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Inclusive Green Economy (IGE) Assessment towards Sustainable Development of East Kalimantan Province

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Abstract

East Kalimantan economy is heavily relied on natural resource-based sectors. Thus, East Kalimantan experiences a substantial growth and becomes one of the significant contributors to the national economy. On the other hand there are some externalities ensuing the East Kalimantan economic development that possibly will hamper an Inclusive Green Economy (IGE) to be achieved. This study aims to assess the IGE of East Kalimantan during 2000-2012. There are three aspects of IGE will be assess: (1) economic inclusiveness, (2) greenness of the economy, and (3) green economy as driver of growth and development. Some indicators employed are adopted from sustainable development initiatives that share the same idea with IGE and have been proposed by various international organizations. Moreover, DEA Model is applied in examining East Kalimantan efficiency in utilizing its natural resources and environment. Furthermore, Integrated Sustainability Index is employed to monitor IGE comprehensively.

Keywords: inclusive green economy, sustainable development, DEA model, Integrated Sustainability Index.

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1. Introduction

Nowadays, natural scarcity and degradation has become an issue discussed in many countries. Natural resources, renewable and unrenewable, have been intensively exploited without considering its impact on environmental quality. Meanwhile, climate change and global warming are haunted the earth and they reduce the earth ability in providing resources for human needs. Therefore, there has been a transition on development paradigm from business as usual (BAU) to sustainable development.

Sustainable development was introduced by the UN World Commission on Environment and Development (Brundtland Commission) in 1987. It is defined as a societal development "… that meets the needs of the present without compromising the ability of future generations to meet their own needs". The idea of sustainability combines three goals, economic power with ecological responsibility and social justice. Moreover, the concept of sustainability that connects the economic activity of people with the nature as resource provides the idea that economic processes must be sustainable if long-term development goals shall not be sacrificed to short-term prosperity.

Sustainable development is also defined as the increase of utility or welfare per capita along the time or the increase of a set of development indicators [7]. There are three conditions should be met in order to create sustainable development. Firstly, aggregate number of human and natural capital has not decreased and there is a possibility that both capitals are substitute. Secondly, natural capital depreciation should be avoided. Thirdly, the total of environmental stock cannot decrease. Therefore, it is crucial to find appropriate governance arrangements to meet the aims of sustainability in an economy.

UNEP stated that in order to deliver the goal of sustainable development, one economy should implements a green economy policy [16]. Green economy is defined as: "One that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is low carbon, resource efficient and socially inclusive. In a green economy, growth in income and employment should be driven by public and private investment that reduces carbon emissions and pollution, enhances energy and resource efficiency, and prevents the loss of biodiversity and ecosystem services".

Green economy concept has developed into inclusive green economy [12]. Inclusive green economy is believed to be able to focus on systemic problem in current economic system and create an inclusive and sustainable growth that can increase economic returns and social returns from investment activity in developing environmental quality and also low carbon and climate-resilient development. Inclusive green economy can be seen as ways in integrating social, economic and environmental goals from sustainable development to create benefits for marginal and vulnerable group and reducing inequality.

National Development Planning Agency (BAPPENAS) states that there are four pillars in achieving sustainable development. There are social, green economy, environment and governance. In Indonesia context, the concept of green economy is applied through green growth program. Green growth program is a new approach to achieve several goals in order to create sustainable development in Indonesia. The notion of the program is to

stimulate green growth that recognizing the value of natural capital, increase resilience, building local economic and that is inclusive and fair. There are five dimensions of green growth: (1) sustained economic growth, (2) greenhouse gas emission reduction, (3) social, economic and environmental resilience, (4) inclusive and equitable growth and (5) healthy and productive ecosystems providing services. Therefore, although it is not explicitly stated, the concept of green economy in Indonesia is believed to be similar with the concept of inclusive green economy.

As a response to the national policy of green growth, East Kalimantan Government takes an active part by launching Kaltim Green (Kaltim Hijau) Program on 7th January 2010. Kaltim Hijau is defined a condition where East Kalimantan is equipped by policies, system of government and development programs that provides social and ecological protection, long term assurance of welfare and security for people of East Kalimantan, as well as environmental sustainability. Moreover, East Kalimantan Government has formulated Regional Action Plan in Reducing Greenhouse Gas (RAD GRK) in 2012 for all sectors. East Kalimantan Government has also developed Strategy and Action Plan for REDD+ (Strategi dan Rencana Aksi atau SRAP REDD+). The documents are providing framework for reducing emission. However, some challenges remain in implementing inclusive green economy policy in East Kalimantan.

Firstly, East Kalimantan economy is heavily relied on natural resources. This puts East Kalimantan as one of biggest emitter in Indonesia. Therefore, some alternative sectors aside from natural resource-based sectors should be considered as exit strategy to the East Kalimantan economy. In addition, environmental economic indicators have not been provided in measuring economy transition and performance from BAU economy to an inclusive green economy. Therefore, this paper focuses on assessing the inclusive green economy in East Kalimantan Province to shed more lights on the existing situation and the potential regarding its sustainable development.

2. Inclusive Green Economy Assessment Method

2.1. Indicators for IGE Assessment

Barr [17] stated that UNEP has proposed indicators for measuring inclusive green economy targets. These indicators are expected to be able in monitoring and tracking progress the inclusive green economy policy. There are three aspects of the policy should be measured, that are: (1) inclusiveness in an economy, (2) the greenness of an economy, and (3) the green economy as the engine of growth.

According to McKinley [18], economic inclusiveness refers to an improvement in income per person, while also ensuring members of society have equitable access to the benefits of that growth. A green economy can only basically transform society for the better welfare if growth is equitable distributed. Thus, distributional impact or the level of equity needs to be adequately assessed in order to have a more comprehensive description of economic development. Some indicators that represent inclusiveness are income inequality, not only vertical equity in terms of income, but also horizontal equity, particularly between rural and urban populations.

PEP [12] states that an economy is reflected “green” when it has the ability to increase natural resource

productivity and efficiency, reduces pollution and the impact of natural hazards, and invests in sustaining ecosystem resilience. This because increasing environmental and resource productivity is necessary conditions for green growth. Some of the indicators of economy greenness are those identified by UN [22]. They are energy intensity per capita, energy intensity per unit of gross income, and emission intensity that shows air quality.

The third aspect of inclusive green economy measurement shows to what an extent that green economy is an engine for prosperity and development, as well as how actions that benefit the environment may also provide economic returns. PEP [12] stated that an inclusive green economy increases the economic returns from investing in environmental improvement, and development that is resource-efficient, low–carbon, and climate-resilient. Some indicators have been applied to OECD countries are R&D expenditure related to green growth and innovation in all sectors that are related to the environment, environmentally-related taxation, water pricing and cost recovery. However, for East Kalimantan, data related to this aspect has been difficult to be obtained. Third aspect of IGE will be represented by using Data Envelopment Analysis (DEA) which assesses how resource-efficient East Kalimantan economy has been.

2.2. Analytical Method

Data Envelopment Analysis (DEA)

Data Envelopment Analysis (DEA) will be applied to assess the IGE of East Kalimantan during 2000-2012. This method is an non parametric approach to evaluate the relative efficiency of decision making units (DMUs) which using the same inputs and outputs [23]. The basic concept of DEA is to compare each DMU with the best DMU. The best DMU will be noted by the efficiency score of 1. The DMU is considered being inefficient when the score is less than 1.

This study will utilize DEA to assess the efficiency of East Kalimantan economy in using its inputs to generate output. Inputs will be represented by CO_2 emission intensity and energy use intensity, while output will be measured by real GDP per capita during 2000-2012.CO_2 emission intensity will be represented by Green House Gas (GHG) per capita, and energy use intensity will be measured by coal production per capita

Efficiency score will be obtained and assigned for each year. The best year will be assigned with efficiency score of 1, suggesting that the best practice is applied in that year. It implies that the production in such a year is the most efficient compared to any other years. High efficiency in production indicates good opportunity to achieve IGE, since the necessary conditions of the green growth can be fulfilled.

This study employs input-oriented CCR model with the assumption of constant return to scale. The model measures efficiency in using the minimum inputs to produce a certain amount of outputs. The DEA model to be adopted is formulated as follows:

$$\min_{\lambda} z_0 = \theta_0 \qquad (1)$$

Subject to:

$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{r0} \qquad r = 1, 2, \ldots, s \qquad (2)$$

$$\theta_0 x_{i0} - \sum_{j=1}^{n} \lambda_j x_{ij} \geq 0 \qquad i = 1, 2, \ldots, m \qquad (3)$$

$$\lambda_j \geq 0 \qquad j = 1, 2, \ldots, n \qquad (4)$$

Where: θ is efficiency score, y_{rj} is output value r in year j, x_{ij} is input value i in year j, and λ is a non-negative weight.

Multi-Criteria Analysis (MCA)

Multi-Criteria Analysis (MCA) is employed for assessing the current situation when there are competing evaluation criteria [24]. The analysis will be based on integrated sustainability index that considers inclusiveness, greenness and economic aspects of the East Kalimantan economy. The changes of targeting indicators show the dynamic of the policy impact into the economy. The application of MCA would allow policy makers to decide the most efficient pathways for the economy to be inclusive and green, since it provides ranking policy measures and also harmonization of different policies targeting on different sectors and aims. Some indicators employed for the analysis are presented in Table 1.

Table 1: Inclusive Green Economy Indicators

	Variables	Indicators	Units
Inclusiveness	Poverty level	Poverty rate	%
	Income inequality	Gini Ratio	Share of income between fifth and first quintile
	Unemployment	Unemployment rate	% from labor force
Greenness	Atmospheric pollution	Emissions of GHG	Ton CO_2e per Capita
	Energy intensity	Energy intensity of GDP	Ton of Coal per Capita
Economic	Created Gross Value Added (GVA)	GRDP	Million Rupiahs
	Export expansion	Total export	Thousand Dollars

Integrated sustainability assessment indicators can be calculated by summing the weighted indices of all indicators:

$$Q_n = \sum w_i * Q_{in} \qquad (5)$$

Where: Q_n is integrated indicator for inclusive green economy assessment at time n, Q_{in} index of indicator i at time n, and w_i is weight of indicator i and $\sum w_i = 1$

Index of respective indicator can be calculated by using formula:

$$Q_{in} = {}^{q_{in}}/_{q_{i0}} \quad (6)$$

Where: Q_i is index of indicator i at time n, q_{in} is the value of indicator i at time n, and q_{i0} is value of indicator i at base year (first year of monitoring).

If the value of indicator decrease is positive in terms of IGE assessment, the index of the indicator should be calculated following:

$$Q_{in} = {}^{q_{i0}}/_{q_{in}} \quad (7)$$

The weights for indicators in this study are assumed to be equal.

3. Paradox Of East Kalimantan Economy

In 2013, East Kalimantan GRDP at current prices was estimated to be 425.4 trillion rupiahs. This size of East Kalimantan economy puts the province as the sixth largest economy compared to other provinces in Indonesia. It consists of a significant contribution of natural resource-based sector, such as oil, gas and coal, as well as forestry, which amounts to 69 percent of the total of the economy. Being dominated by natural resource-based sectors, East Kalimantan experienced a consistent growth during period 2000-2011 with annual average of 3.3 percent (Figure 1). However, these dominant sectors contribute to the carbon emission so that they make East Kalimantan as the third largest emitter Province in Indonesia.

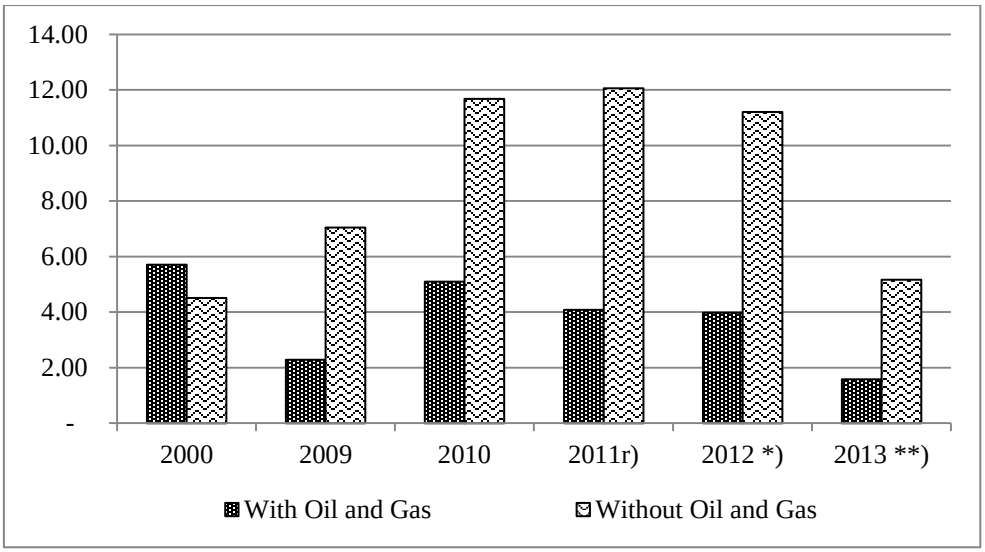

Figure 1: Economic Growth of East Kalimantan Province at Constant Prices Year 2000-2011 in Trillion

Rupiahs

Based on analysis result carried out by Mc Kinsey Company, DNPI (National Council of Climate Change) and East Kalimantan Government [2], dominant sectors, that is oil palm plantation, agriculture, forestry, mining and coal, as well as oil and gas, are main sectors that create CO_2 emission. In 2010, from the total of 251 million ton of CO_2e, 90 percent of emission is produced by those sectors, or called as land use sectors especially forest land use (Figure 2).

There is 14.7 million Ha of forest (or 60 percent of the total Province area) in East Kalimantan Province in 2012. However, if it is compared to the previous period forest area has been reduced dramatically. This due to the existence of illegal logging and extensive agriculture efforts such as palm oil plantation. Data from East Province Forestry Office shows that from 2004 and 2009, there was an increase in the forest degradation that was around 350,000 Ha annually or it is equivalent to 66.6 trillion rupiahs. In 2004, there was forest degradation in 6.4 million Ha and this number increases in 2009 to 8.1 million Ha.

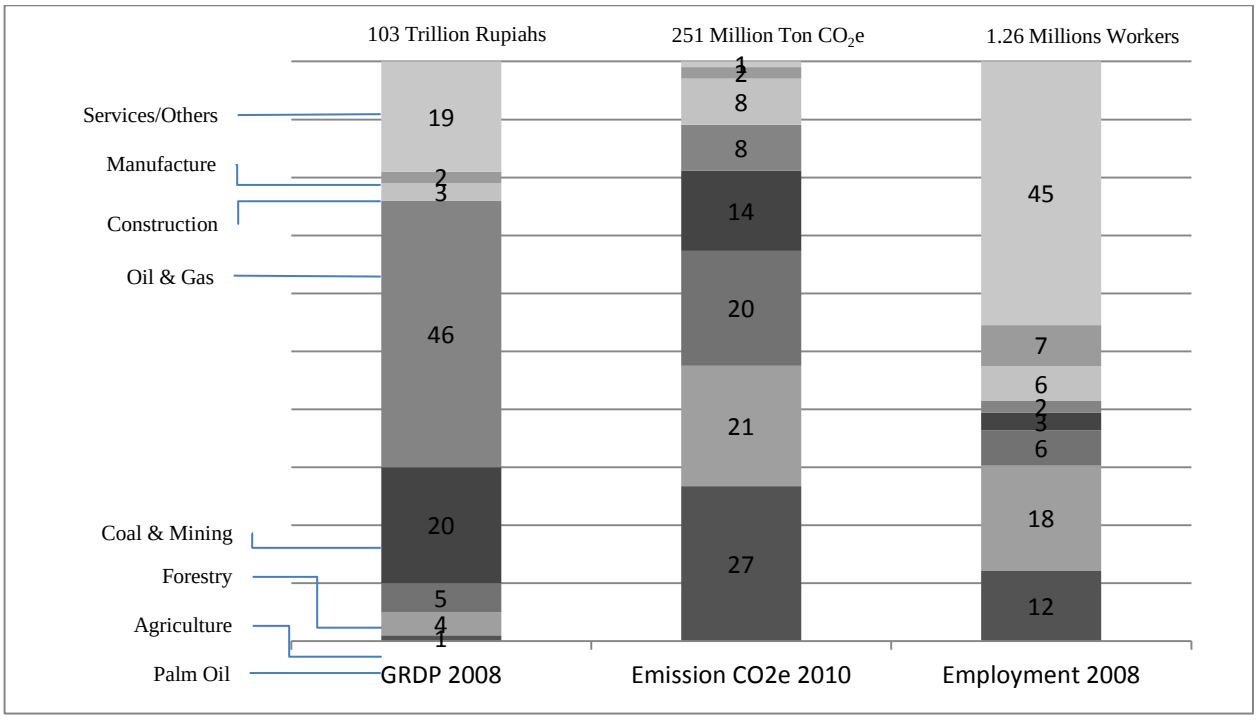

Figure 2: GRDP Distribution at Constant Price Year 2008, CO_2e Emission Year 2010 and Employment Year 2008 by Sector

Moreover, WWF [28] shows that there is a decrease in the quantity and quality of forest resource indicated by deforestation rate that is quite significant. In 2004, there was deforestation in an area of 219,170 Ha and this becomes a highest deforestation during period 2004-2008. In 2005 and 2006, deforestation took place in area of 134,800 Ha and 119,530 Ha respectively. In 2008, there was deforestation in area of 183,190 Ha. Table 1 shows that most municipalities and regencies in East Kalimantan have degraded land averaged one third to half of their each total area. By using data of degraded land change in 2005 and 2006, it is estimated that each year there are an increase of 500,000 Ha of degraded land and if it continues then forest area will eventually below 30 percent.

Even though forest resources have been greatly exploited, it seems that they have not benefited to the rural livelihoods that is spatially located near the forest. This is indicated by poverty statistics that remains high in rural areas. One of the reasons for that condition to exist is that rural community does not have access to the forest resources. Forest resources mostly belong to the large establishments who have concession in exploiting forest, thus community role in economic activities that is forest related is limited and insignificant [3].

DNPI and East Kalimantan Province [2] carried out an analysis related to setting up strategy for sustainable development in East Kalimantan Province. The result shows that East Kalimantan can experience growth while conserving the environment by reducing carbon emission. In forestry sector alone, by 2030 there is a potential increase in added value up to 16 billion rupiahs. This can be done if economic activities are carried out by focusing on forest product-based industry. Moreover, there is also an additional added value by utilizing forest trees fully that has been done in countries in Europe, North America and Brazil. Additional added value is up to 700 billion rupiahs. Large-diameter wood for high-value applications (as is already done in East Kalimantan), but then to sell small-diameter wood and wood residue for lower value applications like pulp and paper, board manufacturing, and the production of wood chips and wood pellets. These additional added values that are expected to be gained by practicing green economy concepts should benefits the rural poor people, especially poor people near forest in East Kalimantan.

Table 2: Degraded Land In and Outside Forest by Municipalities/Regency in East Kalimantan Province (Ha)

Municipalities/Regencies	Total Area	Degraded Land		
		In Forest Area	Outside Forest Area	Total
1	2	3	4	5
Balikpapan	56,070	8,235	29,905	38,140
Berau	2,252,171	606,004	206,637	812,641
Bontang	16,339	4,356	3,165	7,521
Bulungan	1,724,961	448,833	137,067	585,900
Kutai Barat	3,094,379	965,736	305,974	1,271,710
Kutai Kartanegara	2,632,600	923,997	348,750	1,272,747
Kutai Timur	3,188,459	1,348,029	460,656	1,808,685
Malinau	3,979,988	582,523	201,889	784,412
Nunukan	1,387,542	296,076	170,359	466,435
Paser	320,966	107,089	65,162	172,251
Penajam Paser Utara	1,093,638	447,629	192,625	640,254
Samarinda	71,823	830	50,497	51,327
Tana Tidung*)	-	-	-	-
Tarakan	25,181	7,147	9,581	16,728
Jumlah	19,844,117	5,746,484	2,182,267	7,928,751

Source: East Kalimantan Office of Statistics Indonesia (2010) and Management Board of River Basin (BPDAS) Mahakam-Berau (2010)

*) *included in its main regency (Bulungan)*

4. IGE Assessment for East Kalimantan

4.1. Economic Inclusiveness of East Kalimantan

The concept of economic inclusiveness is share with the idea of inclusive growth. An economy is considered being economic inclusive if it experiences increase in income level while maintaining to reduce the inequalities, and not just the poverty [29]. This implies that the poor and the rich should not be expected to benefit proportionately from growth or by an equal percentage increase in their incomes. To be economic inclusive, it requires a progressive distribution of benefits from growth that is in favor of the poorer people in the society. This is expected to reduce income equality.

In general, there is a decrease in the number and percentage of poor people in East Kalimantan during 2000-2012 (Figure 3). The reduction of the poverty is around 6 percent annually overtime. Even there was a rise in the 2006, afterwards the poverty incidence continuously decreased.

However, even there is a decrease in the percentage of poor people in East Kalimantan that is from 22.10 percent in 2000 to 6.38 percent in 2012, the proportion of poor people in rural area is higher than urban (Figure 4). In 2011, the percentage of poor people in urban area was only 4.06 percent, whereas in rural area the number was 11.21 percent. Moreover, in the same period Poverty Gap Index (P1) was 1.352 and Poverty Severity Index (P2) 0.289 for rural areas and these indexes are higher than urban areas indexes. This indicates that expenditure average of rural poor people is lower than expenditure average of urban poor people. In the same time, the disparity of expenditure of rural poor people is higher than urban poor people. This information confirms that the exploitation of natural resources has not benefited to the poor people in rural area.

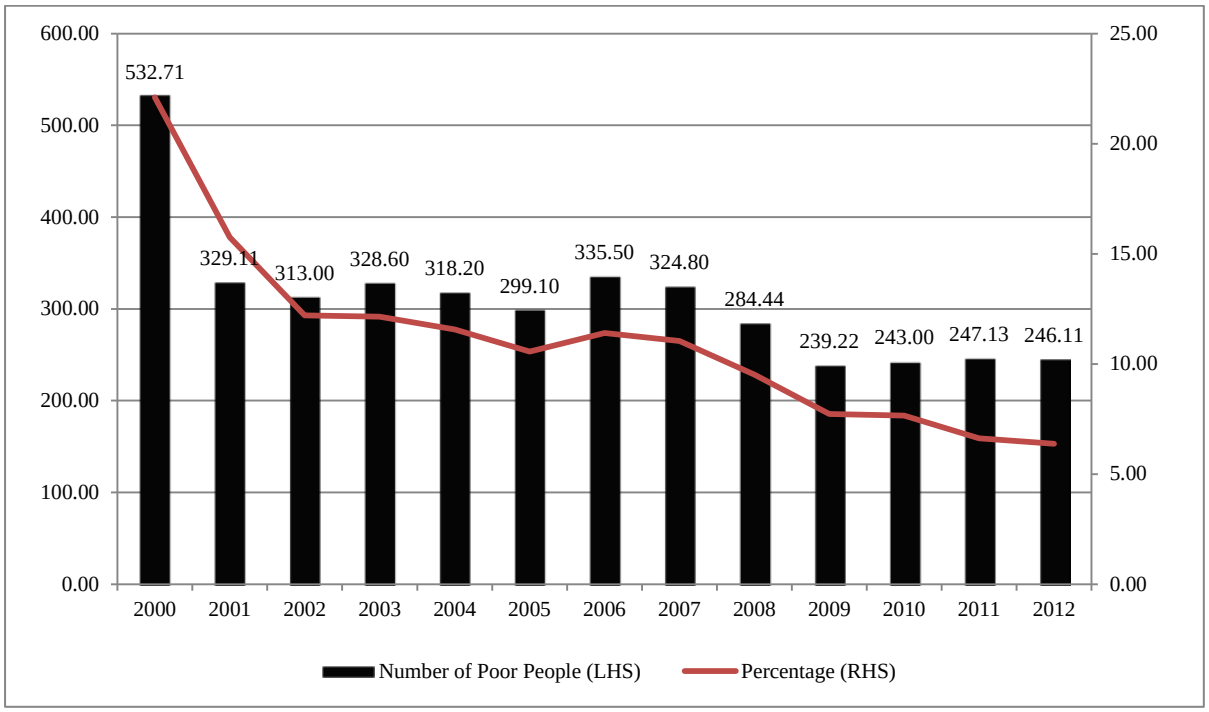

Figure 3: Poverty in East Kalimantan Province Year 2000-2012

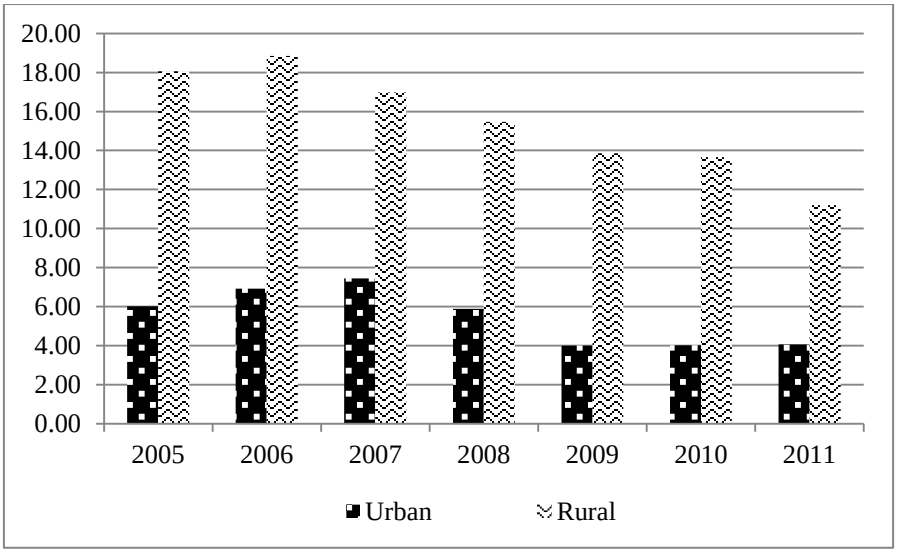

Figure 4: Percentage of Poverty in East Kalimantan Province Year 2005-2011 (%)

During 2000-2012, Gini Ratio shows the trend of vertical equity development in East Kalimantan (Figure 5). From the graph, it can be seen that there is a negative trend towards income equality in East Kalimantan. In general, there is an increase in income disparity in East Kalimantan, which is indicated by the rise of Gini Ratio values during that period. Still, there is potency for the economy to have a reduction in disparity, since there is a decline of Gini Ratio from 2008 to 2012.

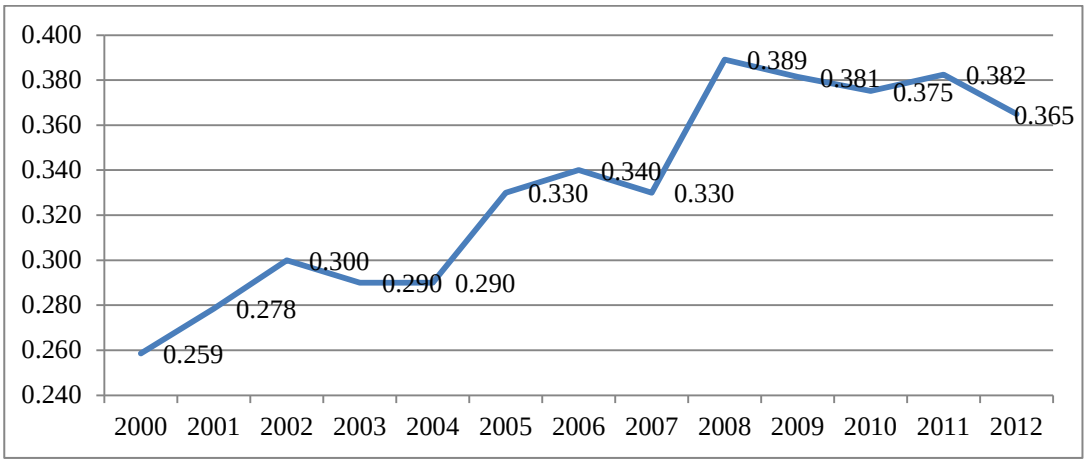

Figure 5: Gini Ratio Year 2000-2012

Using data from National Social Economic Survey year 2010 and 2011, which is combined with Village Potency Survey 2011, the economic inclusiveness can be assessed by employing indicators of horizontal equity that are proposed by McKinley [18]. Table 3 indicates that there is higher incidence of poverty in villages that are located near and in forest area. This may due to high restriction for the people near the forest to access the resources, especially for the people in conservation/protected forest. This finding is similar to Justianto's study [3] that is poverty rate remains high in areas that are located near the forest in East Kalimantan.

Table 3: Poverty Rate by Location Year 2010-2011 (%)

Location		2010	2011
In Forest Area	Conservation/Protected	36.2	45.9
	Production	81.6	36.1
	Total	45.8	40.2
Forest Area Surrounds	Conservation/Protected	24.6	28.0
	Production	37.5	30.1
	Total	28.8	29.0
Outside Forest Area		13.9	11.3

Source: Author's calculation

Furthermore, Data Collection for Social Protection Program (PPLS) 2011 indicates similar pattern of horizontal inequalities in East Kalimantan. In general, Table 4 reveals that poverty rate is greater in the forest area and its surrounds compared to outside forest area. While it is only around 4 percent in the outside forest area, the poverty rate in forest area and its surrounds are about 7-10 percent or nearly two-fold of the poverty rate in the outside forest area. This implies that poverty incidence is still being problem in the East Kalimantan development, especially in rural areas that is represented by location which are relatively closer to the forest area. In addition, data also confirms that spatial inequality in East Kalimantan economy remains.

Table 4: Poverty Based on PPLS 2011 by Location Year 2011 (%)

No	Regency/Municipality	In Forest Area		Forest Area		Outside Forest		Total	
		Very Poor	Poor	Very Poor	Poor	Very Poor	Poor	Very Poor	Poor
1	Pasir	2.45	3.58	3.98	5.06	3.26	3.91	3.41	4.24
2	Kutai Barat	10.02	10.58	5.37	7.97	4.03	4.78	4.50	5.79
3	Kutai Kartanegara	4.95	5.38	1.56	2.24	1.88	2.27	1.87	2.34
4	Kutai Timur	6.12	8.63	3.14	5.81	1.48	3.07	2.21	4.08
5	Berau	2.14	3.10	2.68	3.51	1.12	1.27	1.52	1.88
6	Malinau	6.77	7.94	6.82	8.87	5.32	5.32	6.05	6.85
7	Bulungan	4.98	4.64	4.07	4.88	2.27	2.93	3.35	3.85
8	Nunukan	5.56	11.77	7.30	11.72	4.05	6.44	4.68	7.57
9	Penajam Paser Utara	11.41	18.48	6.11	8.20	5.11	5.69	5.40	6.38
10	Tana Tidung	4.70	4.88	10.26	13.52			5.44	6.03
11	Balikpapan			0.18	0.48	0.72	0.93	0.70	0.92
12	Samarinda			0.16	0.31	1.24	1.39	1.19	1.34
13	Tarakan			1.40	2.15	0.95	2.80	0.97	2.78
14	Bontang			0.89	1.51	1.70	2.46	1.54	2.27
	East Kalimantan	4.76	5.99	3.09	4.43	1.83	2.45	2.01	2.72

In terms of employment, Figure 6 shows the unemployment rate during 2000-2012. It reached its peak on 2006 that is 13.43 percent. Then, it has continuously decreased to 8.90 percent in 2012. However, this positive change in terms of employment seems contradict to the previous information given related to the equity. If recently there is more number of workers being absorbed, then why spatial inequality between outside forest and forest surrounds remains?

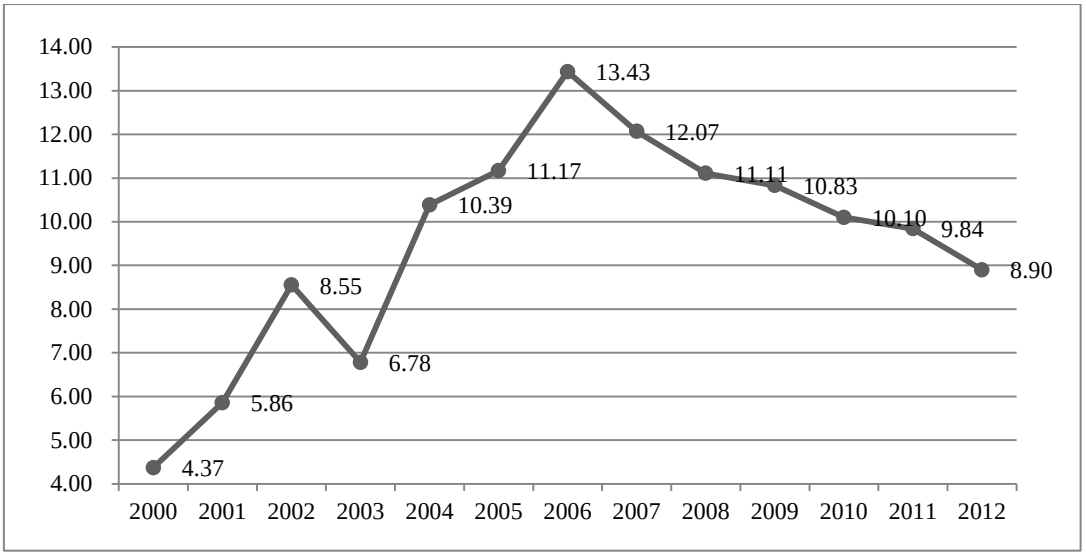

Figure 6: Unemployment Rate Year 2000-2012 (%)

Some empirical studies show that there is the relationship between economic growth and poverty incidence across countries and time periods [30]. Change in the poverty level is determined by two factors, which are change in the average income level and change in income inequality. The results of studies reveal that the magnitude of poverty reduction associated with growth varies. This due to which factor is dominant. Although there are differences on the magnitude, evidence suggests some common features. Growth is inclusive when it takes place in the sectors where poor work, such as agriculture; occurs in the places where poor live, such as around forest area; and uses factor production owned by the poor, such as unskilled labors.

In East Kalimantan, although it only consists about 5-6 percent in the share of GRDP, agricultural sector absorbs mostly workers or about 28 percent of the total worker (Figure 7). In contrast, mining and quarrying sectors dominates the economy which contributes to more than 45 percent to GRDP, however it only captures 10 percent of the total worker. Similarly, manufacture sector that quite significantly contributes to the total GRDP, or about 23-25 percent, is only able to absorb 5 percent of the total worker. This may explain to why inequality, especially horizontal inequality remains, in East Kalimantan.

4.2. The Greenness of East Kalimantan

Some of the environmental and sustainability indicators that have been proposed by various international organizations are appropriate to be adopted in measuring the greenness of an economy [17]. Several indicators those are potential to be adopted, such as emissions and energy intensity per capita. Those indicators will be used in assessing the greenness of East Kalimantan economy. Emissions attempts to measure the degree to which the economy is being lost, while energy intensity per capita focuses on the efficiency of material resource use.

Figure 8 shows that from 2009 to 2012, Environmental Quality Index fluctuates. In 2009, East Kalimantan achieved 68.63 and this was above national average. However, in 2010 the Index dropped to 62.22. Even though

it rose in 2011, the Index then continued to deteriorate that is the Index value is lower compared to 2009, or 57.29, in 2012.

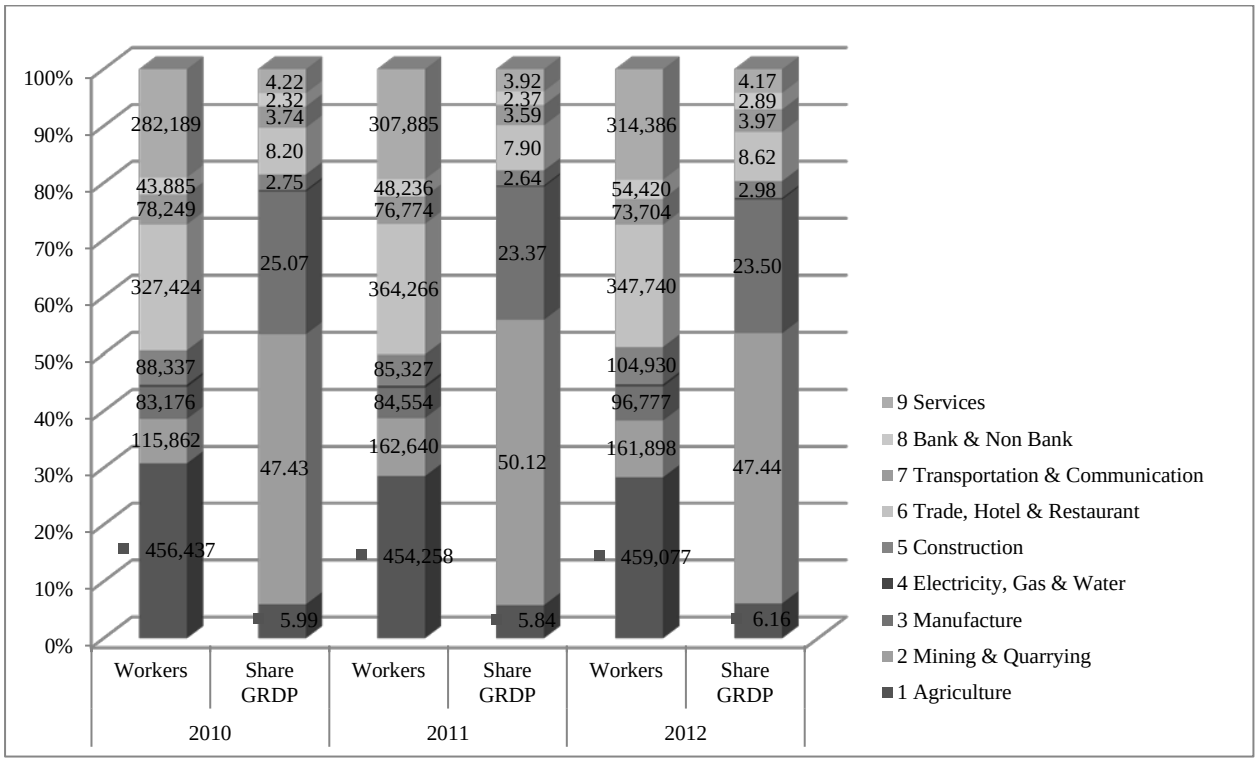

Figure 7: Number of Workers and Share GRDP by Sector Year 2010-2012 (%)

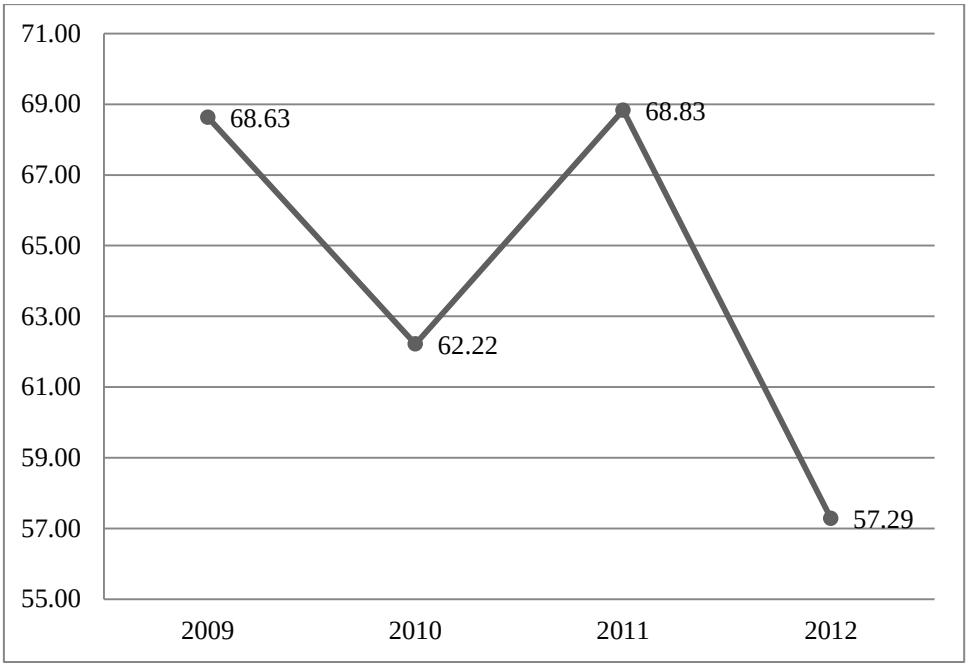

Figure 8: Environmental Quality Index Year 2009-2012

Government of East Kalimantan calculated emission generated for period 2007-2020. The calculation is based on assumption that the economy applies the strategy of business as usual (BAU). Table 5 shows that there is a sharp positive trend of generated emission. Land-based sector is the biggest emitter, dominantly generated from mining sector.

Table 5: Generated Emission under BAU by Sector Year 2007-2020 (Million Ton CO2e)

Sector	Year								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Land-based	408,144	635,594	862,980	1.090.380	1.317.737	1.371.707	1.425.678	1.479.649	1.533.620
Waste	4,956	5,993	6,913	7,697	8,367	8,942	9,438	9,868	10,242
Energy, Transportation and Industry	26,830	28,780	31,660	35,240	37,310	39,950	42,980	46,370	50,560
Total	439,930	670,367	901,553	1.133,317	1.363,414	1.420,599	1.478,096	1.535,887	1.594,422

Source: RAD GRK of East Kalimantan Province, 2012

Figure 9 displays that in period 2000-2012, emission intensity increases overtime. Although there is a decline in 2007, emission intensity tends to rise along the period. Moreover, under BAU development scenario there is a sharp increase in 2012, which is nearly as twice as previous year. This should be alarmed the Regional Government, that there is an urgency to change regional economic structure to be more green.

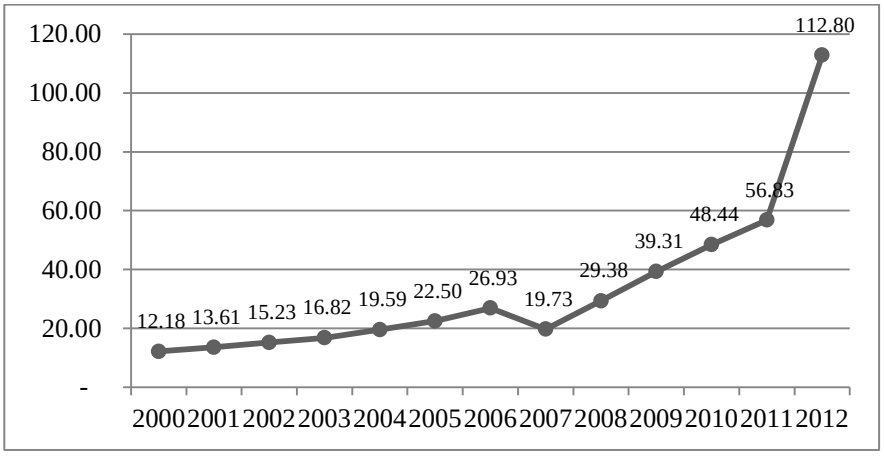

Figure 9: GHG Emission Intensity Year 2009-2012 (Ton CO2e per Capita)

Coal product of East Kalimantan dominates the national total production. It consists of 37.5 trillion ton or 35.7 percent of the national total production. Nowadays, East Kalimantan economy is heavily relied on this product. However, the production of coal significantly generates emission; in fact it is the biggest emitter in the land sector. Thus, coal products will be used to assess the greenness aspect of the economy.

During 2000-2012, energy intensity, which is measured by coal production per capita, tends to increase

overtime (Figure 10). In the document of Kaltim Vision 2030, Government of East Kalimantan [9] stated coal reserve is estimated 28.93 billion ton and will last for only 43.3 years. It is predicted that the supply reduction would affect the economy in 2030. Since this product dominates and gives high returns to the economy, therefore Government of East Kalimantan realizes that revenues from this product should be used optimally and provide basis for economic transformation from BAU economy to be greener economy.

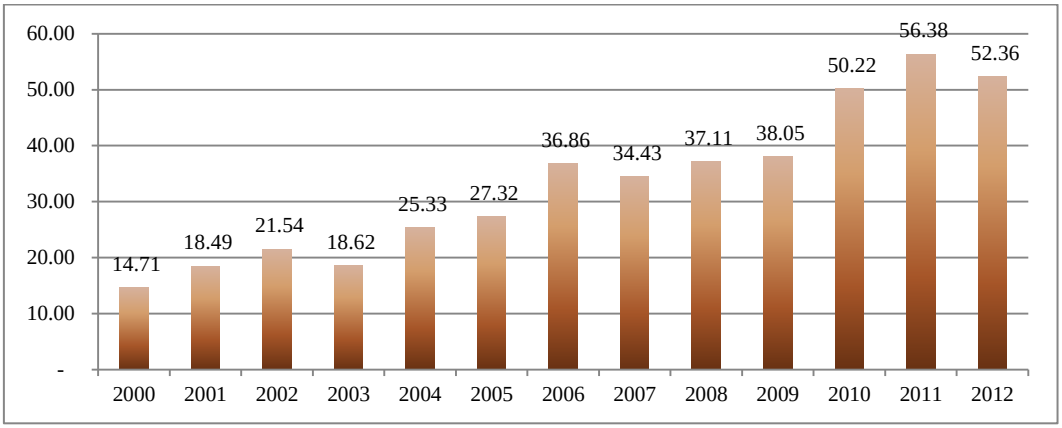

Figure 10: Energy Use Intensity Year 2000-2012 (Ton per Capita)

4.3. Green Economy as Growth and Development Driver

UNDESA characterizes green economy that drives growth and development as the economy that focuses on green technology and innovation, environmentally sustainable economic progress, more resiliency, and new green job opportunities [25]. In other words, it goes beyond GDP increase and job creation. This paper will assess third aspect of IGE in terms of environmentally sustainable economic progress.

Figure 11 shows the development of efficiency score calculated by DEA Model during period 2000-2012. This figure exhibits downward trend of efficiency score overtime, implying that East Kalimantan economy is gradually becoming less efficient overtime. East Kalimantan employed too much its natural resources and environment in creating economic growth.

To have a more comprehensive in IGE assessment, MCA based on integrated sustainability index will be applied. In general, the graph shows an increase of the index, suggesting positive trends towards IGE in order to create sustainable development (Figure 12). In more detail, although there is positive trend, sustainability index fluctuates overtime. Moreover, in 2012 it declines compared to previous year. This implies that there is still a possibility that East Kalimantan economy to be an IGE, but this tendency towards IGE should be maintained by Regional Government.

In East Kalimantan Vision 2030 documents, Regional Government has been aware of the urgency in making the economy becoming greener. The document mentions the necessity to transform the economic basis from unrenewable natural resources to renewable natural resources. Economic transformation is expected to be able to achieve a sustainable development in East Kalimantan.

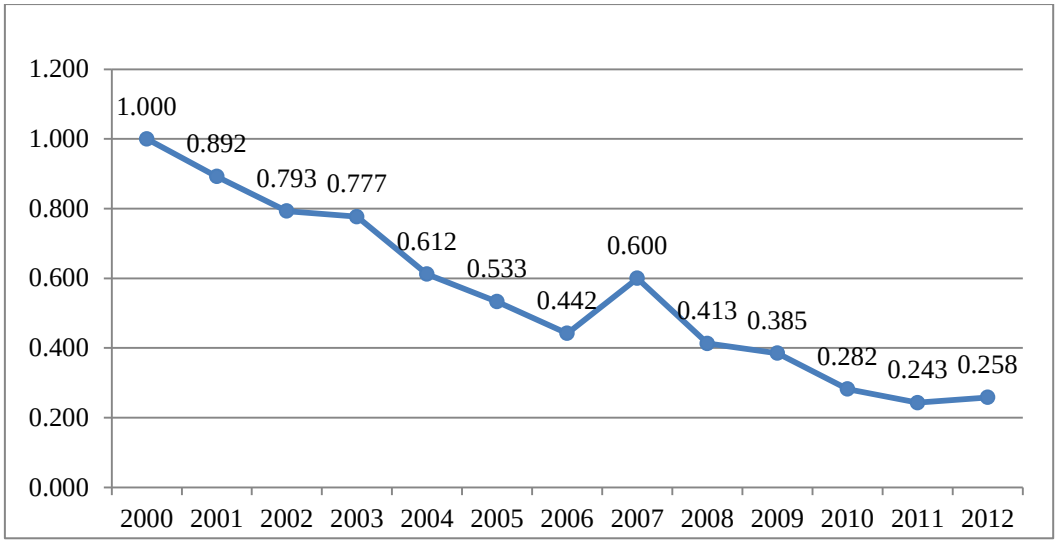

Figure 11: Efficiency Score: Natural Resource and Environmental Governance Efficiency (Year 2000-2012)

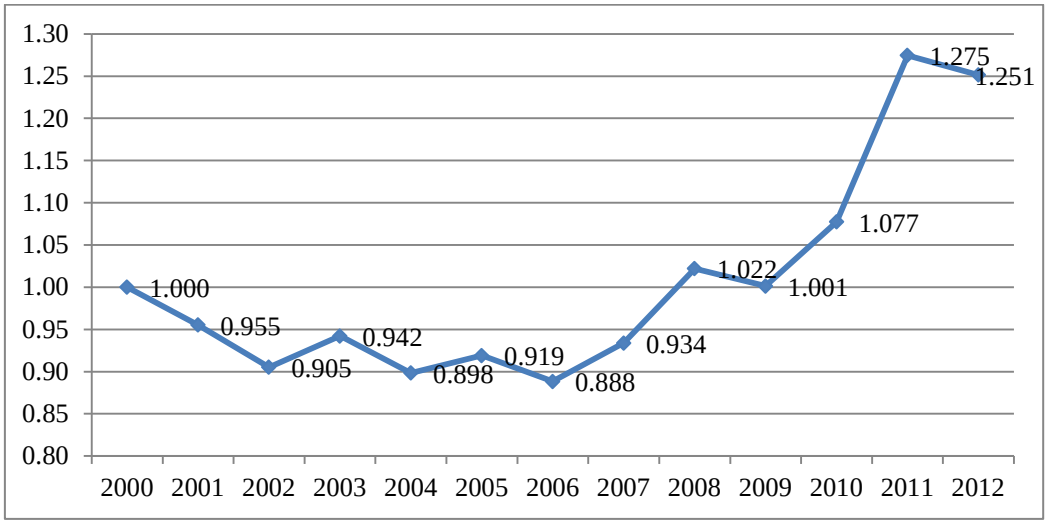

Figure 12: IGE Assessment: Integrated Sustainability Index

5. Conclusion

East Kalimantan economy is heavily relied on natural resources. It creates externalities. East Kalimantan becomes one of biggest emitter in Indonesia. In addition, rural people, who spatially are located near the forest or land use-based sectors sites, seem that they have not benefited from the economy indicating that inequality exist in East Kalimantan.

In terms of inclusiveness, both vertical and horizontal inequities are still to be problem for East Kalimantan development. This is indicated by the positive trend in the Gini Ratio values. Moreover, poverty rate mapping confirms that spatially inequality remains in East Kalimantan.

The performance of greenness aspect of East Kalimantan is indicated by emission intensity and energy intensity. During period 2000-2012, there is an increase in the emission intensity assuming that economy applies BAU practices. Moreover, there is also a tendency to use more energy per capita overtime. This suggests that the sustainability would be threatened given that there is no other new energy reserve found.

DEA model indicates that East Kalimantan becomes less efficient overtime in terms of utilizing its natural resources and environmental management. However, putting together between social, economic and environmental dimensions in Integrated Sustainability Index, the economy tends to move towards IGE. However, in detail there is fluctuation during period of study. So that, in order to ensure the economy in achieving IGE, it requires an optimal structure that considerate three aspects of IGE. Goal Programming model can be applied in order to find a new economic structure.

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