THE IMPACT OF CLIMATE FACTORS, DISASTER, AND SOCIAL COMMUNITY IN RURAL DEVELOPMENT

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Abstract

Global warming affects climate change and has an overall impact on all aspects of life. On the other hand, community behavior and disaster aspects also have an important role in people's lives. This will also have an impact on regional development. This study aims to determine the effect of climate, disaster, and social society on rural development. This research uses OLS Regression Analysis method, then continued with CHAID analysis to determine the segmentation of the role of climate, disaster, and social factors in rural development. The results of this study found that all research regressor variables significantly influence the Rural Development Index (IPD2018), with an R-squared value of 32.9 percent. Efforts that need to be taken in order to implement policies that are targeted, effective, and efficient. The results of this study can be a reference for the government in determining policies by focusing on villages that have high duration of sunshine, cultivating natural disaster warnings especially in areas prone to natural disasters, and need to focus on underdeveloped areas.

Keywords: climate, natural disasters, rural development

1. INTRODUCTION

At present, the world is faced with the issue of global warming. The issue has an impact on climate change that is felt by humans. In some regions, climate change will have an impact on all aspects of life. (Han et all, 2016; Ihara et all, 2009; Lendrun et all, 2007; Mort et all, 2018; Yesil, 2006). In addition extreme climate change will have a derivative impact such as natural disasters and changes in the livelihoods of local communities. So that, in the long run climate change, disaster, and community behavior will have an impact on people's welfare. The accumulation of community welfare, as a micro community, can be reflected through rural development (Bieganza et all, 2018).

The high climate change can also impact on the economic development of a region (Barbier et all, 2018; Barreca et all, 2012; Barreca et all, 2012; Barrios et all, 2010). In addition, extreme climate change can cause natural disasters, which is one of the obstacles to the development of the business world (Bhuriyan et all., 1997; Chester et all., 2014; Deligne et all., 2017; Padli et all, 2018; Preface et all, 2010; Vankoningsveld et all., 2008). This condition will certainly affect the interests of investors in investing. In addition, the mitigation of poor disaster management will also have an impact on the lack of investment in the local area, so that it will have an impact on regional income per capita (Bronfman et all., 2019; Sulistyaningrum et all., 2018). This condition is exacerbated when a rural is far from the center of the crowd.

Village-related regulations define development in rural areas as "efforts to improve the quality of life and life for the maximum welfare of rural communities". Article 78 paragraph (1) states that the development objectives in rural areas, namely "improving the welfare of the village community and the quality of human life and poverty reduction through meeting basic needs, construction of rural facilities and infrastructure, development of local economic potential, and utilization of natural resources and environmentally sustainable ". "In the implementation of village development it is important to prioritize togetherness, kinship, and mutual cooperation in order to realize the mainstreaming of peace and social justice", it is stated in article 78 paragraph (3).

Factors that can become obstacles to development performance, are through natural disasters that often occur in an area. Development will be in vain, if an area prone to natural disasters does not pay attention to the condition of the area and the potential for disaster. On the other hand, even areas of concern for potential disasters will still have various unavoidable limitations so that development acceleration will not be effective.

Climate change will certainly change the social conditions that exist in society, as reflected in changes in livelihoods. The sector most affected by climate change is the agricultural sector (Faradiba, 2018). The agricultural sector is the sector most expected to develop along with population growth. Sometimes, people are required to do various ways to maintain agricultural production. However, sometimes these methods actually exacerbate the climatic conditions of an area, and it was apparently not realized by farmers (Kamga et all, 2016). For example, to grow agricultural crops, sometimes people are willing to burn fields. Farmers feel this is more effective and efficient. In fact, puffs of smoke from burning fields will damage the ozone layer, and will indirectly affect climate change. Especially, if an area is around the equator, which tends to have a tropical climate. On the other hand, through PODES data, there are areas where mangrove forests exist when an area is around the sea. This is very positive for the region, considering that the coastal area is one of the areas that is vulnerable to natural disasters (Khan et all, 2009) .

Indonesia has a lot of mineral resources. However, the management of these resources sometimes has positive and negative impacts, like two blades. On the one hand, it will improve the mining and quarrying sector. However, on the other hand it will damage the environment, because sometimes the excavation location is in the forest, which is the lung of the local area. Forests that continue to be cut down due to exploration of natural resources, will have an impact on the climate that occurs (Mancini all, 2018).

There have been many studies that review the relationship of climate, natural disasters, and social conditions to economic conditions at the state or provincial level. However, no one has analyzed the influence of climate, disaster and community behavior on development at the village level. Therefore, the expected results in this study are to determine the effect of climate factors, disasters, and community behavior on village development in Indonesia. The results of this study describe the regressor together as having a significant effect on village development. Our research uses 21 variables, including: rainfall, wind speed, humidity, temperature, air pressure, duration of sunshine, burning fields, excavation sites, warnings of natural disasters, floods, flash floods, earthquakes, whirlwinds, volcanoes,

and a number of control variables that also affect village development. This research will also review what indicators need to be the focus of attention so that rural development is better.

2. THEORITICAL REVIEW

Based on the introduction above, there are several factors that influence village development when viewed from the aspects of climate, disaster and community behavior. When this aspect can be anticipated and controlled properly, it will result in regional development that can run as expected. The impact, rural development goes according to plan and will produce prosperity and comfort for the community.

Climate change is a change in the average weather over a relatively long period. In modern terms, the term climate change is also known as global warming, which causes geothermal heat to increase. The heat tends to be felt by the people in the area that is crossed by the equator. Indonesia is one of the countries in the world that is crossed by the equator. Phenomena that occur around the equator, including sunlight in the equatorial region fell to the ground at an angle of 90 degrees. This angle of falling sunlight makes solar power falling per unit area larger so that the area around the equator is hotter. Sunlight is almost always located above the equator, so temperatures below the equator are always high.

Climate has an influence in the development economy both directly and indirectly. Has a direct effect when the livelihoods of residents in an area rely on climate factors. Communities cannot generate income when climate change occurs. Has an indirect effect when there is an intermediate event before it impacts on people's income. For example, due to the high intensity rainy season, an area is flooded. Floods that occurred in the region will disrupt the economic activities of the community. Climatic conditions in each region can be different, so the economic progress of the impact of the climate will also be different.

Inequalities that occur in an area, can be divided into developed regions and developing regions, so this will trigger social inequality (Hulme et all., 1990). One factor that causes disparities in rural and urban areas is the development of economic activities that occur in society (urban bias). As a result of this phenomenon the sector most affected in the rural economy is the agricultural sector. Contradicting the agriculture sector, the industrial and service sectors tend to develop more. Each country has alternative steps to overcome the disparities that occur between regions, with a focus on rural area development (Adisasmita, 2006), because disparities between regions can cause poverty. Rural development that is still lagging behind is a concrete step in developing rural areas by taking into account the socio-economic conditions and community limitations. So that through these steps it is hoped that the disadvantaged villagers can improve their quality of life, or at least not much different from other villages (Puspasari et all., 2016). In national development, Indonesia has established disadvantaged districts. This is intended so that there is more effort from the authorities in developing the area.

Rural communities tend to be difficult to accept the changing era. This has an impact on the modernization of economic activity that is normally carried out by the community. Even though maintaining culture is very important, we need to also adopt an outside culture that is constructive and

does not conflict with customary norms. Rural communities tend to accept conditions, so do not have a strong motivation to change the strata of life. In addition, rural communities have a natural nature, which tends to be quickly satisfied with what is obtained. Even though the rural has a lot of potential that has not been fully developed. Because of these factors, causing development needs to be focused on rural areas.

Development in rural areas needs to be done to support the economy of the region above, and of course it will lead to a country. In addition, development is taking place in rural areas as an effort to reduce poverty, and reduce rural inequality. In practice, rural development can be a source of economic growth driven into the countryside, so that rural areas become more attractive places to live and as a source of income. Another important factor is rural infrastructure. Infrastructure must be provided as a medium for development activities so that rural areas can become more advanced and developed (Daldjoeni et all., 2004).

Indonesia is one of the largest archipelagic countries in the world having around 17,491 islands. The Indonesian archipelago spreads around the equator, and tends to have tropical weather. Indonesian territory is limited by administrative areas, which have very strategic functions. Some of its functions include the separation of administrative territory, besides that the administrative area also functions as a determinant of all regional development activities and the calculation of regional income sources (PAD). This is stated in "Guidelines for asserting regional boundaries have been established by the government through Permendagri No. 1 of 2006 " (Nugroho, 2011). In the administrative area level II consists of districts and urban areas. Urban areas tend to be more advanced in terms of development.

3. METHODOLOGY AND DATA

This study uses data from the 2014 PODES (Rural Potential) data collection as an independent variable and the Rural Development Index 2018 as the dependent variable. Between the independent and dependent variables the data are distinguished so that its are visible. The number of observations used was 72,333 villages (without kelurahan). This figure is the result of matching between the 2014 PODES Variable and the 2018 Rural Development Index. In addition, this study uses district/municipality per capita GRDP data as well as data on underdeveloped areas as stated in "Presidential Regulation Number 131 Year 2015 Regarding Determination of Disadvantaged Areas in 2015-2019", as well as using climate average data for 2001-2014. In addition to climate variables, the independent variables use dummy variables, related to the existence/status of the corresponding conditions. Code "1" if the village has conditions that correspond to the observation variable, and code "0" if vice versa. We used OLS multiple regression analysis tools, and continued with Chi-squared Automatic Interaction Detector (CHAID) analysis to determine climate segmentation, disaster, and community behavior towards village development.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + \beta_{17} X_{17} + \beta_{18} X_{18} + \beta_{19} X_{19} + \beta_{20} X_{20} + \beta_{21} X_{21} + \varepsilon$$

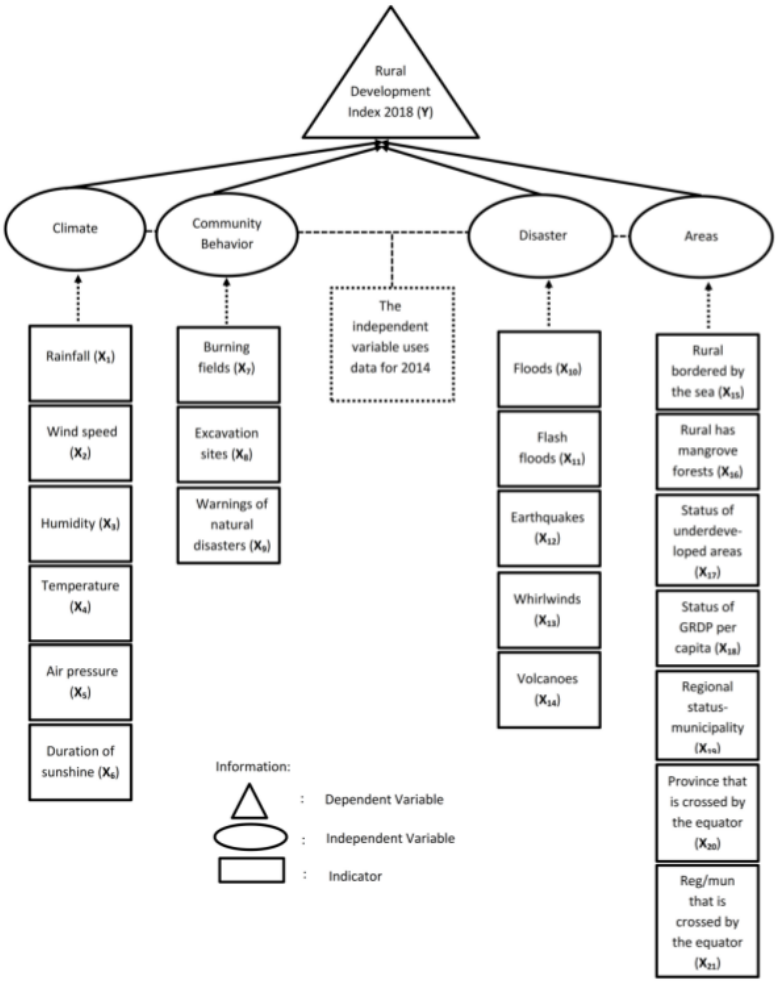

Figure. 1. Research Conceptual Framework

The Rural Development Index (IPD) is an index compiled to measure performance or development that occurs in rural areas. IPD is arranged through variables that can represent the development that occurs. IPD is one alternative to identify the conditions of village development, because this index accommodates 5 dimensions and 42 indicators that describe the availability and accessibility of services to rural communities. The calculation of IPD in 2018 uses the results of the 2018 Rural Potential Data Collection (PODES 2018) (BPS, 2019).

Next the analysis used is the Chi-squared Automatic Interaction Detector (CHAID). CHAID generally estimates a single variable, referred to as regresan, which is associated with other variables, called a reressor. CHAID is an iterative technique that tests one by one the regressors used in the classification, and arranges them based on the level of statistical significance of chi square on regresan (Gallagher, 2000). CHAID analysis is expected to be able to provide an indicator of priority priorities for conducting rural development.

This test technique allows us to find out the independence between two variables at each level. For example a first variable has *r* ategories and the second variable has *c* categories then n_{ij} is an observation on the first variable at level *i* and the second variable at level *j*, in general the table is presented as follows:

Table 1. Chi-Square Test Data Structure

Row and Column	1	2	.....	c	Total
1	n_{11}	n_{12}	.....	n_{1c}	$n_{1\bullet}$
2	n_{21}	n_{22}	.....	n_{2c}	$n_{2\bullet}$
...	.....	.....	.....	.....	.....
...	.....	.....	.....	.....	.....
...	.....	.....	.....	.....	.....
r	n_{r1}	n_{r2}	.....	n_{rc}	$n_{r\bullet}$
Total	$n_{\bullet 1}$	$n_{\bullet 2}$	.....	$n_{\bullet c}$	n

Table 2. Cell Probabilities

Row and Column	1	2	.....	c	Total
1	p_{11}	p_{12}	.....	p_{1c}	$p_{1\bullet}$
2	p_{21}	p_{22}	.....	p_{2c}	$p_{2\bullet}$
...	.....	.....	.....	.....	.....
...	.....	.....	.....	.....	.....
...	.....	.....	.....	.....	.....
r	p_{r1}	p_{r2}	.....	p_{rc}	$p_{r\bullet}$
Total	$p_{\bullet 1}$	$p_{\bullet 2}$	.....	$p_{\bullet c}$	p

where *pij* is the probability of the occurrence of the slice between *row i* and *column j*
$p_{i\bullet}$ is the total probability on the row *i*
$p_{\bullet j}$ is the total probability on the columns *j*

The hypothesis in chi-square testing is:
$H_0 : p_{ij} = p_{i\bullet}\, p_{\bullet j}$ (no relationship between rows and columns (bebas))
$H_1 : p_{ij} \neq p_{i\bullet}\, p_{\bullet j}$ (there is a relationship between rows and columns (not free))

Whereas the test statistic is:

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(n_{ij} - E_{ij})^2}{E_{ij}} \qquad (1)$$

$$\chi^2 = \frac{n_{i\bullet}\; n_{\bullet j}}{n} \qquad (2)$$

where

n_{ij} = the number of observations in the *row i* and *column j*

E_{ij} = Expectation value of observations in the *row i* and *column j*

$n_{i\bullet}$ = total number of observations in *row i*

$n_{\bullet j}$ = the total number of observations in the *row j*

n = total number of respondents

The decision taken from this chi-square test is rejected H_0 if value of χ^2 *count* > χ^2 *table* or *p-value* < α.

4. RESULTS

Table 3. Calculation Regression of Climate Factor and Natural Disaster in Rural Development Index

Indicator	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rainfall	0.042***	0.041***	0.041***	0.021***	0.021***	0.021***	0.020***	0.019***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Wind speed	0.533***	0.556***	0.556***	0.464***	0.459***	0.446***	0.442***	0.444***
	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Humidity	-2.141***	-2.139***	-2.138***	-1.490***	-1.488***	-1.488***	-1.503***	-1.468***
	(0.032)	(0.032)	(0.032)	(0.033)	(0.033)	(0.033)	(0.032)	(0.033)
Temperature	-8.715***	-9.217***	-9.216***	-7.489***	-7.399***	-7.215***	-7.759***	-7.712***
	(0.203)	(0.206)	(0.206)	(0.198)	(0.199)	(0.200)	(0.204)	(0.204)
Air pressure	0.226***	0.248***	0.248***	0.195***	0.191***	0.184***	0.204***	0.202***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Duration of sunshine	-0.169***	-0.166***	-0.165***	0.010	0.009	0.013*	0.063***	0.075***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Burning fields	-4.043***	-3.925***	-3.931***	-2.460***	-2.443***	-2.399***	-2.510***	-2.460***
	(0.103)	(0.104)	(0.104)	(0.102)	(0.102)	(0.102)	(0.102)	(0.102)
Excavation sites	0.320***	0.446***	0.440***	0.667***	0.664***	0.671***	0.551***	0.549***
	(0.094)	(0.094)	(0.094)	(0.092)	(0.092)	(0.092)	(0.092)	(0.092)
Warnings of natural disasters	1.940***	2.017***	2.029***	1.130***	1.131***	1.104***	1.096***	1.083***
	(0.144)	(0.144)	(0.144)	(0.136)	(0.136)	(0.136)	(0.137)	(0.136)
Floods	1.882***	1.845***	1.838***	1.554***	1.573***	1.584***	1.555***	1.557***
	(0.098)	(0.097)	(0.097)	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)
Flash floods	0.854***	0.895***	0.895***	0.945***	0.933***	0.864***	0.849***	0.858***
	(0.287)	(0.287)	(0.287)	(0.280)	(0.280)	(0.280)	(0.281)	(0.281)
Earthquakes	-2.995***	-2.965***	-2.960***	-2.432***	-2.436***	-2.577***	-2.442***	-2.427***
	(0.197)	(0.197)	(0.197)	(0.189)	(0.189)	(0.188)	(0.188)	(0.187)
Whirlwinds	1.374***	1.448***	1.447***	1.263***	1.255***	1.247***	1.208***	1.208***
	(0.136)	(0.136)	(0.136)	(0.131)	(0.131)	(0.131)	(0.131)	(0.131)
Volcanoes	2.457***	2.390***	2.405***	1.753***	1.703***	1.485***	0.881*	1.047**
	(0.509)	(0.508)	(0.508)	(0.499)	(0.499)	(0.510)	(0.506)	(0.510)
Rural bordered by the sea		-1.796***	-2.138***	-1.074***	-1.058***	-1.123***	-1.322***	-1.406***
		(0.124)	(0.169)	(0.167)	(0.167)	(0.166)	(0.167)	(0.166)
Rural has mangrove forests			0.667***	0.638***	0.662***	0.733***	0.605***	0.584***
			(0.220)	(0.218)	(0.218)	(0.218)	(0.219)	(0.218)
Status of underdeveloped areas				-8.357***	-8.386***	-8.340***	-8.724***	-8.980***
				(0.127)	(0.127)	(0.127)	(0.134)	(0.136)
Status of GRDP per capita					-0.267**	-0.417***	-0.506***	-0.470***
					(0.114)	(0.115)	(0.115)	(0.115)
Regional status (municipality)						3.437***	3.263***	3.348***
						(0.328)	(0.336)	(0.335)
Province that is crossed by the equator							1.924***	1.690***
							(0.138)	(0.140)
Regency/municipality that is crossed by the equator								3.189***
								(0.329)
Constant	233.952***	225.132***	225.034***	176.521***	177.609***	180.047***	172.542***	169.903***
	(2.342)	(2.410)	(2.410)	(2.406)	(2.475)	(2.476)	(2.558)	(2.556)
Observed	**72,333**	**72,333**	**72,333**	**72,333**	**72,333**	**72,333**	**72,333**	**72,333**
R-squar	**0.265**	**0.267**	**0.267**	**0.324**	**0.325**	**0.326**	**0.328**	**0.329**

Level of Significant *** p<0.01, ** p<0.05, * p<0.1

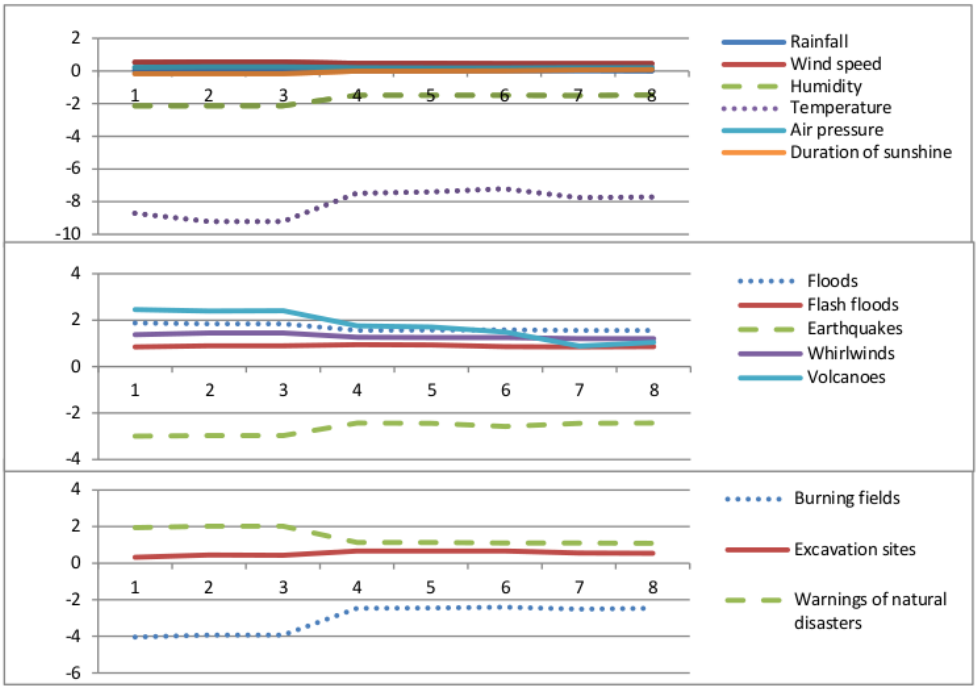

Figure. 2. Comparison of Coefficients According to Model and Observation Factors

From Table 3 the information is obtained, that before entering the control variable the R-squared value of 26.50 percent and increased to 32.90 percent when interacting with seven control variables. From the models formed, it is known that the more control variables involved, the better the strength of the model. Underdeveloped area indicators have the greatest impact when included in the model.

Overall, the model has the same direction when before and after the control variable is entered. Temperature and Underdeveloped area indicators have the greatest constants when compared to other indicators. While rainfall is the smallest indicator on the model. Of the overall models and indicators there is only 1 indicator that is not significant, namely duration of sunshine in model 4 and model 5.

When viewed through climate variables, it is known that temperature has the greatest role in rural development. The second big negative response can be seen from the air pressure indicator, where each positive increase in temperature and humidity will negatively impact rural development in the range of 10 points. The other 4 climate indicators have relatively the same coefficients. When viewed through the disaster variable, it is known that earthquake and flood indicators have the greatest impact. However, the coefficients on these variables have the opposite direction. The other 3 disaster variables have relatively similar coefficients. When viewed through community behavior variables, it is known that burning of fields and warning of natural disasters have the greatest impact. However, the coefficients on these variables have the opposite direction. For the excavation location variable has a positive coefficient.

Table 4. Ranking of Variables Based on CHAID Calculation of Climate and Disaster Factors in Rural Development

Indicator	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rainfall	**(1)**	**(2)**	**(3)**	**(3)**	**(3)**	(6)	**(5)**	**(4)**
Wind speed	(7)	**(3)**	**(2)**	**(4)**	**(5)**	**(4)**	**(4)**	**(5)**
Humidity	**(2)**	**(5)**	(11)	(7)	(7)	(8)	(9)	(8)
Temperature	(6)		(8)	(6)	(6)	**(5)**	(6)	(6)
Air pressure	**(5)**	**(4)**	**(4)**	**(5)**	**(4)**	**(3)**	**(3)**	**(3)**
Duration of sunshine	**(3)**	**(1)**	**(1)**	**(2)**	**(2)**	**(1)**	**(1)**	**(2)**
Burning fields	**(4)**	(6)	**(5)**	(8)	(8)	(7)	(8)	
Excavation sites	(9)	(11)	(12)	(12)	(13)	(13)		
Warnings of natural disasters	(13)	(12)	(13)	(13)	(14)	(16)		
Floods	(8)	(8)	(7)	(10)	(12)	(15)		
Flash floods	(14)			(17)				
Earthquakes	(12)	(13)	(14)	(11)	(11)	(11)	(12)	
Whirlwinds	(11)	(10)	(9)	(14)	(15)			
Volcanoes	(10)	(9)	(10)	(15)	(16)	(14)		
Rural bordered by the sea		(7)	(6)	(9)	(9)	(9)	(11)	
Rural has mangrove forests				(16)	(17)	(17)		
Status of underdeveloped areas				**(1)**	**(1)**	**(2)**	**(2)**	**(1)**
Status of GRDP per capita					(10)	(12)		
Regional status (municipality)						(10)	(10)	(9)
Province that is crossed by the equator							(7)	(7)
Regency/municipality that is crossed by the equator								

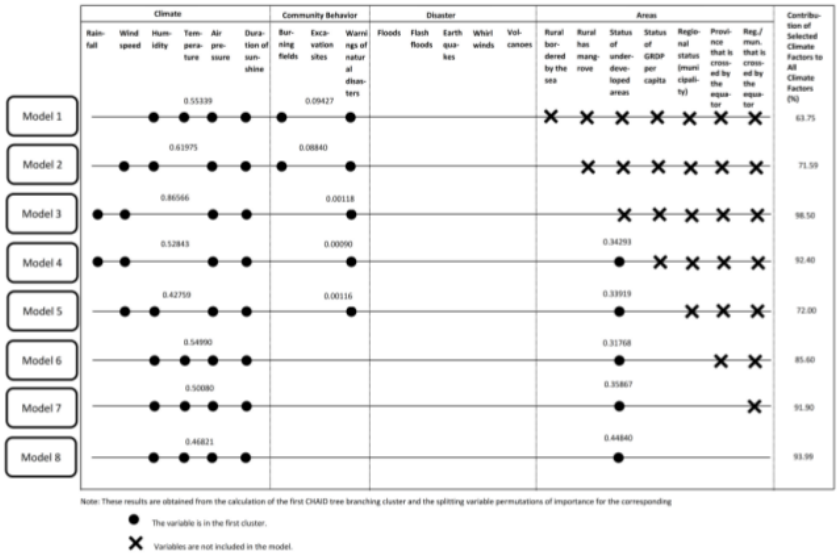

Figure. 3. Calculation of Priority Clusters

Through the CHAID analysis it is known that the highest ranking of the 8 models includes indicators of rainfall, wind speed, humidity, temperature, air pressure, duration of sunshine, people's behavior in burning fields, and the status of underdeveloped areas. The status of underdeveloped areas and duration of sunshine has a very large contribution in the model, because it always has a big role compared to other observational indicators.`

From Figure 3, information is obtained that climate has the largest composition in rural development, this can be seen from the cumulative value of splitting variable permutation importance. In cluster 1 analysis, most of the climatic factors had a large contribution followed by regional indicators. Territorial indicators are only dominated by the role of underdeveloped areas indicators. The community behavior variable has a very small role in the model. Indicators of community behavior that have a role are indicators of burning fields and warning of natural disasters.

The culture of burning fields to farmers when they want to open new agricultural land becomes a negative factor in the formation of the rural development index. This is clearly felt, when practical ways like this are done, it means that the local community is still relatively low in terms of knowledge. On the other hand, natural disaster warnings implemented in a village will have a positive impact on rural development. A rural that has implemented a disaster warning means that the rural has considered the adverse effects when a disaster occurs in its area. This anticipation is very positive, because the rural will have minimal impact in the event of a natural disaster. In addition, the aspect of disaster mitigation is the result of developing the mind and cooperation of the community and rural officials. This factor will indirectly contribute positively to rural development.

If seen from the role of selected climate factors in cluster 1 against all indicators on climate factors, information is obtained that selected climate indicators have a role in the range of 63.75 - 97.50 percent in the overall model. Where in model 3 looks a very big role of the selected climate indicators on overall climate factors. This indicates that in model 3, the collaboration of 4 indicators can make a major contribution to the model formed.

5. Discussion

Climate, disaster and community behavior are important factors in rural development. Climate is a natural phenomenon that cannot be denied by living things. However, climate phenomena can be controlled before worse impacts will occur. This condition of climate change has been felt by all countries in various parts of the world, and will have a negative impact on human life if it is not accompanied by good mitigation. Bad climate is often followed by natural disasters that occur. The series of conditions will certainly be responded by the community to survive. However, unwittingly people's behavior actually aggravates the state of the environment. The set of observational variables will accumulate into community development, which at the smallest level will be reflected in rural communities.

From the results of the calculation of regression analysis, with or without control variables, it is known that all variables have a significant effect. Climate variables have a large role on humidity and

temperature indicators. Humidity and high temperatures will cause low rural development. Humidity and temperature are 2 contradictory things, where when the temperature rises, humidity will decrease. From this phenomenon it can be concluded that development will run well when a rural has a temperature that is not high, but not too humid too.

The impact of natural disasters on rural development has both positive and negative impacts. Disasters that have a negative impact on rural development in the future are earthquake disasters. This indicates that the earthquake disaster will still have a negative impact in the next 4-6 years (long-term) period on rural development. In contrast to other disaster indicators in observations that have a positive impact. This is due to the role of the government and local communities who are swift in rebuilding after a natural disaster, so that development will be created in the short term.

In the development process it is necessary to take into account the effectiveness and efficiency of a policy. The climate variables that need to be the focus of the government are indicators of solar radiation and air pressure. Whereas on community behavior, the government can focus on clearing community land through burning fields and promoting natural disaster warnings, especially in villages prone to natural disasters. If you look at territorial variables, it is appropriate that the government has lately focused development on underdeveloped areas.

This research indicates that community and government participation is needed in developing a rural. From climate factors, villages need to anticipate, especially if the village has an extreme climate and is vulnerable to natural disasters. In addition, villages need to implement appeals to people who carry out economic activities that will indirectly harm the environment, such as mining in green areas. If all goes well, surely an increase in village development will be created. This study uses climate data at the provincial level, for that in future studies climate data at the village level are needed in order to obtain more representative results.

6. Conclusion

At present, the world is faced with the issue of global warming. The issue of global warming will affect climate change and will certainly have an impact on all aspects of life. On the other hand, community behavior and disaster aspects also have a role in people's lives. The results of the study mentioned that these factors had a significant contribution to rural development. Community and government participation is needed as an anticipatory measure, these factors have a direct or indirect impact. In implementing a policy sometimes policy makers must be faced with several constraints, including time, budget, and human resources. So we need the main steps that need to be taken in order to run an effective and efficient policy. Related to this research, the government needs to pay attention to rural that have high sun exposure, to culture natural disaster warnings especially in areas prone to natural disasters, and need to focus on underdeveloped areas.

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