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Infrastructure Development in Border Areas; Who Benefits?

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ABSTRACT

The development of the border area actually has the aim that the border area is developed and prosperous. For this reason, the government launched five infrastructure development programs, namely road infrastructure, markets infrastructure, agriculture infrastructure, health infrastructure and education infrastructure. In fact, the five programs aimed at border areas do not all have a positive impact on economic performance in the region, but instead have a positive impact for the economic performance of non-border regions. This research was conducted in provinces that have borders with neighboring countries, then divided into border and non-border areas, including the Kalimantan corridor, East Nusa Tenggara corridor and Papua corridor. The study covers the year is 2015-2022, the year when the government launched Nawacita as the basis for development in the border area. This study employed Panel Data Regression. The results show that only agricultural and education infrastructure have a positive impact on GDP per capita and HDI in border areas, but poverty reduction has not been achieved. Health infrastructure, which is actually aimed at the disputed area, in fact has a positive influence on non-border areas. The study found evidence of spillover effects from border to non-border areas.

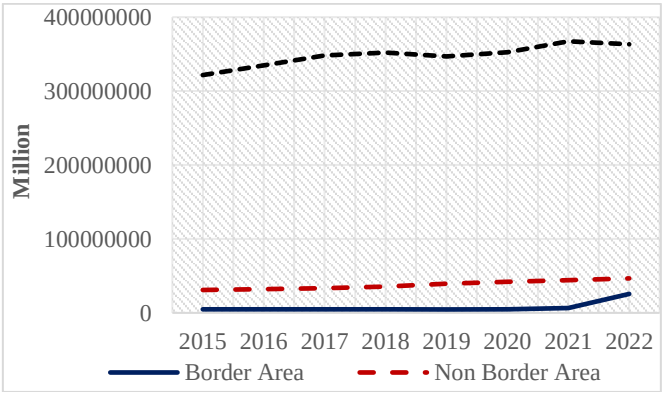
1. INTRODUCTION

One of President Jokowi's visions when elected in 2014-2019 was the realization of a politically sovereign Indonesia, independent in the economic field and personality in culture. Then the vision is contained in nine priority development agendas known as Nawacita. In the third Nawacita, it is stated that his mission is to build Indonesia from the periphery by strengthening regions and villages within the framework of a unitary state. The implication of this third Nawacita is the acceleration of the development of Indonesia's border areas which are peripheral areas [1, 2]. For this reason, the government makes various investments in development programs in peripheral areas, ranging from road and market infrastructure development, agriculture, education and health. In the end, the expectations of the development goals are in line with the sustainable development goals, namely economic, social, environmental development and reducing inequality between regions [3-6].

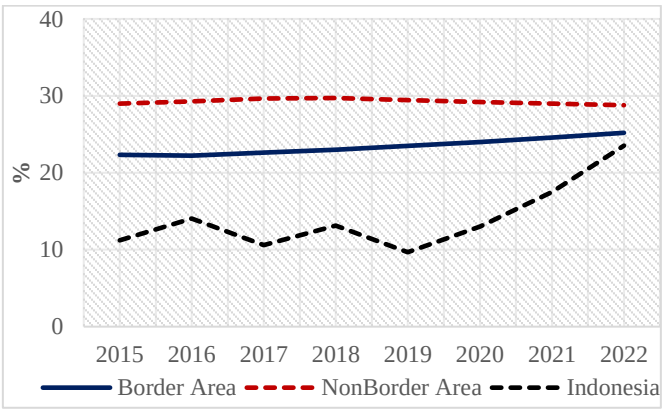
The border area, as a periphery, is known as an area that has various problems, including poverty [7, 8], regional inequality compared to neighboring countries [9], security defense [9, 10], and human trafficking [11]. However, the government does not remain silent with these various problems. Precisely since the proclamation of Nawacita, various programs and policies were launched [12]. Economic development was encouraged [13] and infrastructure development became the motor of development in the region [14]. Although it was later questioned to what extent its effectiveness [2] was, the development of border areas which are underdeveloped areas is still the government's main program. This condition finally made a paradigm shift in viewing the border area [15, 16], which was originally the backyard of a country, into the front yard and entrance of the country [17].

Regarding border areas, Indonesia has seven provinces whose districts are directly adjacent to neighboring countries. West Kalimantan, East Kalimantan, North Kalimantan border Malaysia. Papua, Mountain Papua, South Papua borders Papua New Guinea and East Nusa Tenggara borders Timor Leste. Like most border areas in other countries, Indonesia's borders also have quite complicated problems. In fact, the condition of Indonesia's land borders is still lagging when compared to non-border areas, especially for regions that are already underdeveloped [18]. During 2015-2022, the GDP per capita of border communities was recorded lower than that of non-border areas in the seven provinces. Although there was an increase in 2021-2022, the increase has not been able to match non-border areas (Figure 1 (a)). On the bright side, border

poverty is lower than non-border areas, but still quite high compared to Indonesian poverty. This is thought to be because borders are rural areas, where poverty is lower, and non-border areas are urban areas with generally higher poverty (Figure 1 (b)).



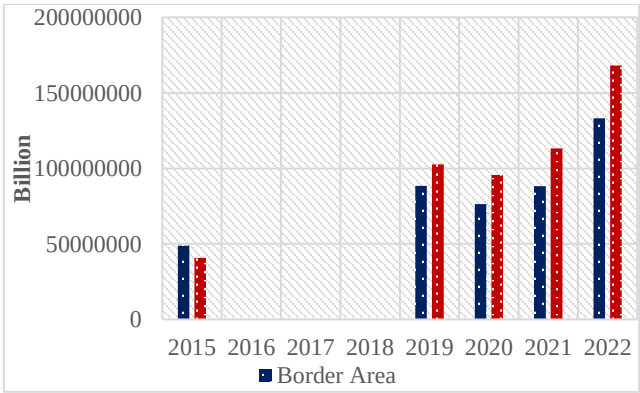
(a) GDP per capita



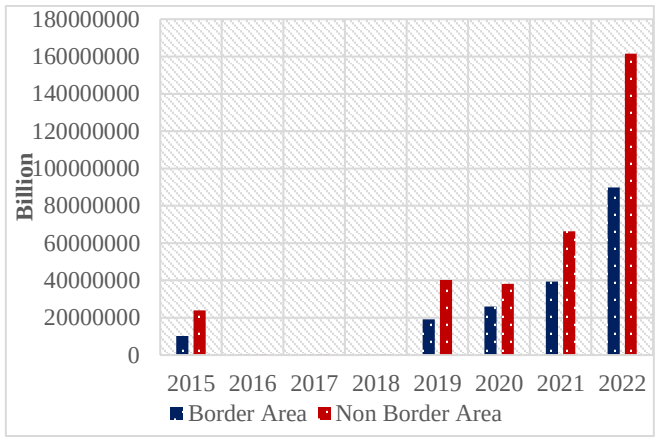
(b) Poverty

Figure 1. Comparison of GDP per capita (a) and Percentage of poverty (b) in border and non-border areas

If considered further, the two conditions above have quite rational reasons, namely the low realization of road infrastructure funds and markets in border areas (Figure 2). For the record, these two infrastructures are the basic capital for improving the welfare of the community [19]. Throughout 2015-2022, road infrastructure as an opening door for the progress of border areas has an average growth of 11%, a value lower than non-border areas of 29%. (Figure 2 (a)). Empirically, road infrastructure development has proven to be able to increase the per capita income of a region and open the isolation of an area [20-22].



(a) Road infrastructure



(b) Market infrastructure

Figure 2. Realization of road infrastructure funds (a) and Market infrastructure (b) at border and non-border

At the same time, market infrastructure in border areas also has lower realization than non-border areas (Figure 2 (b)). Market infrastructure in border areas increased by an average of 10% during 2015-2022, but in non-border areas increased by an average of 13% in the same year. The urgency of market infrastructure has basically been emphasized by Kuznet, as a public service obligation, this infrastructure is the government's obligation, in addition to this infrastructure is the most primary public infrastructure in supporting the economic activities of a region, underdeveloped regions must also be prioritized in financing [23]. The availability of infrastructure also greatly determines the level of efficiency and effectiveness of economic activities and is a prerequisite for the turning of the wheels of the economy to run well. Therefore, on this basis, the low development of this vital infrastructure will inevitably slow down the economic performance of a region.

If examined more deeply, all problems in the border area have an influence on economic performance in the region. For this reason, this study aims to determine how the influence of infrastructure development on economic performance in border and non-border areas. In these two regions, which one benefits more from the infrastructure development.

2. RESEARCH METHOD

The study was conducted in seven provinces directly adjacent to neighboring countries and grouped into three corridors. First, the Kalimantan corridor, which is a combination of North Kalimantan, West Kalimantan and East Kalimantan, has nine border districts and twenty non-border districts. Second, the Papua corridor, which is a combination of Papua, Papua Pegunungan and South Papua, has five border districts and twenty-four non-border districts. Finally, the East Nusa Tenggara corridor, consisting of four border districts and eighteen non-border districts. Observations were made using secondary data from 2015-2022 and analyzed using Panel Data Regression. Some of the advantages of Panel Data Regression analysis are obtaining better estimation results. It happens because along the increase in the number of observations, it automatically has implications for increasing degrees of freedom and avoiding the error of omission of variables [24, 25]. The variables used in this study are as listed in Table 1 below.

Table 1. Dependent and independent variables

No.	Variables	Unit	Descriptions
1	GDP per capita (GDP_B)	IDR	GDP per capita, the income of people in border areas based on economic activity
2	GDP per capita (GDP_{NB})	IDR	GDP per capita, the income of people in non-border areas based on economic activity
3	Human Development Index (HDI_B)	Point	Human development index in border area
4	Human Development Index (HDI_{NB})	Point	Human development index in non-border area
5	Poverty (Pov_B)	%	Percentage of poor people in border areas
6	Poverty (Pov_{NB})	%	Percentage of poor people in non-border areas
	Independent Variable		
1	Road Infrastructure (X_1)	IDR	Funds issued by the government related to road infrastructure development in border area
2	Market Infrastructure (X_2)	IDR	Funds issued by the government related to market infrastructure development in border area
3	Agriculture Infrastructure (X_3)	IDR	Funds issued by the government related to agricultural infrastructure development in border area
4	Health Infrastructure (X_4)	IDR	Funds issued by the government related to health infrastructure development in border area
5	Educational Infrastructure (X_5)	IDR	Funds issued by the government related to the development of educational infrastructure in border area
	β		Constant
	i		Research locations
	t		Years of research; 2015 -2022

The equations in this research are as follows:

1) The effect of independent variables on GDP per capita

$$Ln\mathrm{GDP_B} = \beta_0 + \beta_1 LnX_{1it} + \beta_2 LnX_{2it} + \beta_3 LnX_{3it} + \beta_4 LnX_{4it} + \beta_5 LnX_{5it} + \varepsilon_{it}$$

$$Ln\mathrm{GDP_{NB}} = \beta_0 + \beta_1 LnX_{1it} + \beta_2 LnX_{2i2} + \beta_3 LnX_{3i2} + \beta_4 LnX_{4i2} + \beta_5 LnX_{5i2} + \varepsilon_{i2}$$

2) The effect of independent variables on HDI

$$Ln\mathrm{HDI_B} = \beta_0 + \beta_1 LnX_{1it} + \beta_2 LnX_{2it} + \beta_3 LnX_{3it} + \beta_4 LnX_{4it} + \beta_5 LnX_{5it} + \varepsilon_{it}$$

$$Ln\mathrm{HDI_{NB}} = \beta_0 + \beta_1 LnX_{1it} + \beta_2 LnX_{2it} + \beta_3 LnX_{3it} + \beta_4 LnX_{4it} + \beta_5 LnX_{5it} + \varepsilon_{it}$$

3) The effect of independent variables on poverty

$$Ln\mathrm{Pov_B} = \beta_0 + \beta_1 LnX_{1it} + \beta_2 LnX_{2it} + \beta_3 LnX_{3it} + \beta_4 LnX_{4it} + \beta_5 LnX_{5it} + \varepsilon_{it}$$

$$Ln\mathrm{Pov_{NB}} = \beta_0 + \beta_1 LnX_{1it} + \beta_2 LnX_{2it} + \beta_3 LnX_{3it} + \beta_4 LnX_{4it} + \beta_5 LnX_{5it} + \varepsilon_{it}$$

3. RESULT AND DISCUSSION

3.1 Kalimantan corridors

The Kalimantan corridor is a combination of the borders of West Kalimantan, East Kalimantan and North Kalimantan. The merger of these three provinces was carried out because of the similarity of regional characteristics. The main problems in the Kalimantan corridor are regional inequality compared to neighboring Malaysia [26], and the proximity of economic activities in border areas to neighboring countries compared to district capitals [27]. Physical conditions between border areas in Indonesia and Malaysia are also clearly different. However, after Nawacita some border areas, have cross-border posts and good road infrastructure. In general, the Malaysian region has good and adequate road infrastructure, adequate market access and education, proper health facilities and easy transportation. Meanwhile, on the border which is the territory of Indonesia, there is limited infrastructure, market access and education that are difficult to reach, inadequate health facilities, and transportation that is still limited in number [28].

The results of this study show that, in border areas, agricultural and educational infrastructure has a positive and significant influence on increasing the GDP per capita of the community with an R-square (R^2) of 0.408 (40.8%). Every 1% increase in agricultural infrastructure development funds can increase GDP per capita by 31%, and a 1% increase in education funds can increase GDP per capita by 16%. Meanwhile, in terms of poverty reduction, the improvement of agricultural infrastructure has a significant effect and the R-square (R^2) is 0.492 (49%). It was seen that with a 1% increase in agricultural infrastructure funds, poverty decreased by 10.6%. Unfortunately, these five variables have not been able to increase HDI in this corridor (Table 2). These results confirm that an area with high poverty and low per capita income, and where the region still depends on agriculture, improvements in agricultural infrastructure and education are very important.

Table 2. The effect of independent variables on economic performance in the border areas of the Kalimantan corridor

Independent Variables	GDP per Capita		Poverty		HDI	
	Coeff	Prob	Coeff	Prob	Coeff	Prob
C	24.5	0	1.55	0.022	4.36	0
lnRoadInf	0.01	0.98	-0.01	0.93	0.00	0.89
lnMarketInf	0.12	0.341	-0.01	0.616	0.00	0.34
lnAgrInf	0.31	0.006**	-0.1	0.001**	0.00	0.20
lnHealthInf	0.18	0.493	-0.05	0.261	0.00	0.93
lnEduInf	0.16	0.03*	0.06	0.197	0.01	0.06
R Square	0.40803		0.492183		0.322201	
Prob (F-Stat)	0.03844		0.057705		0.026164	
DW-Stat	1.25261		1.741449		1.804697	

*: α=0.05, **: α=0.01

At the same time, development programs in border areas actually have a positive impact on improving the quality of people in non-border areas through agricultural infrastructure development. It can be seen that every 1% increase in agricultural infrastructure development, it can increase 2.6% of the quality of human life in non-border areas (Table 3). This condition also proves the multiplier of border area development against non-border. The multiplier is in the form of a spread effect on border area development in non-border areas.

Table 3. The effect of independent variables on economic performance in non-border areas of the Kalimantan corridor

Independent Variables	GDP per Capita		Poverty		HDI	
	Coeff	Prob	Coeff	Prob	Coeff	Prob
C	17.17	0	1.639	0.00	4.29	0
lnRoadInf	0.066	0.33	0.007	0.690	0.001	0.44
lnMarketInf	0.08	0.10	-0.003	0.78	8.6E-0	0.93
lnAgrInf	-0.09	0.24	-0.034	0.09	0.003	0.07*
lnHealthInf	0.040	0.59	0.0183	0.34	-0.008	0.6
lnEduInf	-0.05	0.58	0.041	0.09	0.003	0.15
R Square	0.576052		0.39297		0.554403	
Prob (F-Stat)	0		0.020303		0	
DW-Stat	0.682132		2.119189		1.173025	

*: α=0.05, ***: α=0.01

Based on the two comparisons above, it can be seen that the infrastructure development program that is actually intended for border areas in the Kalimantan corridor does not fully affect performance in the region. Some programs are indeed able to improve economic performance in the region, but it is undeniable that there is an "abundance of blessings" in non-border areas, which in fact are more developed. Non-border areas benefit from the increase in HDI through agricultural infrastructure development.

3.2 East Nusa Tenggara corridors

The results of this study show that agricultural infrastructure development plays a positive and significant role in increasing GDP per capita in East Nusa Tenggara. Every 1% increase in agricultural infrastructure funds can increase GDP per capita by 27% (Table 4). The great potential of East Nusa Tenggara so far is the agricultural and plantation sector, this sector also has a big role for the community's economy. However, the development of the agricultural sector is slowly forgotten because it is often considered as a supporting element in the economy, not the main element [29]. This happens because the productivity of the agricultural sector in East Nusa Tenggara is declining day by day [30]. Therefore, more massive development of the agricultural sector needs to be done because it can be an alternative to reduce the gap in the development of border and non-border areas. While related to the decrease in poverty rates and the increase in HDI, the variables tested have not been seen significantly. Ubur in his research explained, some things that make poverty reduction in Nusa Tenggara constrained are the role of institutions / institutions that are not optimal in supporting poverty alleviation, low education and community development programs whose disbursement of funds is not balanced with the magnitude of the problem [31].

Table 4. The effect of independent variables on economic performance in the border area of the East Nusa Tenggara corridor

Independent Variables	GDP per Capita		Poverty		HDI	
	Coeff	Prob	Coeff	Prob	Coeff	Prob
C	15.77	0	3.697	0	4.099	0
lnRoadInf	-0.207	0.089	-0.01	0.897	-0.003	0.662
lnMarketInf	0.007	0.560	-0.001	0.27	0.0009	0.152
lnAgricInf	0.272	0.05*	0.133	0.13	0.007	0.354
lnHealthInf	0.111	0.25	-0.07	0.21	0.0013	0.806
lnEduInf	0.161	0.058	-0.02	0.64	-0.003	0.494
R Square	0.301013		0.170594		0.427407	
Prob (F-Stat)	0.099728		0.0618221		0.004807	
DW-Stat	2.425294		1.895832		1.88239	

*: α=0.05, **: α=0.01

Development programs in border areas above in fact have a significant influence on the quality of human life in non-border areas through agricultural and health development programs. For every 1% increase in funds on agricultural infrastructure, it can increase 0.7% of the quality of human life in non-border areas. Likewise, every 1% increase in health infrastructure development can improve 0.2% of the quality of human life in non-border areas (Table 5).

Table 5. The effect of independent variables on economic performance in non-border areas of the East Nusa Tenggara corridor

Independent Variables	GDP per Capita		Poverty		HDI	
	Coeff	Prob	Coeff	Prob	Coeff	Prob
C	15.801	0	3.842	0	4.070	0
lnRoadInf	0.006	0.94	-0.058	0.219	0.0039	0.497
lnMarketInf	0.014	0.37	-0.002	0.802	-0.001	0.939
lnAgricInf	-0.029	0.78	-0.06	0.302	0.021	0.007**
lnHealthInf	0.08	0.403	0.076	0.163	0.021	0.002**
lnEduInf	-0.039	0.49	0.041	0.206	-0.007	0.867
R Square	0.32276		0.50874		0.139078	
Prob (F-Stat)	0.619375		0.03458		0.00658	
DW-Stat	1.849215		2.89095		1.771114	

*: α=0.05, **: α=0.01

The results of the above research more or less make confidence that infrastructure development in border areas has not been able to have a major impact on improving economic performance in the East Nusa Tenggara corridor. Only agricultural infrastructure development was significant at the increase in GDP per capita, while everything else seemed to have no impact. Even the infrastructure and health programs planned for the border area actually target increasing the HDI of non-border area communities. At the same time, poverty did not see any significant changes in either region.

3.3 Papua corridors

Indeed, the Indonesian government is strongly committed to encouraging equitable development while reducing poverty in Papua. Through infrastructure development carried out by the Ministry of Public Works and Public Housing (PUPR), the government reduces the level of expensiveness that occurs in Papua. The government gradually continues to increase the availability of infrastructure to support connectivity, food and water security, and residential housing, even some of which are national priorities, as stated in Presidential Regulation No. 3 of 2016 concerning the Acceleration of the Implementation of National Strategic Projects (PSN) [32, 33].

The results of this study show that agricultural infrastructure development plays a positive and significant role in increasing GDP per capita with diversity in the model can be explained by an independent variable of 0.264 (R-square 26.4%), while the rest is explained by other variables outside the model. It was noted that every 1% increase in funds on improving agricultural infrastructure was able to increase 9.4% of people's GDP per capita. For the record, agriculture in Papua is an economic activity that is considered to have high

potential for increasing growth, so it is used as a target of special attention in the government's main program [34]. Even the economic improvement program at the border is carried out by making women the spearhead through economic activities based on agricultural products and increasing the educational capacity of the community [35-37]. The hope is that this program will also have an impact on reducing poverty while increasing HDI. It is proven that economic programs involving women have an impact on reducing poverty rates on the border of Papua. So far, the decrease in poverty has been influenced by improvements in agricultural infrastructure and education infrastructure. Every 1% increase in agricultural infrastructure funds was able to reduce poverty by 9% and diversity in the model was explained by an independent variable of 0.285 (R-square 28.5%), while the rest was explained by other variables outside the model. This result makes it certainly part of the government's efforts to reduce inequality at the Papuan border. So, because poverty is quite high, the development of education and improvement of agricultural infrastructure is certainly a way out for the people there. While in the increase in HDI, none of the variables had a significant effect (Table 6), and the R-square (R^2) was known to be 20.9%.

Table 6. The effect of independent variables on economic performance in the border areas of the Papua corridor

Independent Variables	GDP per Capita		Poverty		HDI	
	Coeff	Prob	Coeff	Prob	Coeff	Prob
C	14.79	0	2.196	0.002	4.250	0
lnRoadInf	0.075	0.437	0.037	0.628	-0.013	0.520
lnMarketInf	-0.003	0.873	0.002	0.884	0.0012	0.73
lnAgricInf	0.094	0.038*	-0.091	0.011*	-0.002	0.841
lnHealthInf	0.048	0.487	-0.011	0.844	-0.009	0.536
lnEduInf	0.065	0.26	-0.109	0.016*	0.0186	0.114
R Square	0.264499		0.285365		0.209014	
Prob (F-Stat)	0.0921271		0.0378947		0.0875407	
DW-Stat	2.517365		2.525781		2.685117	

*: α=0.05, **: α=0.01

Meanwhile, the development of educational and agricultural infrastructure which is actually aimed at border areas has an impact on non-border areas. Every additional 1% in improving education infrastructure, it can add 0.6% to the number of poor people in border areas. But for every 1% increase in agricultural infrastructure development, it is able to improve the quality of human life by 3.9% (Table 7).

Table 7. The effect of independent variables on economic performance in non-border areas of the Papua corridor

Independent Variables	GDP per Capita		Poverty		HDI	
	Coeff	Prob	Coeff	Prob	Coeff	Prob
C	4.513	0	3.954	0	17.135	0
lnRoadInf	0.037	0.061	-0.059	0.205	-0.034	0.621
lnMarketInf	0.008	0.036	-0.009	0.326	0.014	0.313
lnAgricInf	0.0033	0.50	-0.026	0.124	0.036	0.039*
lnHealthInf	-0.006	0.96	-0.022	0.622	-0.033	0.50
lnEduInf	0.0006	0.927	0.068	0.001**	0.057	0.010
R Square	0.314789		0.295592		0.151676	
Prob (F-Stat)	0.01493		0.015519		0.0862866	
DW-Stat	1.890612		1.565513		1.751677	

*: α=0.05, **: α=0.01

In fact, the development of agricultural infrastructure aimed at the border areas of Papua not only has a positive impact on increasing GDP per capita in the region, but also for improving the quality of life of people in non-border areas. Unfortunately, poverty, which is a heavy burden in the Papua corridor, has not been able to be overcome.

4. CONCLUSION

The development of border areas is a necessity, not solely for economic purposes, but more than that for the sake of developing the area. In fact, it turns out that development aimed at border areas has a positive effect on non-border areas. Although not all development programs are successful, at least there is a spread effect for non-border areas. This condition is in line with the Myrdal theory, that more developed areas will be better able to absorb development than underdeveloped areas.

In general, government investment in agriculture and education has proven to be able to have a significant influence on economic performance in border areas while providing blessings for non-borders. The significant effect is seen in the increase in GDP per capita, poverty reduction and increase in HDI. However, the development of road infrastructure and markets has not shown a significant impact on both regions. Agricultural development is carried out because almost all people in the region depend on the agricultural sector for their lives. In addition, the development of educational infrastructure is also a top priority because education is one of the important components in community welfare. The development of health infrastructure is also an important note, because it was originally aimed at border areas, but had a significant effect on non-border areas. In the case of development in this border area, the greatest benefits are actually obtained by the government. The blessing of the spread effect on border areas provides a multiplier for non-border areas. The cost of development spent by the government for one region has a positive impact on other regions. Of course, this is a starting point for the government as a policy maker to develop border areas.

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