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Analysis of Relation Human Development Index and Economic Growth Regency/City in the Province of West Kalimantan

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ABSTRACT

Human development index (HDI) and economic expansion are measures of the welfare of a region. Cointegration and causality of HDI and economic growth of districts/cities in West Kalimantan Province was the focus of this research. Panel data is a combination of cross-sectional data for 14 regions or cities and time series data from 2010 to 2021 in this study case. Klassen typology, cointegration test, and causality test are used in this study to determine the relationship between HDI and economic growth, as well as the long-term relationship or balance between each variable. HDI and economic growth patterns are cointegrated or in balance in the long run. According to the Granger causality test, there is a one-way relationship between HDI and economic growth. Thus, economic growth does have a significant impact on HDI.

Keywords: klassen typology, cointegration test, causality granger

INTRODUCTION

Human development is one of the criteria for determining whether economic progress is successful. This has proved that a country's economic operations can be supported and strengthened so that it can compete in the face of international competition. In this connection, reliable and quality human development is an important asset. (Muslikhati, 2018)

Human development was first released by the United Nations Development Programme in 1996. According to the article, the improvement of human qualities becomes a process of expanding people's choices, described as a process that improves people's lives in many ways. UNDP divides human development into four categories: productivity, equality, sustainability, and empowerment (Setiawan & Hakim, 2013). The concept of human development grew out of the realization that unemployment, poverty, and income inequality cannot always be solved by strong economic growth (Garibaldi & Hidayat, 2014).

Table 1. Economic Growth and HDI of Provinces on the Island of Kalimantan in 2021

Province	Economic Growth (Percent)	HDI
(1)	(2)	(3)
West Kalimantan	4,78	67,90
Central Kalimantan	3,40	71,25
South Kalimantan	3,48	71,28
East Kalimantan	2,48	76,88
North Kalimantan	3,98	71,19

Source: BPS (2021), data processed.

Table 1 shows that compared to other provinces on the island of Kalimantan, the HDI of West Kalimantan is the lowest in 2021. However, it is different from economic growth. Despite the COVID-19 epidemic, West Kalimantan's economic escalation rose rapidly from other provinces on Kalimantan Island in 2021.

According to the study of Ariza, A. (2016), The HDI of West Kalimantan Province lags far behind other provinces on the island of Kalimantan. Lumbantoruan, E.P and Hidayat, P. (2014) found that the economic growth and human development index of all provinces in Indonesia have a balanced relationship over time. However, other studies show HDI does not affect economic improvement (Mukarramah, Yolanda, & Zulkarnain, 2019).

Infrastructure improvements in education and health will encourage an increase in HDI (Maulana & Bowo, 2013). Several studies on the relationship between the development of human quality and economic progress, including those made by Ningrum et al. (2020), Andriyani and Wibowo (2019) on the Examination of Cointegration of Monetary and HDI Developments in the Focal Java City Area, Asghar et al. (2012) using cointegration and causality analysis on the relationship between economic growth and HDI in Pakistan. Then, Insany and Fajri (2019) were doing a similar study and the other was also carried out by Saragih (2018). The author is interested in conducting research based on the background given using causality and cointegration analysis in districts/cities spread throughout West Kalimantan Province, with the aim of knowing the Cointegration and causal relationship between HDI and economic development.

METHODOLOGY

This study used the cross-section data from fourteen districts/cities in West Kalimantan Province combined with time series data for 2010–2021 or in other words, we are using panel data types. The data of this study was obtained from the Badan Pusat Statistik (BPS) of West Kalimantan Province. The scope of the study covers districts and cities from 2010 to 2021.

The analytical procedures in this study combined several distinctive techniques, which have unique applications, to find out the pattern of the relationship that exists between HDI and the economic growth of districts or cities in the Province West Kalimantan. One such technique is the Klassen typology and then using the VAR VECM method, the test steps are as follows:

1. The stationary investigation is using the Augmented Dickey-Fuller value by way of a test criterion to show the stability of each variable.
2. Carry out a test to find the best intermission interval in setting the time.
3. The cointegration test is a follow-up stationary test and is used to evaluate whether there is a chance of long-term equilibrium between variables.
4. Test Granger causality is used to check if there is a causal relationship between two variables. Therefore, it is believed there will be able to show a causal relationship and the influence of such factors on economic development is also true.

Typology Klassen

This method can compare a region's development level with another by using the data HDI as the x-axis and economic growth as the y-axis; both variables are two key variables to classify each region. Klassen's typology divides each region into four groups (Mahmudi, 2002):

1. Regions with fast growth, HDI value and high economic growth (quadrant I).
2. Evolving regions, namely regional sectors with low HDI values but high economic growth values (quadrant II).
3. Decreased regions, to be precise regional sectors with a high HDI value but a low economic growth value (quadrant III).

4. Relatively lagging regions, where the value of HDI and economic growth is relatively low (quadrant IV).

Unit Root Test

This method is used in research to ensure the stationariness of panel data. Stationariness tests must be accomplished because panel data is a combination of cross-section and time series data. Stationarity tests on panel data are unlike stationarity tests on data series and cross-sections, especially with individual influences and timing so that the representative will differ.

The root test unit needs to be performed Augmented Dickey-Fuller(ADF-test) testing, with the ADF test formulation as follows:

$$\Delta Y_t = \beta_1 + \rho Y_{t-1} + \sum_{i=2}^{\rho} \beta_i \Delta Y_{t-i+1} + \varepsilon_t \quad (1)$$

Where ΔY_t is the operator of difference, β is the coefficient variable, ρ is the coefficient estimate, and εt is the residual. Performed by testing hypotheses:

H_0 : data isn't stationary

H_1 : data stationary

Test statistics:

$$t_{hit} = \frac{\widehat{p}}{S_p} \quad (2)$$

The test criterion is to reject H_0 , if the absolute value test statistics (t-hit) is greater than the critical value in the MacKinnon table (Widarjono, 2013).

Determination Lag Length Optimum

Determination of long lag optimum is executed to avoid specification errors when the lag used is too low and may affect the degree of freedom when lag is too long. To determine the optimum lag length observed in the Schwarz Information Criterion (SIC) with the model as following:

$$SIC = ln\left(\frac{\sum_{t=1}^{T} \varepsilon^2{}_t}{T}\right) + \frac{k\ ln(T)}{T} \quad (3)$$

Where *k* is the estimated parameter, *T* is the number of periods, and *εt* is the residual model on the t-th period. Specifying the model that produces the lowest SIC value contains the recommended lag duration (Widarjono, 2013).

Cointegration Test

Cointegration is a long-term relationship between each variable that although not stationary separately, will become stationary when those variables are linearly linked. The cointegration test on time series data, which is derived from the Pedroni and Koo (Eagle-Granger) approach and the Combined Individual Test (Fisher/Johansen) and expressed in the following regression model, provides the basis for the stationary test on the data panel:

$$Y_{it} = \alpha_t + \delta_t + \beta_{1t} X_{1it} + \beta_{2t} X_{2it} + \cdots + \beta_{Mt} X_{Mit} + \varepsilon_{it} \quad (4)$$

Obtained the residuals as follows:

$$\varepsilon_{it} = \rho_{it} \varepsilon_{it-1} + u_{it} \quad (5)$$

Or

$$\varepsilon_{it} = \rho t \varepsilon_{it-1} + \sum_{f=1}^{\rho_i} \varphi_{it} \Delta \varepsilon_{it-1} + u_{it} \quad (6)$$

Hypothesis on the *Johansen test* Cointegration Test:

H_0 : has not an equation cointegration

H_1 : has a equation cointegration

The absolute value of test statistics (t) is used to determine the significance of statistics. The observed variable is cointegrated or has a long-term relationship if the statistical value is more than the critical value in the MacKinnon table, and vice versa applies if the statistical value is smaller than the critical value in the MacKinnon table (Winarno, 2007).

Causality Test

To find out whether there is a two-way or reciprocal impact, a one-way relationship, or no relationship at all, the Granger causality test is used to determine whether there is a causal relationship or a reciprocal relationship between two research variables (Gujarati D. ,2013), It can be described using the model Granger's causality test equation as follows:

$$X_t = \sum_{i=1}^{m} \alpha_i X_{t-i} + \sum_{j=1}^{n} b_j Y_{t-j} + \mu_t \quad (7)$$

$$Y_t = \sum_{i=1}^{r} c_i X_{t-i} + \sum_{j=1}^{s} d_j Y_{t-j} + v_t \quad (8)$$

Based on the linear regression equation above, a causality relationship will be found between each variable regarding the value of its regression coefficients (Nachrowi & Usman, 2006).

RESULTS AND DISCUSSION

West Kalimantan HDI Development 2010-2021

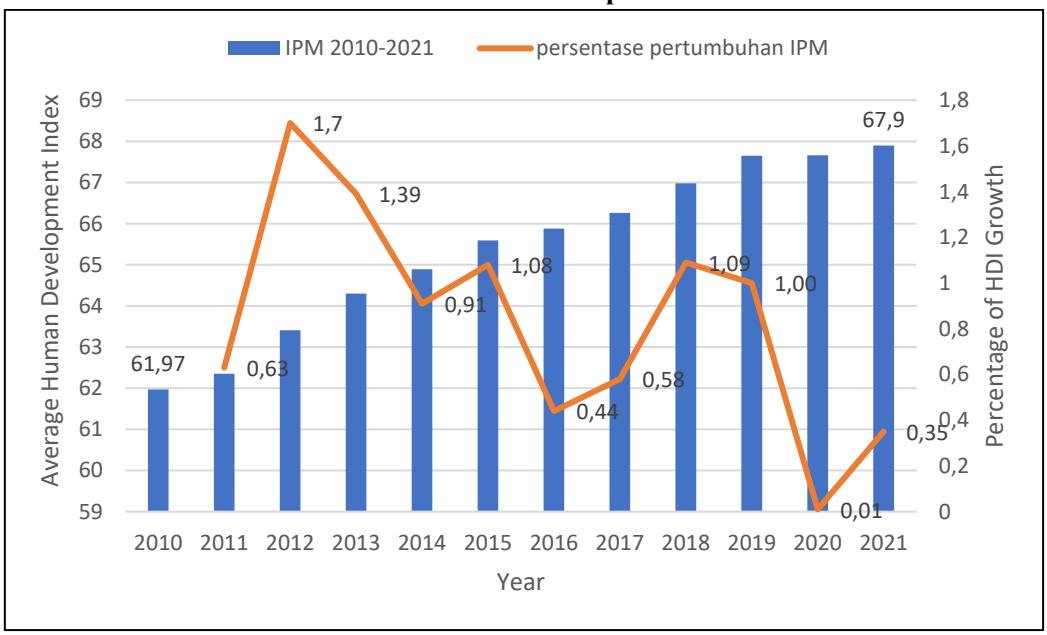

Figure 1. West Kalimantan HDI and HDI growth percentage
Source: BPS (2010-2021), data processed.

From Figure 1, we know that the development of the Human Development Index (HDI) in West Kalimantan from year to year tends to increase, from 61.97 in 2010 to 67.90 in 2021 or an increase of 9.57 percent over 12 years. The highest growth occurred in 2012, when the HDI of West Kalimantan managed to grow 1.7 percent. The Covid-19 pandemic in 2020 caused the HDI of West Kalimantan to slow down so that it only grew by 0.01 percent.

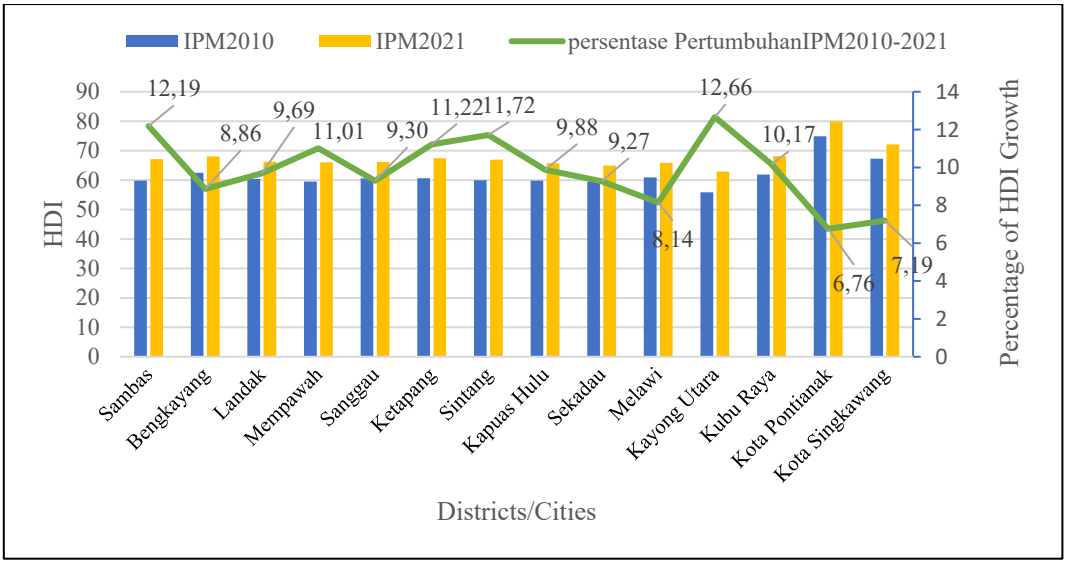

Figure 2. Comparison of HDI of City Districts in West Kalimantan 2010 and 2021, as well as the percentage of HDI growth
Source: BPS (2010 & 2021), data processed.

Meanwhile, HDI according to the city district, Pontianak City is the city district with the highest HDI, far behind other city districts in West Kalimantan, with an HDI of 79.93 (Figure 2). In addition to Pontianak City, Singkawang City has a fairly high HDI of 72.11. Meanwhile, for 12 years, the highest HDI growth occurred in North Kayong Regency. Besides, Sambas Regency grew 12.19 percent.

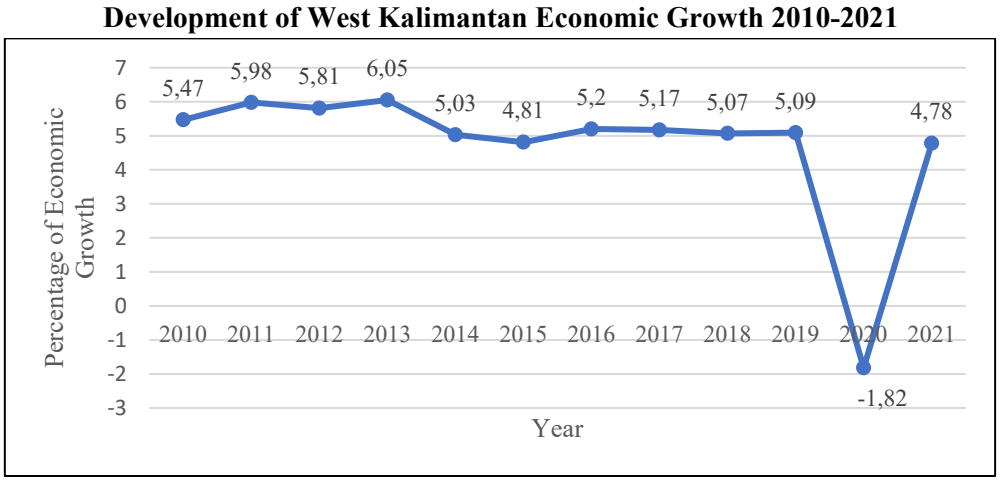

Figure 3. West Kalimantan Economic Growth 2010-2021
Source: BPS (2010-2021), data processed.

In figure 3, it can be seen that the economy of West Kalimantan before 2020 ranged from 4.81 percent to 6.05 percent. If you pay attention, there was a decline in economic performance from 2013 to 2014. Likewise, 2014 to 2019 tends to be stable. An economic contraction of 1.82 percent occurred in 2020.

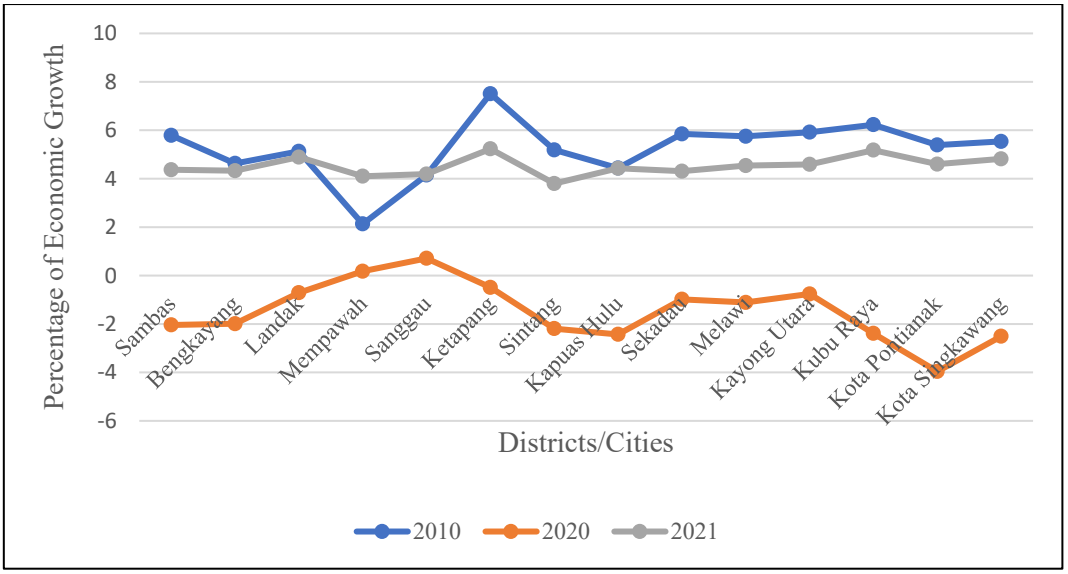

Figure 4. Economic Growth of Urban Districts in West Kalimantan in 2010, 2020 and 2021
Source: BPS (2010-2021), data processed.

Figure 4 shows that almost all urban districts in West Kalimantan contracted in 2020 when the COVID-19 pandemic began to hit. The economy of Mempawah and Sanggau Regencies continued to grow in 2020, namely 0.18 and 0.71 percent. In 2021, the city district's economy began to stabilize, although its growth has not been able to return to what it was before the COVID-19 pandemic.

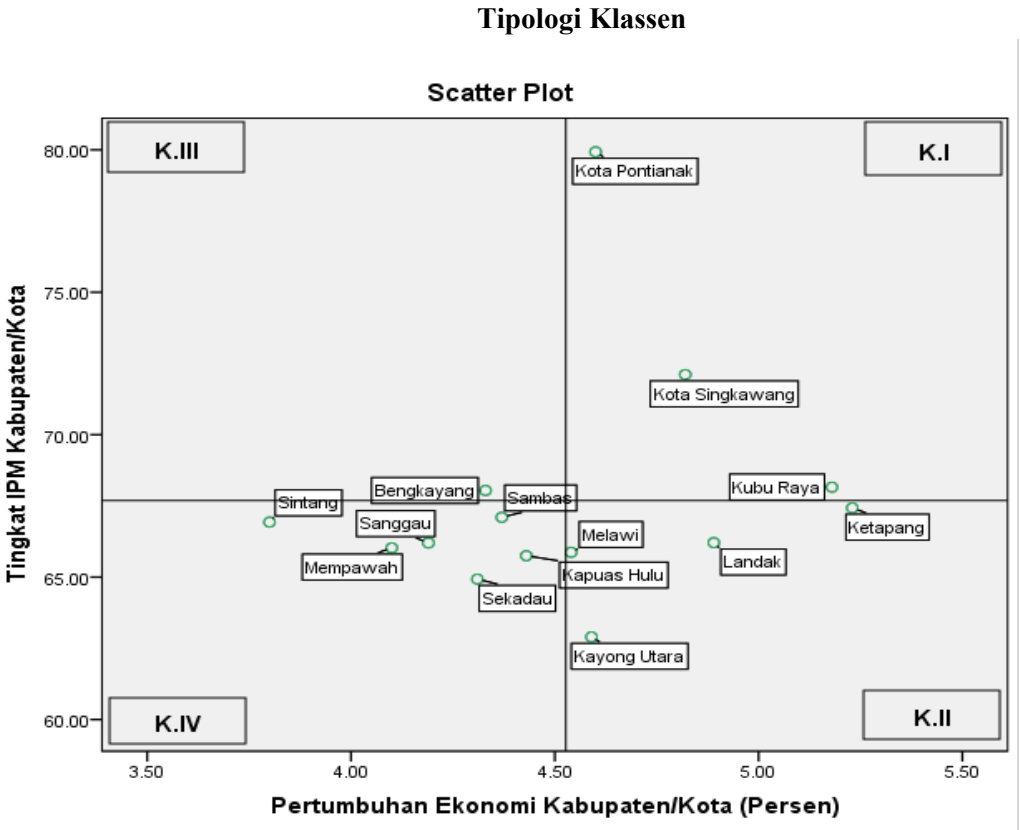

Figure 5. Classification of Klassen Typology
Source: BPS (2010-2021), data processed.

The regions located in quadrant I, explain that each district or city that is in the each category has an above-average percentage of economic growth and HDI value, with an average HDI of 73.40 and average economic growth of 4.86 percent with the status of an area that has a high human turnover and monetary development. Areas that are growing fast and developing both HDI and economic growth include the regencies of Kubu Raya, Pontianak City, and Singkawang City.

Ketapang, Landak, Melawi, and North Kayong regencies are included in the category of rapidly developing regions (quadrant II), which explains that each district or city that falls into this category has a high percentage of economic growth but is not in line with the HDI value below, with an average HDI of 65.60, while economic growth averages 4.81 percent.

Areas in quadrant III are positioned as locations with poor economic growth but high levels of human development, including Bengkayang Regency, which belongs to the category of depressed areas. With an average HDI of 68.04 and annual economic growth of 4.33 percent, the economy is smaller than usual but not in line with above-average HDI values.

Sambas, Sekadau, Sintang, Mempawah, Sanggau, and Kapuas Hulu regencies are included in the relatively lagging areas grouped in quadrant IV. In other words, each district/city in the category has an average percentage of economic growth and HDI value, with an average HDI of 66.37 and average economic growth of 4.29 percent. These areas are in quadrant IV and are positioned as areas with low levels of economic growth and human development.

Unit Root Test

In this study, using a significance level of 5%, there is a root unit or data that is not stationary if the statistical absolute value t is lower than the critical value in the MacKinnon table at various significance levels. The stationariness of the data can be determined using this test, the unit root test.

Table 2. Unit Root Test Results of Each Variable At Level degree

Variable	ADF-test	Prob.	Information
HDI	1,87179	0,9694	Non-Stationary
Economic Growth	-1,53969	0,0618	Non-Stationary

Source: BPS (2010-2021), data processed.

Based on Table 2, it is explained that the variables of HDI and economic growth are not stationary at the level degree by concluding that the probability value of HDI and economic growth is more significant than the significance value of 5%. Since both variables are not stationary at the degree level, the first differentiation level will be continued on the data.

Table 3. Unit Root Test Results of Each First Difference Level Variable

Variabel	ADF-test	Prob.	Information
HDI	-3,08881	0,0010	Stationary
Economic Growth	-6,50412	0,0000	Stationary

Source: BPS (2010-2021), data processed.

Based on Table 3, it is explained that the variable HDI and stationary economic growth at the first level of differentiation by concluding the value of the probability of HDI and economic growth are less than the significance value of 5%. Thus, the Human development index variable and economic growth are considered stationary at the same level of integration, or the first level of integration I(1).

Determination of Optimum Lag Length

The optimal lag duration is determined before running cointegration and causality tests to obtain the best lag and provide better analytical findings.

Table 4. Optimum Lag Length Determination Test Results

Lag	SIC
0	10,90788
1	2,104625
2	2,063188*
3	2,209858
4	2,355112
5	2,656751

Source: BPS (2010-2021), data processed.

Based on Table 4, the determination of the optimum lag length known in the asterisk (*) of the SIC category is found in lag 2, which indicates that the lag has the minimum SIC value. This shows that lag 2 is the optimum lag length in this study.

Cointegration Test

Johansen's cointegration test compared the t-statistical value with the critical importance in the table MacKinnon with a significance level of 5%. If the t-statistical value is smaller than the critical value, then the HDI and economic growth variables are not cointegrated or have a long-term relationship (Winarno, 2007).

Table 5. Johansen test results

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat. * (from max-eigen test)	Prob.
None	240,2	0,0000	197,3	0,0000
At most 1	107,3	0,0000	107,3	0,0000

Source: BPS (2010-2021), data processed.

Based on Table 5 can be explained at a significance level of 5% for hypothesized at most 1, the probability value is less than the significance level of 0.05, then H_0 is rejected, or in another sense, the t-statistical value is greater than the critical value. This suggests that the HDI and growth variables economically cointegrate or have a long-term equilibrium relationship with a confidence level of 95%.

Causality Test

The causality test is used to determine whether HDI and economic growth have a reciprocal relationship or nothing. One of the causality tests is the Granger causality test.

Table 6. Granger Causality Test Results

Null Hypothesis	Obs	F-Statistic	Prob.
Growth Economy Affects HDI	140	4,22639	0,0166
HDI Affects Growth Economy		2,89700	0,0586

Source: BPS (2010-2021), data processed.

Based on Table 6, it can be explained that first, the value of the probability of the economic growth variable to the HDI variable is less than the significance level of 5%; then, H_0 is rejected. It means that economic growth affects the HDI. Second, the probability value of the HDI variable against the economic growth variable is greater than the level of 5% significance; hence, H_0 is not enough evidence to deny. That is, HDI does not affect the growth of the economy. Because Granger's causality test was performed at lag 2, it means that the development of the economy and HDI in the past two periods had a one-way causality relationship. From both conclusions, it can be explained that HDI does not significantly influence economic growth but that economic growth exerts a significant influence on HDI or a one-way causality relationship occurs for the two variables in the previous two periods.).

CONCLUSION AND RECOMMENDATION

The following conclusions were strained from the HDI data and economic growth in the regencies and cities of West Kalimantan Province between 2010 and 2021,

1. The results of the Klassen typology method on fourteen regencies/cities in West Kalimantan Province show that Pontianak City, Singkawang City and Kubu Raya Regency are in quadrant I with a high level of human development and above-average economic growth. Ketapang, Landak, Melawi, and North Kayong Regencies are in quadrant II areas. There is Bengkayang Regency which follows quadrant III. Finally, Sambas, Sintang, Sekadau, Mempawah, Sanggau, and Kapuas Hulu regencies in quadrant IV areas are considered relatively lagging.
2. The cointegration test shows a long-term balance relationship between HDI and economic growth regencies or cities in West Kalimantan between 2010 and 2021.
3. The causality test reveals that there is a one-way relationship between HDI data and economic growth over the previous two periods. The relationship of one-way causality from economic growth to HDI or in other words, economic growth gives influence to HDI in the previous two periods.

In terms of HDI and economic growth in West Kalimantan Province, researchers hope this research can be useful for policymakers in the provincial government. The government of West Kalimantan Province is expected to implement efficient policies in the future to encourage HDI and economi c growth. Especially in relatively underdeveloped areas, such as strengthening the trade balance through increasing exports of local products from each district/city and strengthening domestic demand in the form of employment and micro and small enterprises (MSEs or commonly called UMKM) to create the quality of human resources in West Kalimantan that can encourage HDI and economic growth.

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