

Sustainable Development in Indonesia (Empirical Study on Kalimantan Island)

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Abstract: *Development is a planned change process to improve various aspects of people's lives. Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development consisting of 3 aspects, namely economic, social, and environmental. The new government center will move to East Kalimantan which prioritizes Sustainable Development Goals (SDGs) so that development is balanced between economic, social and environmental. The purpose of this study is to determine the condition of economic development on Kalimantan Island using Klassen typology analysis, to determine sustainable development in the area of Kalimantan Island in terms of economic, social and environmental aspects using an analysis of the sustainable development index, and to determine the spatial distribution of sustainable development in the Kalimantan island region using the Geographic Information System (GIS). The results of the analysis show that East Kalimantan is a developed but depressed area, Central Kalimantan is a developing area, West Kalimantan and South Kalimantan is a disadvantaged area. Kalimantan Island is in the fairly sustainable category with an index value of 64.11-73.23. West Kalimantan, South Kalimantan and Central Kalimantan are included in a fairly sustainable area with a yellow area map, while East Kalimantan is included in a very sustainable area with a green area map.*

Keywords: *Sustainable development, Klassen typology, composite index, geographic information system*

INTRODUCTION

The process of change that is planned to improve aspects of people's lives is called development (Digdowiseiso, 2019). Development can be interpreted as a way to fulfill human needs with available and limited resources and to realize community welfare. Development that only focuses on the economic sector is called the growth paradigm (Suryono, 2010: 16-23). The development paradigm that only focuses on the economic aspect has indeed succeeded in increasing the accumulation of capital and income of developing countries but at the expense of ecological degradation such as shrinking natural resources and social inequality. The existence of concern for the environment, especially with the existence of natural resources that cannot be renewed, has led to the emergence of the concept of sustainable development.

According to Adam Smith, the maximum limit for economic growth is the amount of available natural resources. The decline rate of economic growth can occur because the availability of limited natural resources is one of the inhibiting factors for economic growth. Thomas Robert Malthus in 1798 began to introduce the theoretical basis of sustainable development which explains the concern for the environment due to the increasing population explosion while the available natural resources are limited. Economic growth followed by economic development will increase per capita income with potential economic management (Safrianto, 2018). However, the research conducted by Rozikin (2012) states that the development paradigm that only focuses on the economic aspect has indeed succeeded in increasing the accumulation of capital and income of developing countries but at the expense of ecological deterioration such as shrinking natural resources and social inequality. Study conducted by Fauzi and Oxtavianus (2014) states that development achievements that have not been optimal are caused by the unbalanced development between economic, social and environmental aspects. However, development is needed not only shows improvement in the economic aspect, but also provides improvements in other aspects, social and environmental.

In 1972, the Brundtland Commission (World Commission on Environmental and Development) raised environmental issues at the Stockholm conference regarding the importance of development that pays attention to environmental factors (Rozikin, 2012). Sustainable development is development that fulfills the needs of today's life without compromising the ability of future generations to meet their needs (Muktianto and Diartho, 2018). A balanced development strategy between economic, social and environmental aspects in sustainable development is needed in the long term accompanied by good institutional aspects (Pratiwi, Santosa and Ashar, 2018). Prior to the concept of sustainable development, increasing economic growth was only the goal of a development without taking into account other aspects other than the economy such as social and environmental. Challenges in achieving sustainable development are problems and the complexity of the issue. High economic growth but not concerning in social and environment problems can raise costs as the output of development risks (Erlinda, 2016). According to the study, although Indonesia's economic growth is at a positive 4-5%, when viewed from the social aspect, Indonesia's Human Development Index (HDI) is in the "moderate" category compared to other ASEAN countries, which is in the range of 60-70. Not only from the social aspect, according to Fauzi (2014) in Erlinda (2016) stating that in the results of the World Bank analysis, social costs will appear around 0.2%-7% of Gross National Income (GNP) if the development carried out is not sustainable.

According to Nijkamp and Vreeker (2000) in Erlinda (2016) the shift in sustainable development to the regional level is because the regions have clear demarcations and a certain degree of homogeneity so that more operational empirical analysis can be carried out. One of the efforts to spur regional socio-economic development as well as to reduce regional disparities and improve life sustainability is called regional development (Sosilowati et al., 2017).

LITERATURE REVIEW

Sustainable Development Theory

The concept of sustainable development has existed since Malthus in 1798 worried about the availability of land due to rapid population growth. Meadows published a publication that said that economic growth would be limited by the availability of natural resources in the future in a book entitled "The Limit to Growth" published in 1972. The production of goods and services resulting from limited availability of natural resources cannot be carried out continuously. Although it had received some criticism in the model used by "The Limit to Growth" this book was able to realize the importance of sustainable development (United Nations, 1987). The pillars of sustainable development are economic, social and environmental sustainability where all three must develop in a balanced way. If it does run unequally, it will be trapped in the conventional development model.

Regional Planning Theory

Regional development is described in Law no. 17 of 2007 concerning the National Long-Term Development Plan for 2005-2025. The law states that in the utilization and development of natural resources, it is necessary to pay attention to regional autonomy policies in order to improve people's welfare, develop strategic and fast-growing regions and strengthen regional capacity and commitment to support sustainable development. Regional planning (regional planning) is an activity that creates an area to be better for a community, government and environment by utilizing existing resources and having a comprehensive, complete orientation, sticking to the principle of priority (Riyadi and Bratakusumah, 2003), (Dance, 2008). The form of regional spatial planning regulates the planning for the use of regional space. Meanwhile, regional development planning regulates the planning of activities in the region. The sectoral approach is one of the existing approaches in development planning (Dance, 2008). In the sectoral approach, development activities are grouped into several sectors, that can be selected and analyzed to improve the regional development. According to Anwar (2005) There are several types of regional characteristics, namely:

a. Developed region

Areas that have developed. This area are usually used as centers of growth. Concentrations of growth include concentration of population, industry, government and potential markets.

b. The developing region

The developing region is seen from its rapid growth as well as the support area of the developed region. The potential of natural resources, the level of income and job opportunities are high, but there has not been a pressure on social costs and overcrowding.

c. Pre-developed area

Pre-developed areas are areas with low growth rates but the potential for natural resources that are owned has not been managed properly. In addition, the level of population density, income and education are also relatively low.

d. Undeveloped area

There are two characteristics of an undeveloped region. First, there is no natural resource potential or good location potential in the area so that it is naturally difficult to experience growth and development. Second, although the area has the potential for natural resources and a good location, it does not have the opportunity to develop this potential and tends to be exploited by other areas.

Regional planning is carried out on a spatial scale that is adjusted to administrative boundaries such as districts/cities and provinces. The objectives of regional planning include:

- a. Creating harmony between residents, activities and space
- b. Reducing regional disparities
- c. Even distribution of development in each region

According to Archibugi (2008) The application of regional planning theory is divided into four components, including:

a. Physical planning

Physical planning is a planning for the physical development of the area that leads to the arrangement of the shape of the city with the city infrastructure network. This theory has also added environmental aspects. The form of regional planning is the master plan (spatial planning, agglomeration, land use and residential location).

b. Macro-Economic Planning **Macroeconomic planning is related to regional economic planning.**

The theory used in macro planning is the same as macroeconomic theory, namely economic development, labor, productivity, income, income distribution, economic growth, trade, consumption and investment. Regional economic policies to stimulate regional economic growth are called regional economic planning. This form of planning is found in the areas of accessibility such as financial institutions, savings and job opportunities.

c. Social planning

Social planning is a plan that discusses education, social integrity, health, living and work conditions, crime and women and children. The directives carried out in this planning are directed to be the basis for regional social development programs. This form of planning is a policy related to the population (demographic).

d. Development planning

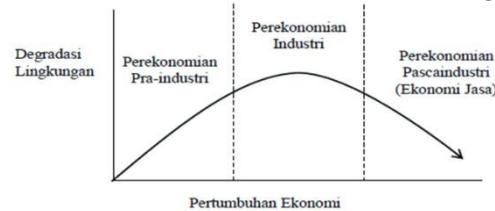
Development planning is a planning related to development programs to achieve regional development.

Environmental Kuznet Curve (EKC)

Environmental Kuznet Curve (EKC) is the relationship between the stages of economic development and environmental degradation which is described in the form of the Kuznet Curve (Theodore, 2003). According to this theory, if a country's income is still low, the focus of that country is to increase income through production and investment by ignoring environmental aspects. Environmental Kuznet Curve (EKC) is divided into three stages, namely pre-industrial, industrial economy and post-industrial economy (Idris, 2015). The Environmental Kuznet Curve (EKC) hypothesis explains that initially economic growth will increase environmental degradation because state income is still low so that it only focuses on increasing production without paying attention to environmental aspects. Then, economic growth at a certain point will realize that it is not only economic aspects that need to be considered but also other aspects such as environmental aspects. This particular point is then referred to as the turning point where economic growth

will then reduce environmental degradation (Shaharira and Alinor 2013 in(Nikensari, Destilawati and Nurjanah, 2019)).

Figure 1. Environmental Kuznet Curve (EKC) turning point process



The curve above is a Environmental Kuznet Curve (EKC) inverted U curve that describes the relationship between economic growth and environmental degradation which is divided into three stages. In the first stage of economic growth through from the pre-industrial economy (agriculture) then there is a transition to stage two, namely the industrial economy and then to the third stage of the post-industrial economy with a service economy system. In the early stages, changes in the economic structure from rural to urban and from agriculture to industry and consumption growth resulted in increased environmental damage. Environmental damage occurs due to the rapid increase in pollution as a result of people being more interested in jobs and income than in clean air and water. At low income levels, The state will switch from agriculture to industry, causing an increase in police intensity as a race for mass production and consumption. The large use of natural resources, high pollution emissions and demands for increased output have resulted in environmental aspects tending to be neglected, resulting in an increase in environmental degradation. Meanwhile, if it has reached the second stage where income levels are high and economic development is dominated by the post-industrial or service economy, awareness of environmental aspects will increase. The movement of the curve will be more balanced to bring the industrial sector to be more environmentally friendly. High pollution emissions and demands for increased output result in environmental aspects tend to be neglected, resulting in an increase in environmental degradation. Meanwhile, if it has reached the third stage where income levels are high and economic development is dominated by the post-industrial or service economy, awareness of environmental aspects will increase. The movement of the curve will be more balanced to bring the industrial sector to be more environmentally friendly. High pollution emissions and demands for increased output result in environmental aspects tend to be neglected, resulting in an increase in environmental degradation. Meanwhile, if it has reached the third stage where income levels are high and economic development is dominated by the post-industrial or service economy, awareness of environmental aspects will increase. The movement of the curve will be more balanced to bring the industrial sector to be more environmentally friendly.

RESEARCH METHODS

This research is a descriptive quantitative study using data obtained from the Central Statistics Agency (BPS), the Ministry of Environment and Forestry of the Republic of Indonesia. This research was conducted in Indonesia in 2010-2019 precisely on Kalimantan or Kalimantan Island. Kalimantan Island consists of 5 provinces, including West Kalimantan, South Kalimantan, Central Kalimantan, East Kalimantan, and North Kalimantan, where North Kalimantan is a division of the province of East Kalimantan. In this study using data analysis methods, including Klassen Typology, Composite Index for Sustainable Development (ISD), and Geographic Information Systems (GIS). *Geographic Information System (GIS)*.

Klassen Typology

Klassen typology analysis is an analytical tool used to describe the pattern and structure of a region's economic growth (Sjafrizal, 2008). This analytical tool can be used through 2 approaches, namely the sectoral approach and the regional or regional approach. The regional or regional approach is used to determine the classification of an area based on the main indicators, namely growth and income or Gross Regional Domestic Product (GRDP) per capita of the region.

Table1. Regional Division Based on Klassen Typology

Rate Growth (r)	$r_i > r$	$r_i < r$
	(Quadrant I) Developed and Fast-Growing Region	(Quadrant II) Developed but Depressed Area
Per GDP Capita (y)	$y_i > y$	$y_i < y$
	(Quadrant III) Developing Area	(Quadrant IV) Underdeveloped regions

Source : (Sjafrizal, 2008)

r_i : growth rate of each province

r : National average growth rate

y_i : GRDP per capita per province

y : National average GRDP per capita

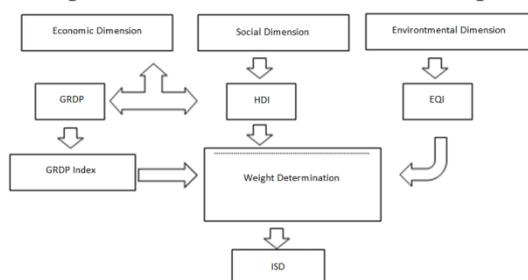
The criteria for regional division based on the Klassen typology are explained as follows:

- Quadrant I: is a developed and fast-growing region that has a higher rate of economic growth and GRDP per capita than the national average
- Quadrant II: is a developed but depressed region that has a higher GRDP per capita but the rate of economic growth is lower than the national average
- Quadrant III: is a developing area that has a higher economic growth rate but GRDP per capita is lower than the national average
- Quadrant IV: is an underdeveloped area that has a lower rate of economic growth and GRDP per capita than the national average

Sustainable Development Composite Index (ISD)

In the preparation of the Composite Sustainable Development Index (ISD), it is necessary to identify a number of parameters from the three pillars of sustainable development, namely economic, social and environmental. Then an analysis of the interaction relationship between the key parameters of each pillar was carried out in order to obtain the results of the key parameters as a constituent of the Composite Index for Sustainable Development (ISD).

Figure 2. Preparation of the Sustainable Development Index



The steps in the preparation of the Sustainable Composite Index (ISD) based on the composition of the composite index by OECD (2008) and Kondyli (2010) there are seven stages that are carried out sequentially, including:

a. Preparation of the theoretical framework

The theoretical framework provide a basis for selecting and mixing single indicators into composite indicators. The theoretical framework required can determine the phenomenon to be carried out with the elements that make up a measurement accurately.

b. Identification and selection of indicators

Identification and selection of indicators is carried out to select indicators based on their level of reliability related to data availability, spatial coverage, and according to the phenomenon being measured and having a relationship between each indicators. The combination of variables should be considered if the data obtained is difficult.

c. Lost data imputation

The imputation of missing data is carried out to describe the conditions of development in the field if the available data is incomplete. There are three other methods of imputing missing data cases: a) excluding records with missing data, b) single imputation such as replacement with the mean or median regression, c) there is imputation such as the Monte Carlo Algorithm (Oxtavianus, 2014)

d. Data normalization

Normalization of data is needed due to the difference in units of each indicator used. Normalized indicators will produce comparable indicator values. The minimum-maximum method is one of the data normalization methods by performing linear transformations on the original data. With the following formula:

$$\text{Normalization} = \frac{x - \text{nilaimin}}{\text{nilaimax} - \text{nilaimin}} \times 100$$

Information:

- x = normalized value
- min value = minimum or lowest value limit
- max value = maximum or highest value limit

e. Weight Determination

Weight Determination has done by giving the same weight to each indicator. There are 2 approaches taken, namely partial and composite between indicators. In the preparation of the composite index of sustainable development, it can be divided into 2, namely from the constituent indicators GDP, Human Development Index (HDI), and Environment Quality Index (EQI) from the development side (economic, social and environmental). So there are 2 scenarios in the calculation of the Composite Index of sustainable development, namely:

- 1) The same weighting between the constituent indicators is by giving the same weight to each indicator

$$\text{ISD} = \frac{\text{Index of GDP} + \text{HDI} + \text{EQI}}{3}$$

- 2) Equal weighting between the sides of sustainable development (economic, social and environmental) where GRDP represents the economic aspect, Environment Quality Index (EQI) represents the environmental aspect, while Human Development Index (HDI) represents 2 aspects, namely economic and social. Then the weighting is done as follows

$$ISD = \frac{Index\ of\ GDP + (3 \times HDI) + (2 \times EQI)}{6}$$

f. Aggregation

Aggregation is based on the indicators used which can be linear, geometric or multi-criteria analysis. In linear and geographic aggregation, the resulting weights will express the trade off between indicators. While the multi-criteria analysis looks for a compromise between two or more of the goals that have been set. In this study, linear aggregation was used. Linear aggregation is a combination of indicators that is carried out by adding up each indicator with a set weight to form a composite index of sustainable development (ISD).

g. Presentation and dissemination of results

Presentation and dissemination of results is the last stage in the preparation of the composite index. Assessment of sustainable regional development aims to see the development and policies of a region in accordance with the principles of sustainable development.

Table 1. Sustainable Development Index Value Table

Index Value	Criteria
0.00 – 25.00	Bad (Unsustainable)
25.01 – 50.00	Less (Less Sustainable)
50.01 – 75.00	Sufficient (Sufficiently Sustainable)
75.01 – 100.00	Good (Highly Sustainable)

Source : (Thamrin et al., 2007)

Geographical Information System (GIS) / Geographical Information System (GIS)

Geographic Information System (GIS) serves to improve the ability to analyze spatial information for planning and decision making for spatial database analysis. The presentation of the information generated in this analysis is in the form of graphics and uses a map as an interface. The analysis process in this study uses an application called GeoDa. This application is useful for displaying spatial data, creating maps and performing spatial data analysis. The steps in conducting a Geographic Information System (GIS) analysis are as follows:

- a. Define the problem or key question
- b. Collect and prepare the necessary data
- c. Define analytical methods and tools
- d. Carry out the analysis process
- e. Check and improve analysis results

(Latifah, Samsuri and Rahmawaty, 2018)

DATA ANALYSIS AND DISCUSSION

Klassen Typology

The results of the analysis using the classification typology are as follows

Table 2. Calculation result of average growth rate (r)

Province	The calculation results
West Kalimantan	5.32
Central Kalimantan	6.55
South Kalimantan	5.09
East Kalimantan	2.82
Indonesia	5.38

Source: processed data

Table3. Calculation result of average GRDP per capita (y)

Province	The calculation results
West Kalimantan	23163228
Central Kalimantan	31052994
South Kalimantan	27509993
East Kalimantan	126835504
Indonesia	34813156

Source: processed data

Based on table 4.5 shows that the average value of the growth rate in Indonesia is 5.38. In the province of West Kalimantan the average growth rate is 5.32, which is lower than the average growth rate in Indonesia. In Central Kalimantan, the average growth rate is 6.55, which is higher than the average growth rate in Indonesia. In the province of South Kalimantan, the average growth rate is 5.09, which is lower than the average growth rate in Indonesia. In the province of East Kalimantan the average growth rate is 2.82, which is lower than the average growth rate in Indonesia.

Based on table 4.6 shows that the average value of GRDP per capita in Indonesia is 34,812,156. In the province of West Kalimantan the average GRDP per capita is 23,163,228, which is lower than the average GRDP per capita in Indonesia. In the province of Central Kalimantan, the average GRDP per capita is 31,052,994, which is lower than the average GRDP per capita in Indonesia. In the province of South Kalimantan the average GRDP per capita is 27,509.993, which is lower than the average GRDP per capita in Indonesia. In the province of East Kalimantan, the average GRDP per capita is 126,835,504 which means higher than the average GRDP per capita in Indonesia.

Table4. Classification of Provinces in Kalimantan Island according to Klassen Typology 2010-2019

Rate Growth (r)	GRDP Per Capita (y)	
	$r_i > r$	$r_i < r$
$y_i > y$	Quadrant I Developed and Fast-Growing Region	Quadrant II Developed but Depressed Area (East Kalimantan)
	Quadrant III Developing Area (Central Kalimantan)	Quadrant IV Underdeveloped regions (West Kalimantan, South Kalimantan)
$y_i < y$		

Source: processed data

According to table 4.3 on the island of Kalimantan, there are no areas that meet the classification in quadrant I (developed and fast growing areas). There are no regions with an average rate of economic growth and an average GRDP per capita higher than the national average. West Kalimantan and South Kalimantan are classified as underdeveloped areas where the average economic growth rate and average GRDP per capita are lower than the national average. East Kalimantan Province is a developed but depressed region with an average GRDP per capita higher than the national average while the average growth rate is lower than the national average. Central Kalimantan Province is a developing region with an average growth rate higher than the national average, while the average per capita GRDP is lower than the national average.

Sustainable Development Composite Index (ISD)

[First Stage] Preparation of Theoretical Framework

The theoretical basis for sustainable development was introduced by Thomas Robert Malthus in 1798 which explained the concern for the environment due to the increasing population explosion while the available natural resources were limited. The World Commission on Environment and Development (WCED) states that sustainable development is development that can meet the needs of the present without compromising the ability of future generations to meet their own needs (United Nations, 1987).

[Second Stage] Identification and selection of indicators

Sustainable development has three aspects that must be met, namely economic, social and environmental. In each of these aspects, one indicator is used that has a role in measuring the achievement of sustainable development. In the economic aspect, the indicators of the Gross Regional Domestic Product per Capita (GRDP) and the Human Development Index(HDI) are used. In the social aspect, the Human Development Index (HDI) indicator is used. In the environmental aspect, the Environmental Quality Index (EQI) indicator is used.

[Third Stage] Lost Data Imputation

In this study, there are limitations in obtaining indicator data in one of the provinces, namely North Kalimantan. This is because North Kalimantan is the result of the division of the province of East Kalimantan. Therefore, the scope of the area studied only covers 4 provinces, including the provinces of West Kalimantan, Central Kalimantan, South Kalimantan and East Kalimantan.

[Fourth Stage] Data Normalization

In this research, normalization is focused on economic aspect data, namely the Gross Regional Domestic Product per Capita indicator. Normalization of data using the minimum-maximum method with a value range of 0-100. If using the minimum-maximum method, there will be two possibilities, namely if the province has a value below the minimum then the value will be normalized with a value of 0 while if the province has a value above the maximum it will be normalized with a value of 100.

Table 5. Boundary Values for Data Normalization

Variable	Unit	Max	Min
GRDP			
Per Capita	Rupiah	72,217,000	2,795,868
HDI	Percent	100	0
EQI	Percent	100	0

The maximum value of GRDP per capita refers to the 2019 GDP per capita target of IDR 72,217,000 listed in the 2015-2019 RPJMN. The minimum value of GRDP per capita refers to the urban poverty line in 2010 of Rp. 232,989 per month or equivalent to Rp. 2,795,868 per year. The selection of the urban poverty line in 2010 was based on the base year of GRDP at constant prices. Other variables such as HDI and EQI do not need to normalize the data because the available data is in the form of a percentage.

Table 6 Normalization of GRDP data per Capita

Province	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
West Kalimantan	24.08	25.11	26.31	27.62	28.69	29.76	30.99	32.27	33.58	34.97
Central Kalimantan	32.64	34.27	35.96	37.90	39.50	41.52	43.36	45.48	47.18	49.22
South Kalimantan	29.71	31.36	32.77	34.04	35.18	36.00	37.08	38.58	40.07	41.21
East Kalimantan	100	100	100	100	100	100	100	100	100	100

Source: processed data

[Fifth Stage] Weight Determination

The weighting that will be used in this research is scenario 2 because the weighting in scenario 2 is more balanced between development dimensions and provides opportunities for areas that are not too advanced in the economic sector but are able to develop other sectors such as social and environmental. In scenario 2, the weighting is the same between the sides of sustainable development (economic, social and environmental) where GRDP represents the economic aspect, EQI represents the environmental aspect, while HDI represents 2 aspects, namely economic and social. Then the weighting is done as follows

$$IPB = \frac{\text{Indeks PDRB} + (3 \times IPM) + (2 \times IKLH)}{6}$$

Based on the above equation, the GRDP indicator is given a weight of 1/6, HDI of 3/6 or and EQI of 2/6 or 1/3.

[Sixth Stage] Aggression

Table 7 Sustainable Development Index (scenario 2)

Province	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
West Kalimantan	60.46	60.10	59.59	59.78	60.00	63.05	62.18	63.23	63.45	61.63
Central Kalimantan	55.21	60.23	63.06	63.26	63.92	60.34	61.48	65.75	66.00	64.31
South Kalimantan	56.96	58.27	57.72	57.88	58.85	64.89	65.61	65.08	67.00	66.96
East Kalimantan	73.06	76.26	77.67	77.68	78.24	80.80	79.58	76.72	83.22	81.93
Kalimantan island	64.11	66.65	67.65	68.35	68.91	70.65	70.40	70.96	73.23	72.22

Source: processed data

[Seventh Stage] Presentation and Dissemination

Based on the calculation of the sustainable development index, it shows that the value of the sustainable development index on the island of Kalimantan has increased every year from 2010 to 2018 while in 2019 it has decreased.

Table 8 Classification of Sustainable Development on the Island of Kalimantan

Province	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
West Kalimantan	enough									
Central Kalimantan	enough									

South Kalimantan	enough									
East Kalimantan	enough	good								
Kalimantan island	enough									

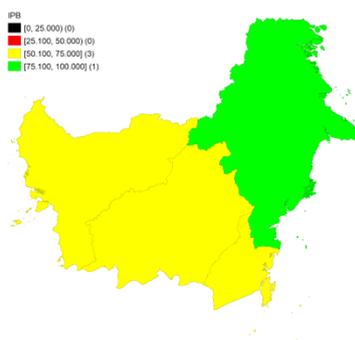
Source: processed data

In the table above, it can be seen that the province of East Kalimantan in 2011 to 2019 was classified as good (very sustainable). Meanwhile, other provinces such as West Kalimantan, South Kalimantan and Central Kalimantan are classified as moderate (sufficiently sustainable). Overall, it can be seen that the island of Kalimantan in 2010-2019 was in the category of being quite sustainable.

Geographic Information System

Figure 3 shows a map of the spatial distribution of regional sustainable development implementation.

Figure 3 Map of the Distribution of Sustainable Development on the Island of Kalimantan



Black color means bad area (unsustainable) with an index value range of 0 – 25, red color means less area (less sustainable) with an index value range of 25.1 – 50, yellow means an adequate area (quite sustainable) with an index value range of 50.1-75 , and green means good (very sustainable) with an index value range of 75.1-100. Figure 4.3 above shows that the provinces of West Kalimantan, South Kalimantan and Central Kalimantan are included in the yellow category, which means the area is quite sustainable. The average value of the sustainable development index for the province of West Kalimantan is 44.42, South Kalimantan is 56.51 and Central Kalimantan is 57.76.

DISCUSSION

In the Klassen typology analysis, this study uses economic aspects, namely indicators of the growth rate of GRDP and income or Gross Regional Domestic Product (GRDP) per capita of the region. Based on the theory of economic growth, according to Harrod Domar, development is related to economic aspects such as the provision of capital and investment(Suryono, 2010). In the classic concept of regional economic growth, Myrdal states that regional income is reflected in one of the ways by investment(Ukhwatul et al., 2019). Development on the spatial dimension is an effort that is applied to regional development planning(Harun, 2016). The results of the study indicate that there are no regions that meet the classification in quadrant I (developed and fast growing regions) for economic development on the island of Kalimantan. This means that on the island of Kalimantan there are no areas with an average GRDP growth rate and per capita income that is higher than the national average. East Kalimantan province is included in quadrant II (developed but depressed areas). Central Kalimantan province is included in quadrant III (developing area). The provinces of West Kalimantan and South Kalimantan are included in quadrant IV (lagging areas). Based on Sarnowo(2017)mentions that there are no provinces on the island of Kalimantan that are included in quadrant I (developed and fast growing regions). In his research, the province of East Kalimantan is included in the developed but depressed area, the province of Central Kalimantan is included in the developing area

while the province of West Kalimantan and South Kalimantan are included in the relatively underdeveloped area. This is also in line with research (Pradipta, 2016) which states that the province of East Kalimantan is a developed but depressed area.

Based on the results of the composite index analysis of sustainable development, the index value mostly increased until 2010 to 2018 and decreased in 2019. Kalimantan Island is included in a fairly sustainable area. In detail, it is stated that the Provinces of West Kalimantan, South Kalimantan and Central Kalimantan are included in a moderately sustainable region, while East Kalimantan is a highly sustainable region. Based on the results of the analysis of the implementation of sustainable development on the island of Kalimantan spatially, it shows that the green color on the map of the island of Kalimantan means that it is included in a highly sustainable area, while the yellow color means that it is included in a fairly sustainable area.

Almost all provinces on the island of Kalimantan are included in the criteria for being quite sustainable which is in line with research (Fauzi and Oxtavianus, 2014). The research states that the province on the island of Kalimantan is included in the criteria for being quite sustainable. This is also in line with the theory of sustainable development which states that the pillars of sustainable development are economic, social and environmental sustainability where all three must develop in a balanced manner. However, this is contrary to the theory stated by Kuznet in the Environmental Kuznet Curve (EKC) hypothesis. The Environmental Kuznet Curve (EKC) hypothesis explains that initially economic growth will increase environmental degradation because it only focuses on increasing production without paying attention to environmental aspects. It can't be proven because mostly, the area of Kalimantan Island is included in a fairly sustainable area.

CONCLUSIONS, IMPLICATIONS, SUGGESTIONS, AND LIMITATIONS

Conclusion

Based on the research above, it can be concluded that:

1. Regional division criteria based on the results of Klassen typology analysis, East Kalimantan is a developed but depressed area, Central Kalimantan is a developing area, West Kalimantan and South Kalimantan is an underdeveloped area.
2. Based on the results of the analysis of the sustainable development index as a whole, Kalimantan Island is in the moderately sustainable category with an index value between 64.11-73.23. The provinces of West Kalimantan, South Kalimantan and Central Kalimantan are included in the moderately sustainable region, while the East Kalimantan Province is included in the highly sustainable region.
3. Spatially the distribution of sustainable development on the island of Kalimantan shows that the provinces of West Kalimantan, South Kalimantan and Central Kalimantan are included in a fairly sustainable area with a yellow area map, while East Kalimantan Province is included in a very sustainable area with a green area map.

Suggestion

Based on the research conducted, the authors provide the following suggestions:

1. The need to maintain the value of the sustainable development index, especially in the province of East Kalimantan while still utilizing the existing economic potential and being able to prosper the community without ignoring or damaging the environment, considering that from the results of the study only East Kalimantan province is included in the very sustainable category.
2. In future research, it is recommended to develop an analysis of the implementation of sustainability on the island of Kalimantan on a city/district basis

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