the effect of all variables in the equation model. Therefore, infrastructures such as roads and ports are key determinants of the variables in this study. Production factors consist of physical capital, human capital, and infrastructure (road and port infrastructures). The form of capital was approached by personnel as government expenditure variables, goods and services expenditures, and capital expenditures for each regency/municipality in West

Timor from 2002 to 2020. The control variables consisted of economic and social variables (the urbanization rate describes the ratio of the population living in urban areas relative to the total population in the region) to capture the social structure of the society.

The analysis of econometric data has evolved rapidly to analyze the empirical growth. The availability of data plays an important role in determining the probability of applying the growth regression for each regency/municipality in West Timor as part of East Nusa Tenggara Province, consisting of 22 regencies and municipalities and is one of the poorest areas in the eastern part of Indonesia. Research on West Timor was conducted with a *cross-section* of six municipalities/regencies (i) and a *time series* of 19 years (y), from 2002 to 2020. As the samples from six municipality/regencies in West Timor do not represent the population of 514 municipalities/regencies in Indonesia. The analysis used the fixed effect model (FEM) for equation analysis (1) and random effect model (REM) for equation analysis (2), with the following independent variables:

1. The following equation was employed to determine social structure and government expenditure impacts to regional economic growth:

$$\begin{aligned} \text{LnGDRP}_{it} = & a_{it} + \beta_1 \text{Povr}_{it-1} + \beta_2 \text{Hdi}_{it-1} + \beta_3 \text{LnEs}_{it-1} + \\ & \beta_4 \text{LnJhs}_{it-1} + \beta_5 \text{LnShs}_{it-1} + \beta_6 \text{LnAcad}_{it-1} + \\ & \beta_7 \text{LnUrban}_{it-1} + \beta_8 \text{LnRural}_{it-1} + \\ & \beta_9 \text{LnBPers}_{it-1} + \beta_{10} \text{LnBGods}_{it-1} + \\ & \beta_{11} \text{LnBCap}_{it-1} + \epsilon_{it} \end{aligned} \quad (1)$$

2. The following was employed to determine the impact of infrastructure and regional mobility on regional economic growth:

$$\begin{aligned} \text{LnGDRP}_{it} = & a_{it} + \beta_1 \text{LnNRoad}_{it-1} + \beta_2 \text{LnPRoad}_{it-1} + \\ & \beta_3 \text{LnDRoad}_{it-1} + \beta_4 \text{LnSVst}_{it-1} + \\ & \beta_5 \text{LnPARvt}_{it-1} + \beta_6 \text{LnPDpt}_{it-1} + \\ & \beta_7 \text{LnDPort}_{it-1} + \epsilon_{it} \end{aligned} \quad (2)$$

where, GDRP is the real regency's per capita GDR; Povr is the poverty rate (%); Hdi is Human development indeks; Es is Elementary school (person); Jhs is Junior high school (person); Shs is Senior high school (person); Acad\_unv is Academic and university (person); Urban is the urban population; Rural is the rural population; BPers, BGods, and BCap are government expenditures on personal, goods and services, and capital goods (infrastructures, land, etc.), respectively (Rp.); NRoad is the length of the national road (kilometers); PRoad is the length of the provincial road (kilometers); DRoad is the district road length (kilometers); SVst is Ship visited (unit); PARvt and PDpt are the numbers of passengers arriving and departing through seaports (person); DPort is the area of the dock port (m<sup>2</sup>);  $\epsilon_{it}$  is the error term;  $i$  is the regency/municipal;  $t$  is time (year).

The advantages of panel data by combining time-series and cross-section (pooling) data, namely, making the observations larger and the marginal effect of the explanatory variables, could be identified from the variation of regional dimensions and time so that the estimated parameters are more accurate. Technically, panel data are also informative, reduce the collinearity between variables, and increase the degrees of freedom, which means increased efficiency. In general, the use of panel data can provide many advantages statistically and in economic theory, including reducing identification problems



and controlling individual heterogeneity. The general approaches applied to panel data are the fixed effects model (FEM) and the random effect model (REM). The two are differentiated based on the assumption of no correlation between the error component and the independent variable (regressor) [34-36].

## 5. RESULTS AND DISCUSSION

The decentralization policy in 2001 was a breakthrough in the Indonesian development management system. Mcculloch and Sjahrir [27] claimed that decentralization in Indonesia is a “big boom” due to the transfer of most of the major responsibilities of the central government for economic development to regencies/municipalities. Recently, President Jokowi’s administration’s policy on developing national periphery regions became a good opportunity for West Timor to increase growth significantly [37].

Economic growth is expected to be distributed evenly throughout society through a trickle-down mechanism [30]. The endogenous economic growth model states that convergence or divergence may occur due to the availability of production factors. Barro and Martin [15] formulated two convergence concepts in economic growth between countries and between regions, namely beta convergence and sigma convergence.

Investigating the determinants of growth on provincial per capita income in Indonesia, we found that indicators such as trade openness, infrastructure, and regional personnel expenditure serve as growth factors, supported by common determinants, such as investment, human capital, and population growth. The results indicated transportation infrastructure, trade openness, and human capital as important determinants of provincial growth. Studying the determinants of growth for Indonesia is even more important as the theoretical exogenous growth process can only explain a small part of the economic growth pattern in the Indonesian region [38].

### 5.1 Impact of socioeconomic characteristics and government expenditures

Table 2 presents the results of the sociofactor and government expenditure impacts from the panel data regression analysis.

The impact of human capital (human development index and academic and university) had significantly affected regional economic growth. This means that the development of human capital in West Timor has significantly impacted economic development. According to Zhang and Zhuang [2], the human capital structure in China is still in the stage of encouraging economic growth, and higher education plays a more important role than a primary and secondary education in economic growth. In other words, areas with a more advanced tertiary education will benefit more, while less-developed regions that rely more on primary and secondary education will experience the opposite effect. Experts propose that human capital is a key factor in changing a region [12], in the era of decentralization, the regency-level government must play an important role in resolving this situation for most of the development services in the regions [27].

The impact of the urban population is significant to improve regional domestic income per capita in West Timor, with

elasticities of 0.118, respectively. According to Vidyattama [33], rural-urban migration flow increases after the availability of good transport infrastructure, which connects regions. The increasing proportion of the urban population seems to play a significant role in increasing the regional economic productivity of West Timor. Furthermore, according to Chen and Partridge [7], urban growth in medium-sized cities has a spreading effect that has an economic impact on districts and rural towns. China’s policy implications lead to local migration from rural to urban areas. Therefore, policymakers need to consider the ideal development budget to sustain balanced development growth so that it does not hinder the development of small towns and suburbs with high social costs.

**Table 2.** Impacts of social factors and government expenditure on per capita GRDP

Fixed-effects (within) regression		Number of obs =	108	
Group variable: numofdistr~y		Number of groups		
	R-sq:	Obs per group: =	6	
Within	= 0.6636	Min=18		
Between	= 0.9215	Avg=18.0		
overall	= 0.8174	Max=18		
		F (11,91)	=16.32	
corr(u_i, Xb) = -0.9637		Prob > F	=0.0000	
ln_GDRP	Coef.	Std. Err.	z	P> z
Povr	.006692	.0063875	1.05	0.298
Hdi	.033877	.0119005	2.85	0.005***
Ln_Es	.1829311	.1868671	0.98	0.330
ln_Jhs	.1957982	.1241783	1.58	0.118
ln_Shs	-.0304333	.0766309	-0.40	0.692
ln_Acd_u	.0243332	.0127034	1.92	0.059*
nv	.1176195	.0614709	1.91	0.059*
ln_Urban	-.1625349	.1532991	-1.06	0.292
ln_Rural	.0111812	.0043453	2.57	0.012**
ln_BPers	-.0108705	.0058493	-1.86	0.066*
ln_BGods	.0305343	.0094634	3.23	0.002***
ln_BCap	3.345412	2.815521	1.19	0.238
_cons				
sigma_u	.76601549			
sigma_e	.16594367			
rho	.95517412	(fraction of variance due to u_i)		

\* is 0.05–0.10; \*\* is 0.01–0.05; and \*\*\* is <0.01.

The impact of personnel government expenditure, and capital government expenditure are significant to improve regional domestic income per capita in West Timor, with elasticities of 0.112 and 0.031. In West Timor, government revenue is still dominated by the transfer budget from the central government in the form of a general allocation fund (DAU) and special allocation fund (DAK) sources. In 2020, the proportion of personnel expenditure is 18.40%, goods and services expenditure are 48.43% and capital expenditure is 33.17% in West Timor. It can be seen that expenditure still has a relatively large proportion [38].

These causes expenditure for goods and services to have a negative impact on economic growth with an elasticity of -0.0109. This indicates that government expenditures, especially for goods and services, is not effective in its use. Therefore, the allocation of expenditures on goods and services by the government should be directed at productive expenditure, namely for personnel expenditure needs, especially for capital expenditure to meet infrastructure needs which are experiencing a deficit in West Timor [30, 31].

Mcculloch and Sjahrir [27] proposed the problem of decentralization according to, among other things, the fact that more regional budgets are allocated to personnel expenditure

in West Timor. Its PAD is unable to meet budget needs. The rest of them rely on the DAU and the DAK disbursed by the central government. This also means that economic activity is still dependent on government expenditure in promoting economic growth in West Timor. This occurs as there are no industrial activities with many workers in West Timor, and various small and home industries exist and absorb many laborers. However, government officials are still the most common job seekers in West Timor.

The research of Mishra et al. [39], who stated that the projection of GDP growth in India averaging 9% per year requires almost double the expenditure on infrastructure budgets. Therefore, aggregate capital formation in the infrastructure sector in GDP has increased by an average of 7.6%, with total infrastructure investment and 5.3% of GDP. Mo [4] also emphasized that the relationship between economic output and infrastructure in the long term among several variables, including GDP, fixed capital stock, and public sector fixed capital stock (infrastructure finance measure and total road length), is important and has a significant impact. However, Barro [40] found that the ratio of real government consumption expenditure to real GDP adversely affects growth and investment.

## 5.2 Impact of road and port infrastructure on economic growth

Table 3 presents the results of the impact of road and port infrastructures on economic growth from the panel data regression analysis.

**Table 3.** The impact of road and port infrastructure factors on GRDP per capita

Random-effects GLS regression		Number of obs =	108	
Group variable: numofdist~y		Number of groups		
R-sq:		Obs per group: =	6	
Within	= 0.0098	Min=18		
Between	= 0.9316	Avg=18.0		
overall	= 0.6189	Max=18		
		Wald chi2(9)	= 162.42	
corr(u_i, X) = 0 (assumed)		Prob > chi2	= 0.0000	
ln_GDRP	Coef.	Std. Err.	z	P> z
n_NRoad	-.41413	.17710	-2.34	0.019**
ln_PRoad	.04731	.06729	0.70	0.482
ln_DRoad	.23550	.10408	2.26	0.024**
ln_SVst	-.1375	.12583	-1.09	0.276
ln_PArv	.15693	.17980	0.87	0.383
ln_PDpt	.02212	.20614	0.11	0.915
ln_DPort	.00281	.03317	0.08	0.932
_cons	8.9706	.63571	14.11	0.000
sigma_u	0			
sigma_e	.2594480			
rho		(fraction of variance due to u_i)		

\* is 0.05–0.10; \*\* is 0.01–0.05; and \*\*\* is <0.01.

The length of district roads (DRoad) significantly impacted the increase in regional economic growth, with elasticities of 0.236. On the contrary, the length of national roads tends to adversely impact economic growth, with an elasticity of −0.414. This means that a 1% increase in national roads (*ceteris paribus*) will adversely impact regional domestic income per capita in West Timor by −0.414.

Approximately 80% of local government capital expenditures in West Timor are allocated to developing regional infrastructure, including transportation infrastructure.

According to the previous regression equation results, local government expenditure on capital expenditure tends to increase regional economic growth. This result is consistent with the results of the second regression equation, where an increase in the length of district roads through local government expenditure tends to increase regional economic growth. District roads are built according to local needs to increase the mobility of goods and people productively.

Meanwhile, the national road system in West Timor, built through central government expenditure, tends to adversely impact regional growth as it facilitates backwashing in the region. The national road network system built by the central government failed to accommodate the needs of local people to increase their productivity. Instead of facilitating the productive activities of the local economy, national roads channel the leakage of value-added goods production systems and the leakage of local people's income due to a high dependence on consuming goods and services from outside the region. The national transportation infrastructure system in West Timor was built with great interest in supplying the demand for beef consumption in western Indonesia (Java Island). The transportation infrastructure in West Timor and NTT Province has generally developed without down-streaming the livestock sector, which can create sufficient added value at the regional level.

According to Myrdal, migration of the flow of financial capital and the influential commodity trade back to more prosperous trading partners can cause a spreading or backwash effect in a region. Backwash is a consequence as underdeveloped countries have to replace the impact of dredging state resources “with welfare” in developed countries in Europe [21]. Furthermore, Hall and Ludwig [16] propose that the backwash and spread effects in Germany are triggered by technological and institutional changes that produce cumulative benefits for the western region, whereas the backwash effect is to the east, which further exacerbates regional inequality in Germany.

The research of Gu et al. [19] and Peón et al. [20] that the development of road infrastructure can cause a spread or backwash effect on economic activity. National roads connected to ports in West Timor are mostly used to mobilize cargo coming from outside the west (imports), according to research data for 2002–2020, which amounted to 425,645 cargo or 70.94% compared to the cargo loaded. from West Timor by 166,577 cargo or 27.76%. This is a indicator that natural resource depletion has occurred because imports in the form of loading and unloading of cargo are greater than exports.

The situation in the West Timor region is consistent with studies on increasing infrastructure access to African economic growth, where the increase in infrastructure quality is not statistically significant. This is due to the low quality and endowment of infrastructure on this continent [4]. The provision of infrastructure in the form of road infrastructure, managed by the central and provincial governments, is not yet optimal.

Selecting an appropriate approach for developing national road infrastructure requires serious attention from the government so that the hinterland areas are not weakened due to the excessive dredging of resources from West Timor to Java Island. The development of transportation infrastructure, including the infrastructure construction of roads and ports, must not be a repeat of that during the Dutch colonial period in Indonesia, the function of the road being to extract resources

from Indonesia to the Netherlands. According to Dell and Olken [25], in 1830, transportation infrastructure (roads) was built for military purposes and to extract Indonesian natural capital to the Netherlands through ports. According to Rahadini [26], this caused a change in the function of roads that led to trading activities. It even presented a new market as a new industrial activity that was more profitable for the Dutch.

Kumari and Sharma [12] studied the level of economic and infrastructure development in India and showed a direct and clear relationship. In India, the low level of economic development is largely a result of poor and inadequate infrastructure. Therefore, the government of India must focus on the development of infrastructure facilities to increase the pace of economic development in the country. The condition of damaged and severely damaged roads in West Timor 33.22% of the total road infrastructure, makes it clear that it is necessary to optimize the high quantity and quality development of the district and provincial roads.

The positive impact of district road infrastructure development aligns with the objectives of transportation infrastructure development, namely, strengthening economic activity and development, increasing international competitiveness, and economic growth [16]. The benefits obtained are as follows: an increase in productivity and economic output due to accelerated access to services; increased market mobility; reductions in time and business costs; easy access to markets and raw materials; and congestion reduction [41, 42]. This enables countries to increase their comparative economic advantage; increase gross domestic product, and provide effective conditions for economic expansion [42].

Kodongo and Ojah [3] showed that the relationship between increasing access to infrastructure and economic growth in Africa is not significant due to the low quality of infrastructure. Africa has an infrastructure deficit, resulting in low international competitiveness, increased costs of business activity, and impeding foreign investment. Perkins et al. [43] conducted a long-term analysis of infrastructure development in South Africa and found that infrastructure investment would not impact economic growth if the infrastructure budget was insufficient for effective infrastructure development. Therefore, policymakers must focus on selecting or supporting the right type of infrastructure at the right time [44] form of entrepreneurship, specialization, and innovative capacity.

## 6. CONCLUSIONS

Human capital, urbanization and local government expenditure play an effective role in triggering economic growth in a region generally categorized as a disadvantaged regencies in the interstate border area, West Timor. As a region with a low level of industrialization, government expenditure on local government personnel, in-migration from outside this region, and from rural to urban areas is quite effective in triggering the growth of downstream primary sector products in this region. Productive urbanization and immigration have a significant impact on economic growth by supporting local government expenditures on capital goods, including infrastructure.

The development of road infrastructure by the local government at the district level has been significantly effective in promoting local economic growth. However, the construction of national roads by the central government that

is based on national interests and characterized by a “Java-biased” policy has caused a backwash effect that has a contradictory impact on regional economic growth.

The development of land and sea transportation infrastructure in disadvantaged archipelagic regions requires the integration of national and regional interests and complementary connectivity of land and sea transportation. National infrastructure development in the national interest must be synergistic and must not sacrifice local interests in increasing economic growth. The development of disadvantaged areas of the archipelago requires integrated development support for the development of the infrastructure system and the development of the economic and industrial base sectors, with the growth of local-scale urban centers to prevent economic backwashing.

Further research on the integration and optimization of land-sea transportation systems in less developed archipelagic regions is urgently needed, and integrated infrastructure development between national and regional systems in the national periphery to promote regional economic growth.

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