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Social Economic Variables Influence on HDI With Data Panels Regression in Klassen Cluster at East Java Province

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Abstract. *This study analyzes the effect of socio-economic variables on HDI in East Java. Secondary data sources come from the Statistics Central Bureau of East Java Province. The research method used is cluster analysis and panel data regression. The sample quantity is 228 from panel data. The results showed that in a large panel of East Java Gini ratio, population density, crime, and gender empowerment had a significant effect on HDI, while unemployment and economic growth had no significant effect on the HDI. In quadrant I, unemployment, economic growth, Gini ratio, and population density have a significant effect on HDI, while crime and gender empowerment have no significant effect on the HDI. In quadrant IV, Gini ratio, crime, and gender empowerment have a significant effect on HDI, while unemployment, economic growth and population density have no significant effect on the HDI. Simultaneously, all independent variables have a significant effect on the dependent variable HDI, and this applies to all panels.*

Keywords: HDI, klassen typology, panel data regression, cluster analysis

JEL Codes: O15, C33, C38

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1. Introduction

A region's growth can be measured from two perspectives: economic development and human development. Human advancement can be attained through a variety of human development endeavors.

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Human development is defined as a process in which humans are either recipients or objects (Statistics Central Bureau, 2016). Human development attempts to make people's lives better by ensuring that they are healthier, live longer, educated, productive, and prosperous. The Human Development Index is a measure of how well a region has done in terms of human development. A long and healthy life, education, also welfare are the three fundamental components of HDI. HDI has various advantages, including being a tool for measuring people's well-being, assessing government performance, defining a country's development rating, and serving as a strategic resource. The Human Development Index is used to measure how well a region has done in terms of human development (HDI). The HDI is made up of three key components: health, education, and welfare. HDI also offers various advantages, including being one of the indicators for estimating community welfare, government performance, and defining a country's development ranking, as well as being a strategic data source (Statistics Central Bureau, 2015).

HDI rate is formed from four components as the main determinants, particularly: life expectancy at birth, schooling expected years, the average length of schooling, and per capita expenditure (Statistics Central Bureau, 2015). However, based on empirical studies, the high and low HDI can also be influenced by many factors, including: education budget, per capita income (Bintang, Ismail, & Indra, 2015); literacy rate, estimated life at birth, Gini ratio, fertility rate, and CO_2 emissions (Shah, 2016); crime rate, renewable energy use (Anderson, 2014); unemployment (Taner, Sezen, & Hakan, 2011); GRDP, illiteracy rate (Sembada, Tiara, & Fauzan, 2019); also population density (Attari & Chaudhary, 2015). In this study, socio-economic variables analyzed as HDI determinants are the unemployment rate, economic growth, Gini ratio, population density, crime, and gender empowerment. Researchers raised the issue of gender (gender empowerment) because gender empowerment is one of the goals of SDGs to meet the world's future challenges toward a better and balanced life. In addition, researchers have not found any previous research that raised gender empowerment as HDI predictor variable. Previous studies have also analyzed the HDI in general, not using cluster analysis. Both are very interesting research gaps to study in order for the results of this study to have a clear position on previous studies' results, particularly in refining previous studies' results by raising gender issues and using cluster analysis.

East Java Province is one of the provinces in Indonesia that is indicated to have problems in terms of human development. This is based on data on the fluctuating trend of East Java Province HDI growth

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(Figure 1) and the average achievement of East Java Province HDI which is repeatedly below the National HDI average (Figure 2)

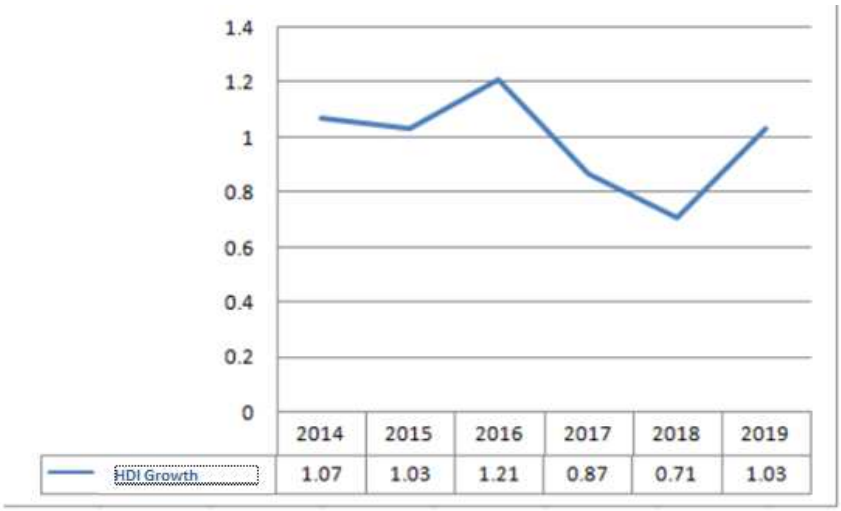

Fig. 1 : East Java HDI Growth, 2014 – 2019

Source: Statistics Central Bureau of East Java Province, (2020)

Fig. 2 : East Java Province HDI Position towards National HDI

Source: Statistics Central Bureau of East Java Province, (2020)

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The economic condition of East Java Province, in general, is actually satisfactory, from 2001 to 2013, East Java Province was the second largest contributor to the national GDP (Kuncoro, 2019). Although East Java's position is stable, the percentage of its contribution is experiencing a downward trend.

Apart from macroeconomic conditions that seem well, there are some interesting socio-economic phenomena in East Java. Some of the phenomena are the unemployment rate, economic growth, Gini ratio, population density, crime, gender empowerment, also HDI which tends to fluctuate and be unequal.

Development inequality between regions that occurs over a long period of time can have an impact on the humans' quality and community socio-economic life. Consequently, the HDI study between regions in East Java Province has urgency as a reference for the government in formulating policies for efforts to improve people's welfare, as well as poverty alleviation. Moreover, one of the main issues of development today is to produce exceptional Indonesian human resources in the future, so the study of HDI is very relevant. The findings of this study can be followed up by the Government to find alternatives to measure the success of the HDI policy. In addition, local government stakeholders are able to know the condition of their area and then they can develop more effective long-term development plans.

In order to obtain a comprehensive study of inter-regional human development achievement, this study uses cluster analysis based on the Kklassen typology. The Klassen clustering can provide an overview of the economic development conditions and human development in the analyzed cluster. In this clustering, an area can be classified into four quadrants, namely: Fast-forward and Fast-Growing Areas, Developed but Depressed Regions, Fast-Developing Regions, and Relatively Disadvantaged Regions (Kuncoro, 2019). Clustering data will also make it easier for the government to carry out accelerated and equitable development programs. This is because generally, areas that are in one cluster have the same forms of obstacles and challenges.

Based on the background above, the problem formulation is as follows: 1) How are the simultaneous effects of unemployment, economic growth, Gini ratio, population density, crime and gender empowerment on HDI in East Java?; 2) How do unemployment, economic growth, Gini ratio, population density, crime and gender empowerment partially affect HDI in East Java?.

The research goal is to examine the effects of unemployment, economic growth, Gini ratio, population density, crime, and gender empowerment on the HDI in East Java, both simultaneously and partially, based on the problems. Academically, this research is predicted to have a favorable impact on the growth of

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science, particularly development economics and regional economics, and can be utilized as reference material for future research, particularly HDI-related research. In application, as a resource for other researchers and the government in defining various regional-based human development program policies.

2. Literature Review

Human Development Index

The Human Development Index (HDI) was first created by the United Nations Development Programme (UNDP) as a method of conquering poverty. The United Nations Development Programme (UNDP) highlights numerous key aspects of the human development process that require attention, including productivity, equity, sustainability, and aspects of empowerment. According to UNDP, the ability to live a long and healthy life, the breadth of knowledge and degree of education, and the extent to which people can feel a good existence determine a country's success or failure in human development.

Apart from being largely determined by the three basic dimensions of its formation, HDI can also be influenced by various other factors. Although researchers who have studied HDI have provided many references to the determinants of HDI, there is an intriguing research gap to examine, namely incorporating gender empowerment variables into the HDI model, and combining Klassen typology-based cluster analysis with panel data regression to assess HDI.

Unemployment

Unemployment is defined as a workforce that has not been absorbed by employment and does not own a business, resulting in a lack of income. One factor that impacts the level of communal prosperity is income (Sukirno, 2019). If full employment circumstances can be achieved, the community's revenue will be at its peak. In actuality, full employment conditions have never been achieved, resulting in permanent unemployment. According to a previous study, unemployment has a substantial impact on human development. The higher the unemployment rate, the lower the HDI (Taner, Sezen, & Hakan, 2011; Chalid, Nursiah, & Yusuf, 2014; and Baeti, 2013); however, other studies have concluded that there is no significant relationship between unemployment and HDI (Taner, Sezen, & Hakan, 2011; Chalid, Nursiah, & Yusuf, 2014; and Baeti, 2013); however, other (Arisman, 2018).

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Economic growth

UNDP stated that human development will be sustainable if it is supported by economic growth. Previous research has proven that economic growth has a significant influence on human development. Economic growth can increase HDI as supported in the research results by (Baeti, 2013; Hudakova, 2017; Sembada, Tiara, & Fauzan, 2019; Setiawan & Hakim, 2013; Muliza, Zulham, & Seftarita, 2017; Khan, Ju, & Hassan, 2019; and Farida, 2019).

Gini Ratio

High economic growth has a negative side, such as inequality in society. When inequality is high, at the same time economic growth is also high. Economic growth and development are interrelated because they are both determinants of human well-being. The World Bank revealed that urban areas (developed areas) have high-income inequality (The World Bank, 2019, accessed July 13, 2019 from https://www.worldbank.org/en/topic/poverty/overvie). On the other hand, inequality in income distribution can lead to economic and asset allocation inefficiency, and also will undermine social stability and solidarity (Todaro & Smith, 2011). Previous research has proven that the Gini ratio has a significant negative relationship with HDI (Shah, 2016; Bintang, Ismail, & Indra, 2015; and Pratowo, 2013). Gini ratio decreases as the HDI rises. However, there are also previous studies conducted in Indonesia that found that the Gini ratio had a positive effect on HDI (Rustariyuni, 2014). The HDI increases as the Gini ratio rises.

Population density

In some of the world's poorest areas, population density increased has negatively contributed to the degradation of the more severe resource which these people need to survive (Todaro & Smith, 2011). As resources become scarcer and more expensive as a result of resource degradation, it becomes more difficult for the poor to live in prosperity. Thus population density has a negative impact on welfare. This is reinforced by several previous research results that population density has a negative effect on HDI (Octavilia, Puspita, & Sugiyanto, 2018; Sulistianingsih, Junia, & Wirarizki, 2018). On the other hand, an increase in population density can lead to a growing economy (Sukirno, 2019). Previous research has shown that population density has a significant positive effect on HDI in Punjab District, Pakistan, with the explanation that high population density in Punjab District supports productivity growth, stimulates high-

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tech innovation, and gives a strong incentive to do so; it also drives human resources investment due to better human resources productivity (Attari & Chaudhary, 2015).

Crime Corruption is one type of crime. Corruption is theft-related criminal conduct. If a country is generally free of corruption, it will attract investment, hence accelerating economic growth and development (Todaro & Smith, 2011). Furthermore, governments that fight corruption tend to stimulate competition and lower obstacles to entry into the economy, improve the professionalism of public services by paying civil employees higher salaries and benefits, and ensure that all residents have access to better education and health care. Crime has also been shown to have a major negative impact on human development in previous studies (Kusuma, Hariyani, & Hidayat, 2019; Sohnen, 2012; and Alves, Curta, & Diaz, 2017).

Gender Empowerment

Because women's active engagement is critical for society's success (Todaro & Smith, 2011), policy designs must ensure that women benefit equally from development efforts. Amartya Sen also emphasized the importance of balancing globalization and liberalization with efforts to improve human skills. As a result, several efforts to improve education, health, and gender empowerment are required (Deliarnov, 2016). Gender empowerment has a considerable impact on HDI, according to theoretical studies. Gender empowerment will promote higher-quality human development (IPM) and contribute to the overall prosperity of the community. Based on the theoretical framework, the relationship between variables can be described as follows:

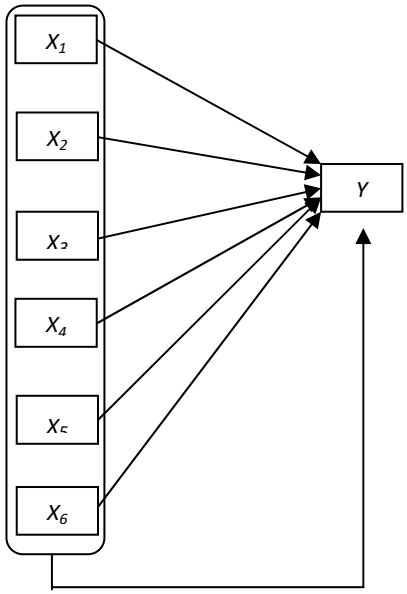

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Fig. 3 : Research Framework

Description:

- Y : Human Development Index
- X_1 : Unemployment
- X_2 : Economic growth
- X_3 : Gini Ratio
- X_4 : Population density
- X_5 : Crime
- X_6 : Gender Empowerment

3. Research Methodology

Research Design

This research is a quantitative research using a cluster analysis approach based on the Klassen typology. Previous researchers who also used the Klassen typology called it the fuzzy-Klassen model (Munandar & Wardoyo, 2015). The Klassen fuzzy model is used to analyze development inequality between regions by taking into account the average growth and development contribution of each GRDP sector in the analyzed area and then comparing it with the reference area. This approach is also one way to find out a picture of the success of development in the region (Kuncoro, 2019). Cluster analysis will result in tabular data that is descriptive and quantitative. The researcher then utilizes a comparative causal research design to explain and test the influence of factors after clustering.

Data Source

The study was conducted in 2020, using secondary data from the East Java Province Statistics Central Bureau. This study involved 228 samples of panel data, from 38 districts or cities as cross section data and 6 years observation period as time series data.

Variable

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Variables operationalization as follows:

1. Unemployment is the unemployment rate published by East Java Province Statistics Central Bureau.
2. Economic growth is the GRDP increase rate compared to the previous year published by East Java Province Statistics Central Bureau.
3. Gini ratio is a measure of income distribution inequality published by East Java Province Statistics Central Bureau.
4. Population density is the ratio of the total population per km2 published by East Java Province Statistics Central Bureau.
5. Crime is the number of criminal incidents in a certain period published by the East Java Province Statistics Central Bureau
6. Gender empowerment is the level of women's empowerment published by East Java Province Statistics Central Bureau.
7. HDI is the value of the Human Development Index published by East Java Province Statistics Central Bureau.

Model Structure

The model structure is presented as follows:

$$\ln(HDI_{it}) = \alpha + \beta_1 \ln(U_{it}) + \beta_2 \ln(EG_{it}) + \beta_3 \ln(GR_{it}) + \beta_4 \ln(PD_{it}) + \beta_5 \ln(C_{it}) + \beta_6 \ln(GE_{it}) + e_{it}$$

Description:

HDI : Human Development Index

U : Unemployment

EG : *Economic growth*

GR : Gini Ratio

PD : *Population Density*

C : Crime

GE : *Gender Empowerment*

α : intercept

β_{1-6} : parameter

e_{it} : error

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i : individual (city/district);

t : Time Period

Observations total number: $\sum_{i=1}^{N} T_i$

Assumption : e_{it} = nol

Analysis Techniques

The panel data regression analysis stages which have been carried out are as follows:

A. Estimation model Determination

The panel data estimation model is used for pragmatic technical reasons, especially to overcome problems regarding data availability, in addition to having the advantage of freedom increasing degrees (Ekananda, 2016). Panel data regression is a regression analysis with a data structure which is panel data with the characteristics of time series data as well as cross-section (Ariefianto, 2012).

The estimation model is carried out using three approaches, they are:

1. CEM (Common Effect Model), is the simplest panel data model approach because it just combines time series and cross-section data and ignores the dimensions of time and persons (samples), the simplest panel data model approach assumes that the behavior of the sample data is consistent across periods. (Widarjono, 2018). In this case, the coefficient remains between time and between individuals or the intercept and slope are the same both between time and between individuals. This method can also use the OLS (Ordinary Least Square) approach or the least-squares technique to estimate panel data
2. FEM (Fixed Effect Model). This model also assumes that the regression coefficient (slope) remains between individuals and between times (Widarjono, 2018). The approach used in this model is the LSDV (Least Square Dummy Variable) method.
3. REM (Random Effect Model). This method estimates panel data in which the disturbance variables may be interrelated between times and individuals. This model is often referred to as the Error Component Model or ECM (Widarjono, 2018).

B. The Best Estimation Model Selection

The best estimation model selection through a number of tests, particularly: chow test, Hausman test, and Lagrange multiplier test (Widarjono, 2018)

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1. Chow test, to select between CEM and FEM If the prob value. F < critical limit, then choose FEM but if the value of prob. F critical limit then chooses CEM.
2. Hausman test, to choose between FEM and REM. If the prob value. Chi-square < significance level, then choose FEM. However, if the value of prob. Chi-square significance level, then choose REM.
3. Lagrange Multiplier (LM) test, to decide between CEM and REM. If the p-value < critical limit then choose REM, but if the p-value is critical limit, then choose CEM.

C. Classical assumption test

Classical assumption tests consist of:

1. Residual normality test used the Jarque Bera test. If the p-value > 0.05 then the normality assumption is fulfilled.
2. The multicollinearity test was carried out using the pairwise correlation method. If the correlation value < 0.85 means that there isn't a concern with multicollinearity.
3. The heteroscedasticity test uses the White test by looking at the Chi-Squared p-value if > 0.05 then there is no problem with the non-heteroscedasticity assumption.
4. Autocorrelation test using Breusch-Godfrey Serial Correlation LM test. If prob. Chi-square > 0.05, it means that there is no autocorrelation issue.

D. Significance Test

In order to find out how well a sample regression line qualified the data, goodness of fit test is performed for the F statistic value, t statistic value, and adjusted R2 (Gujarati & Porter, 2012).

1. The F test is a way of testing the zero hypothesis that involves more than one coefficient (Sarwoko, 2005). If F count < F table, it means that there is no simultaneous effect. On the other hand, if F count > F table, it means that there is a simultaneous effect. As for it viewed from the significance, if the significance <0.05, then there is a significant simultaneous effect.
2. The t-test was used to test the hypothesis about the regression slope coefficients individually (Sarwoko, 2005). If t count < t table, it means that there is no effect of each variable X with variable Y. On the other hand, if t count > t table, it means that there is an influence between each variable X and Y. Likewise, when viewed from the significance, if the significance <0.05 then there is a partially significant effect.

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3. The coefficient of determination (R2) test was conducted to determine how much the independent variable contributed to the dependent variable. The coefficient of determination is also used as a measure of accuracy in determining predictors, meaning that R2 indicates the contribution of X to Y.

4. Result and Discussion

East Java Cluster Based on Klassen Typology

Based on the Klassen typology calculation matrix for the observation period from 2014 to 2019, four clusters of the East Java Province were obtained, they are Quadrant I, Quadrant II, Quadrant III, and Quadrant IV. The Klassen Typology Matrix is presented in Table 1 below.

Table 1.
Matrix of Typology Klassen Results in East Java Province

HDI / Economic Growth	$HDI_i > HDI_y$	$HDI_i < HDI_y$
Ec. Growth$_i$ > Ec. Growth$_r$	**Quadrant I** **Developed & Fast Growing Areas** **Regencies:** Sidoarjo, Mojokerto, Lamongan, Gresik, **Cities:** Blitar, Malang, Probolinggo, Mojokerto, Madiun, Surabaya, Batu	**Quadrant II** **Fast Developing Areas** **Regencies:** Banyuwangi, Pasuruan, Bojonegoro
Ec. Growth$_i$ < Ec. Growth$_r$	**Quadrant III** **Developing but Depressed Areas** **Regencies:** Tulungagung, Kediri, Jombang, Nganjuk, Madiun, Magetan, **Cities**: Kediri,Pasuruan	**Quadrant IV** **Less Developing Areas** **Regencies:** Pacitan, Ponorogo, Malang Trenggalek, Blitar, Lumajang, Jember, Bondowoso, Situbondo, Probolinggo, Ngawi,Tuban, Bangkalan, Sampang, Pamekasan, Sumenep

Source: Data Processed by researcher (2020)

All quadrants appear to be filled in the matrix, showing that East Java Province is quite dynamic and diversified. Quadrant I, specifically Fast Forward and Fast Growing Areas, is occupied by all cities (excluding Kediri and Pasuruan). This demonstrates that the city is progressing faster in terms of human development and economic expansion. Meanwhile, the Gerbangkertosusila are regencies located in the regencies of Sidoarjo, Mojokerto, Lamongan, and Gresik, which are more developed than the others.

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An equally intriguing discovery is that the four regencies on the island of Madura are all in the category of Relatively Disadvantaged Regions (Quadrant IV), this shows that there is still inequality between mainland East Java and Madura Island.

East Java Vast Panel Regression Analysis without Klassen Typology

Based on calculations using Eviews 10, it was found that the best model for the Large East Java panel was the Fixed Effect Model (FEM). The resulting equation model is:

$$HDI = 3{,}613 - 0{,}007U + 0{,}001EG + 0{,}076GR + 0{,}047PD - 0{,}008C + 0{,}093GE$$

(-1,40) (0,44) (5,16) (3,20) (-2,07) (2,02)

*) the number in brackets indicates the value of t-stat

All variables simultaneously have a significant effect on HDI with p-value F-stat 0.00 < 0.05. Based on the t-test, unemployment has no significant effect on HDI because the t-stat value is 1.40 and the p-value is 0.17 > 0.05; the economic growth variable also has no significant effect on HDI because the t-stat value is 0.44 and the p-value is 0.66 > 0.05. The other variables such as Gini ratio, population density, crime, and gender empowerment have a significant effect on HDI in East Java with p-value < 0.05. Adjusted R^2 of 0.98 indicates the ability of all independent variables to explain HDI by 98 percent, while the other 2 percent can be explained by other variables.

Based on the classical assumption test, this equation model has fulfilled the normality test where the residuals are normally distributed with p-value JB 0.11 > 0.05; multicollinearity test is qualified where the collinearity between independent variables < 0.85; the heteroscedasticity test was met where there was no heteroscedasticity because the chi-square p-value was 0.06 > 0.05.

Quadrant I, Sub Panel Regression Analysis

Based on calculations using Eviews 10, it was found that the best model for the Quadrant I sub panel is the Random Effect Model (REM). The resulting equation model is:

$$HDI = 4{,}388 - 0{,}020U - 0{,}066EG + 0{,}069GR + 0{,}038PD + 0{,}001C - 0{,}034GE$$

(-2,28) (-2,10) (2,49) (3,37) (0,24) (-0,47)

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*) the number in brackets indicates the t-stat value

All variables simultaneously have a significant effect on HDI with p-value F-stat 0.00 <0.05. Based on the t-test, it was found that the variables of unemployment, economic growth, Gini ratio, and population density had a significant impact on HDI with p-values of each < 0.05. Hence crime and gender empowerment variables have no significant effect on HDI because p-value > 0.05. Adjusted R^2 is 0.59 indicates that the ability of all independent variables which explain HDI is 59 percent, while the other 41 percent can be explained by other variables.

Based on the classical assumption test, this equation model has met the normality test where the residuals are normally distributed with p-value JB 0.14 > 0.05; multicollinearity test is fulfilled where the collinearity between independent variables < 0.85; when there was no heteroscedasticity, the heteroscedasticity test was passed because the chi-square p-value was 0.56 > 0.05.

Quadrant I is a selection of Fast-forward and Fast-Growing Regions with characteristics of high economic growth and high per capita income, filled by 4 regencies and 7 cities. These eleven regions have HDI characteristics and their economic growth is above East Java Province average. This cluster, as a city and an industrial center, is able to absorb more labor and lower unemployment. With reduced unemployment on the contrary HDI moves up. Reducing unemployment will increase the amount of income in the community so that people's prosperity increases, people's purchasing power increases, and other basic needs such as education and health can be fulfilled in order to increase human qualities. This is in accordance with Sukirno's theory (2019) which states that an unemployed person has a low level of prosperity because he does not have an income while income is one of the important factors that determine prosperity. The findings in this cluster support previous research from Taner, Sezen, & Hakan (2011), Chalid and Yusuf (2014), and Baeti (2013) which unemployment has a significant effect on HDI.

One of the factors which contribute to higher income inequality in Quadrant I is the labor market condition which is divided into high-skilled workers whose wages are going up and workers who do not have the opportunity to develop skills and are low-paid. Prospective high-skilled workers in the regions usually venture to migrate to the city with the desire to have a more respectable career with a more fulfilling wage. The World Bank (2019) also revealed that income inequality is common in developed regions, this is supported by the finding that the Gini ratio in Quadrant I has a significant effect on HDI in East Java Province.

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This study results in population density has a significant effect on HDI supports the findings of Qasim and Chaudry (2015) and Oktavilia, Puspita, & Sugiyanto (2018). Population density can extend productivity, encourage technological innovation, and create excellent investment incentives. Densely populated areas also often become magnets for economic players because they promise a broad market potential as well as a large and competent labor market. This finding is in accordance with the theory from Sukirno (2019) that population density can have an economic impact.

Quadrant IV Sub Panel Regression Analysis

Based on calculations using Eviews 10, it was found that the best model for the Quadrant IV sub panel is the Random Effect Model (REM). The equation model results is as follows:

$$HDI = 2{,}961 + 0{,}005U + 0{,}002EG + 0{,}049GR + 0{,}033PD - 0{,}012C + 0{,}255GE$$
$$(0{,}68) \quad (0{,}62) \quad (2{,}28) \quad (1{,}61) \quad (-2{,}45) \quad (6{,}18)$$

*) the number in brackets indicates the t-stat value

All variables simultaneously have a significant effect on HDI with p-value F-stat 0.00 < 0.05. Based on the t-test, it was found that the variables of unemployment, economic growth, and population density had no significant effect on HDI because each had a p-value > 0.05. The Gini ratio, crime, and gender empowerment variables have a significant effect on HDI. Adjusted R2 of 0.60 indicates that the ability of all variables to define HDI is 60 percent, while the other 40 percent can be described by other variables.

Based on the classical assumption test, this equation model has fulfilled the normality test where the residuals are normally distributed with p-value JB 0.51 > 0.05; multicollinearity test is met where the collinearity between independent variables < 0.85; when there was no heteroscedasticity, the heteroscedasticity test was passed because the chi-square p-value was 0.69 > 0.05.

Quadrant IV is a Relatively Disadvantaged Regions selection, filled with 16 districts. These sixteen regions have the HDI characteristics and lower economic growth than the East Java average. The cause of high inequality in Quadrant IV Relatively Disadvantaged Regions is economic insufficiency. The more common economic shocks that occur will severely affect poor households, reducing their ability to earn

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more decent incomes and invest in health and education that are needed in order to improve their economic status. Income inequality as measured by the Gini ratio is an incentive that stimulates ideas, creativity, and innovation in order to reduce inequality itself. Inequality in income causes people to be more enthusiastic about their jobs, resulting in increased productivity. This means that income inequality of a certain size (medium Gini ratio) can be a trigger for humans to progress and develop. A high Gini ratio, on the other hand, will be a threat because it might lead to asset inefficiencies (Todaro and Smith, 2011). If income inequality is high, fewer people have access to credit because they do not have collateral. Consequently, people are unable to provide adequate education and health care for their families, as well as develop their business productivity. The finding that the Gini ratio has a significant effect on HDI in Quadrant IV East Java strengthens the research findings of Yolanda et al (2020) and conforms with the Todaro and Smith theory's (2011).

Crime can exist because of social inequality, mental pressure, hatred, also rapid changes in society and culture but are not adhered to by all members of the society, resulting in a lack of perfect adjustment. This study's findings that crime has a significant effect on HDI confirm the truth of Sohnen's (2012) theory which states that crime is correlated with a lack of social development. The results of this study also support the findings of Alves, Curta, & Dias (2017), Kusuma, Hariyani, & Hidayat (2019), and Yolanda et al (2020).

Women can become their husbands' partners to earn a higher income. Moreover, in the 5.0 society era, there are many opportunities that a woman can take so that she is empowered and particularly beneficial to her family. Gender empowerment is proven to have a significant effect on HDI in Quadrant IV East Java Province. This is as stated by Gary Becker (quoted by Todaro and Smith, 2011) that household members manage to work together in order to maximize the shared objective of creating a unitary household. If a husband and wife work, it will strengthen household resilience because they can reach a higher income point.

5. Conclusion

Districts and cities' diverse conditions in East Java Province caused some factors that had a significant effect on HDI were not the same among the panels formed, both in the large East Java Province panel and the Klassen typology clustering panels. A variable that has a significant effect in one cluster is not necessarily significant in another cluster, nor is it necessarily significant in a large panel of provinces. This is

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because each cluster has different characteristics, as a result, clustering or spatial analysis becomes important when studying a province. This also shows the importance of conducting regional clustering both in scientific research and at the practical level in order for the realized policies and programs able to perform more efficiently more effectively because they have previously been adapted to regional conditions and needs.

In a large panel of East Java Province, unemployment and economic growth variables have no significant effect on HDI. The Gini ratio, population density, crime, and gender empowerment variables have a significant effect on HDI. The crime variable has a significant negative effect on the HDI in East Java Province. Meanwhile, all independent variables simultaneously have a significant effect on HDI.

In Quadrant I sub panel (Fast Developed and Fast Growing Regions), unemployment, economic growth, Gini ratio and population density variables have a significant effect on HDI. Hence crime and gender empowerment variables have no significant effect on HDI. Simultaneously all independent variables have a significant effect on HDI.

Subpanel Quadrant IV (Relatively Disadvantaged Regions) the variables of unemployment, economic growth, and population density have no significant effect on HDI. The Gini ratio, crime, and gender empowerment variables have a significant effect on HDI. Together all independent variables have a significant effect on HDI.

Based on the conclusions, it appears that the HDI equation model in East Java Province cannot be generalized to the existing clusters. The declining HDI growth in East Java Province has different causes in each regional cluster. This indicates that policies of the East Java Provincial Government as an effort to encourage HDI increase or community welfare need to be adjusted based on regional conditions. Regions that belong to one quadrant can be given the same treatment.

The research implication results are that each cluster's conditions are different, therefore Regional Government (Provincial and Regency/City) of East Java Province need to make human development efforts that are adapted to the characteristics and conditions of the region so that the development process becomes more effective. The cluster analysis results have advantages over general analysis because the approach is more specific. This research limitation is that the observation period is only 6 (six) years. The longer the observation period, the better the regression results obtained.

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