Journal of Applied Economics in Developing Countries
Vol. 2 No. 1 March 2016, Page 50 - 62

Sustainability in the Mining Town: Does the Ghost Town is Real?

Sulistiyohadi[1)]
Moersidik[2)]
Suparmoko[3)]

Abstract

Coal booming in the last ten years, made the mining industry as the backbone of the mining town. This study aims to assess sustainability at Berau and Paser District in East Kalimantan Province as a mining town; wherein 2024 the mining industry will enter the stage of post-mining. Sustainability cities assessed by comparison of GDP sectors making up the structure of the economy. The methodology is made by depth interviews with stakeholders such as Regent, mining manager and community leaders. The results showed that Berau and Paser as mining town did not sustain and failed to perform the transformation of non-renewable natural resources to empower the human resources. In last five years, the quality of Berau people more than 60% graduated from junior high school. It is not enough to make the growth sustainability. Human interaction from the outside as the miners had formed multiplier economic effect, where it fostered social and economic interaction higher than the socio-economic interaction between the local residents. Migrating miners will reduce economic rents that have been built since 1993. The potential for a real ghost town will occur after the end of mining activities although that conditions ghost town in Paser and Berau's not like in America and Europe. This condition would make the collapse of economics interaction that has been built over the years.

Keywords *: mining town, ghost town, sustainability, Berau, Paser.*
JEL : Q33, Q40, Q57

[1]) Environmental Science, Postgraduate Program, Indonesia University
[2]) Environmental Science, Postgraduate Program, Indonesia University
[3]) Environmental Science, Postgraduate Program, Indonesia University
E-mail : Sulistiyohadi@gmail.com, smoersidik@yahoo.com, suparmoko@yahoo.com

I. INTRODUCTION

Since the rise of mining minerals in various parts of the world, London Mining Journal 1999 Annual Review examined the 158 countries that have contributed significantly to the national economy of many countries. For several years, the mineral in large quantities mined from poor countries, but the results are enjoyed by rich countries.

The mining industry has a great influence on local culture. (Clauss-Ehlers and Lopez, 2002). The environmental impact management of mining activities has been carried out properly by the mining businesses. Unfortunately, that is done only to meet regulations imposed by the mining industry.

Former mining towns in the world has become a ghost town like in Arizona (Pearce, Fittsburg, lee's ferry, Jerome), New Mexico (Cerrillos, lake valley, steins mercantile, white oaks, fort union), California (bodie, calico) Utah (Grafton), Nevada (rhyolite, goldfield), Colorado (buckskin Joe) is a past phenomenon would happen in Indonesia. In addition, there are many ex-mining towns which is worth mentioning the ghost town after the end of mining activities, such as Montana City, Helena, Ninah mine in Jefferson City and Taft, who had a legacy with 2000 settlements (www.blm.gov, 2014). the cities are now abandoned, there is no human activity and becomes a ghost town. traces of settlements has become a monument to the history of human civilization.

Characteristics of the mining industry consist of the issue how a number of waste rocks very much, the economic turnaround in the region, support infrastructure, taxes and royalties, and other (Ballard and Banks, 2003; Freudenburg and Frickel, 1994; Herringshaw, 2004). The mining industry experienced significant growth, especially since regional autonomy. the condition of the mining sector has been rising rapidly since regional autonomy era. total industrial mining license granted by the regent are 10 622 licenses (Ditjen Minerba, 2014) either in the form exploration license and production operation license. one major issue is the impact of the mining industry sustainable development certainty (sustainable development), around the mine (Shields, 2000).

Berau and Paser are districts that being developed into a mining town. GDP from the mining sector as the backbone of the economy, and replace the dominance of the agricultural sector since 1993. GDP both districts more than 50% (since 2000 in Paser and 2008 in Berau) (bps Paser, 2001; bps Berau, 2009). The economic growth in the two districts is very high, reaching 41% in Paser in 2008, and 37% in Berau. Paser's mining sector is dominated by coal mining by PT KIDECO JAYA AGUNG, while Berau is dominated by pt Berau coal. coal mining in Paser and Berau as non-renewable natural resources will end in 2024.

The problems from the above are: Paser and Berau have a dependency on the mining sector, but when the mining ends, whether Paser and Berau will be a sustainable city? do Paser and Berau will become a ghost town? the research purpose was to conduct a study on sustainability Paser and Berau as a mining town, and whether Paser and Berau in will be a ghost town.

II. THEORETICAL BACKGROUND

The world bank (1996) defines sustainable development as :
"sustainability is to leave future generations as many opportunities as we ourselves have had, if not more, leaving future generations more capital per capita than we had, although the composition of the capital we leave to the next generation will be different in terms of its constituent parts than capital we have used in our generation".

The present generation should have the resources and perform a variety of options in use, but it should still maintain its existence while future generations despite having a number of natural resources that may be relatively less, but has a level of knowledge and technology that is better than man-made capital reserves more adequate. The important concept in this definition that future generations no less prosperous than the current generation. Development can be said to be sustainable if there is no inter-generational inequality problem.

Sustainable development in the hard definition is the rejection of all current activities that could damage the environment (ecology), although there is the creation of human resources and man-made capital and result in the improved welfare of future generations. (salim, 1991; suparmoko, 2012).

In recent years the contribution of tertiary education to countries economic success has become the focus of greater attention, since tertiary education is expected to support the supply of skilled workers and enhance the conditions for innovation, bringing substantial social and economic benefits (mcneil and silim, 2012). A number of studies in European countries have supported us evidence of a positive relationship between workforce education or skills and the adoption of new technologies.

Cedefop (2009) research emphasis that agriculture is still the single largest employer in the world, with 1.3 billion farmers and agricultural workers in total. Agriculture is both extremely vulnerable to climate change and a major contributor to it. It is also a major user and polluter of water, a driver of deforestation and of loss of biodiversity. Small farms are more labour-intensive. With adequate technical and infrastructure support, yields from small farms using crop rotation, manuring, natural pesticides, and other sustainable methods can match larger but often more environmentally damaging facilities. Teaching sustainability not only to policy-makers but to worker and employer organizations, civil society organizations and the public is a vital component in a just transition. Sustainability content needs to be embedded in education and training at all levels to promote clean production and consumption.

III. RESEARCH DESIGN

The research was started by collecting from data series against existing coal mined, GDP and education levels of local communities in Paser and Berau since the mining industry in 1993-2013. In 2013 became the baseline due to data available in bps Paser and bps Berau. GDP data between sectors tested for its dependency using the multikolinearitas test GDP. The researcher conducted a socio-economic survey in Paser and Berau to see the real conditions of social and

economic interaction in Paser and Berau according to GDP current year. 2014-2030 GDP predicted by linear equations based on the production of coal by PT KJA (in Paser) and pt bc (Berau).

Coal production plan by PT KJA will finish in 2023, while pt bc in 2024. Those plans are the basis for predicting GDP per sector until 2030, and then it will be presented in graphical form. The graph is analyzed descriptively according to the conditions in the field today. The research design is shown in schematic diagram in figure i.

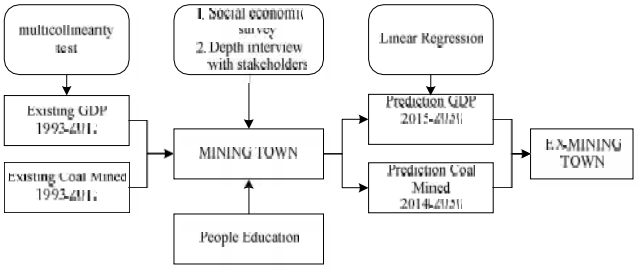
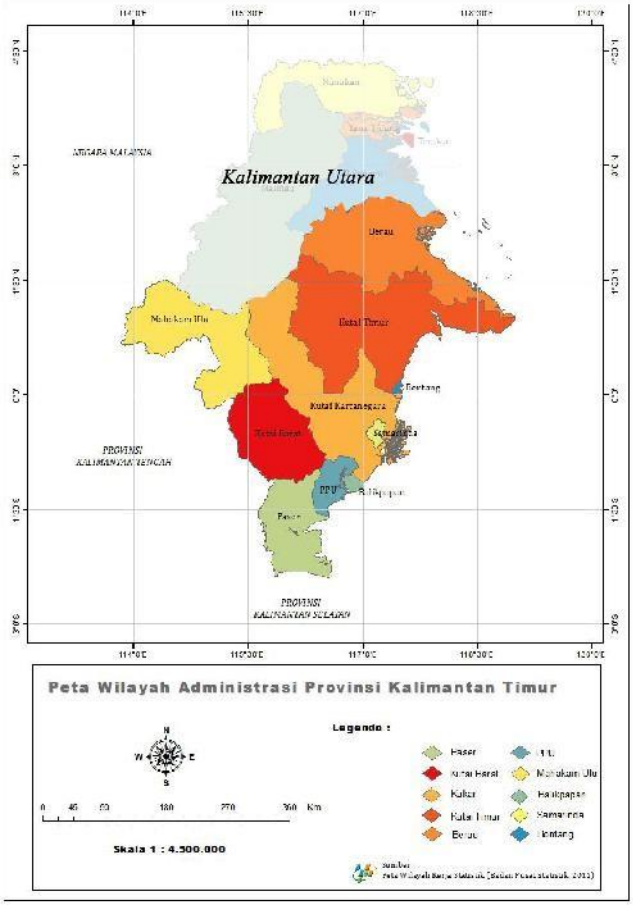


Figure 1. Schematic research design



Source : BPS KALTIM, 2015

Figure 2. Research location at Berau regency and Paser regency

IV. RESULT AND DISCUSSION

PT KJA and pt bc is the icon of Paser and Berau, because the number of employees and the many daily activities in Paser and Berau is dominated by employees of those mining company. The presences of miners in Paser and Berau have been forming of social interaction and economics interaction thus growing up another sector's activity.

Growth in other sectors is characterized by the growth of the financial sector; leasing, trade, hotels and restaurants, then the services sector. It will be evaluated about how the presence of the mining employee and other sectors employee make up the economic rent and its multiplier coefficient. Multiplier coefficient presences show how much the influence of the employee of the mining sector and other sectors.

4.1. Paser And Berau Dependence On Mining Sector

The mining sector has a role as a driver of other sectors in Paser and Berau. Its has to be evidenced by multicollinearity test. This test can be used to determine whether or not irregularities multikolinearitas classic assumption that a linear relationship between the independent variables in the regression model. Multikolinearitas test results described in the next section shows that vif> 5 shows a correlation (santoso, 2000: 76) between the mining sector and other sectors making up GDP.

Table 4.1 Multicolinearity analysis betweeen sectors against Paser GDP and Berau GDP

Variabel bebas	Paser regency		Berau regency	
	Tolerance	Vif*) Value	Tolerance	Vif value
Mining	0,004	252,443	0,012	84,507
Agriculture	0,003	375,113	0,020	49,579
Manufacturing	0,039	25,481	0,010	97,412
Water and electricity	0,001	941,157	0,003	369,206
Construction	0,003	290,115	0,004	284,695
Trade, hotel and resto	0,003	389,328	0,006	171,525
Transportation and communication	0,005	193,523	0,040	24,870
Finance and rental	0,002	657,625	0,002	405,229
Services	0,002	435,428	0,008	130,885

*)vif : variance inflation factor

Multicollinearity test to GDP in Paser and Berau in table 4.1 shows that vif> 5, which means there are correlation between the mining sector and other sectors making up GDP.

4.2. GDP Prediction In The Mine Closure Period

Paser and Berau GDP predicted based on coal production plan of PT KJA (Paser) and pt bc (Berau). In accordance with the above multicollinear test, all sectors in Paser GDP and Berau GDP have a relationship with coal production PT KJA and pt bc as shown in table 4.3, therefore, GDP forecast during the mine based on linear regression equation at equation 1-20.

Table 4.2 Coal production at Paser and Berau until post-mine

Year	Paser (x_c)[1)]	Berau (x_c)[2)]	X_p[3)]
2014	40,00	30,00	35,56
2015	40,00	30,00	38,45
2016	40,00	30,00	39,25
2017	40,00	27,00	40,66
2018	40,00	24,45	38,33
2019	40,00	20,50	38,55
2020	40,00	18,00	40,55
2021	40,00	13,20	40,58
2022	22,00	8,00	36,52
2023	9,00	4,00	37,52
2024	-	1,25	37,52
2025	-	-	37,52
2026	-	-	35,25
2027	-	-	35,60
2028	-	-	40,50
2029	-	-	38,00

Year	Paser (x_c)[1)]	Berau (x_c)[2)]	X_p[3)]
2030	-	-	36,00

[1)]coal production at Paser regency, by PT KJA (million metric ton/year)
[2)]coal production at Berau regency , by pt bc (million metric ton/year)
[3)]x_p: coal price in thousand rp/metric ton
Source : (PT KJA, 2012; pt bc, 2012)

If it is assumed that mining sector x_1; agriculture sector x_2; manufacturing sector x_3; electricity, gas & water x_4; construction x_5; trade, hotel & Resto x_6; transpostation & communication x_7; finance & rental x_8; services x_9; coal production x_c; and coal prices x_p, so,

Paser GDP $=x_1+x_2+x_3+ x_4+ x_5+ x_6+x_7+x_8+x_9$ (1)

Where:

$X_1=0,160x_c+20,153x_p-2288603,122$ ..... (2)
$X_2=0,020x_c+3,005x_p+57846,298$ ..... (3)
$X_3=0,002x_c-0,253x_p+130823,996$ ..... (4)
$X_4=0,35x_p-1908,338$..... (5)
$X_5=0,004x_c+0,362x_p+6899,430$ ..... (6)
$X_6=0,008x_c+0,536x_p+37627,228$ ..... (7)
$X_7=0,001x_c+0,125x_p+17200,530$ ..... (8)
$X_8=0,001x_c+0,205x_p+4228,292$ ..... (9)
$X_9=0,029x_c+0,25x_p+2,720$ ..... (10)

Similarly, the regression equation of Berau GDP 2014-2030 is predicted with equation;

Berau GDP$=x_1+x_2+x_3+ x_4+ x_5+ x_6+x_7+x_8+x_9$ (11)

Where :

$X_1=0,312x_c-0,429x_p-711331,44$ ..... (12)
$X_2=0,12x_c+2,609x_p+139512,940$ ..... (13)
$X_3=0,13x_c+1,387x_p+70768,613$ ..... (14)
$X_4= 0,001x_c+0,008x_p-667,702$ ..... (15)
$X_5=0,005x_c-0,049x_p+9026,756$ ..... (16)
$X_6=0,05x_c+0,083x_p+49373,023$ ..... (17)
$X_7=0,003x_c+0,274x_p+2,723$ ..... (18)
$X_8=0,003x_c-0,003x_p +2847,77$ ..... (19)
$X_9=0,013x_c+0,146x_p -5530,924$ ..... (20)

Paser dan Berau GDP prediction as equation above is shown at figure iii dan figure iv.

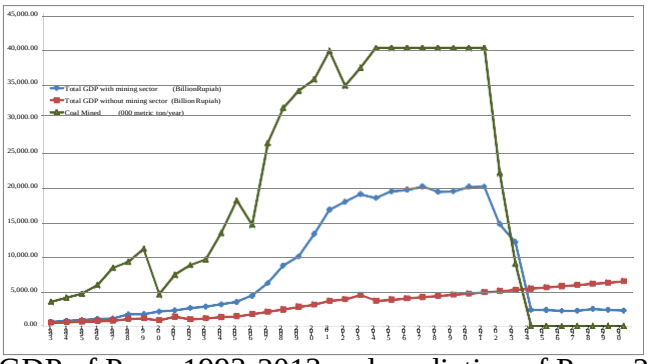


Figure 3. GDP of Paser 1993-2013 and prediction of Paser 2014-2030 (billion rupiah)

The contribution of the mining sector in Paser will finish in 2023 due to the completion of mining PT KJA. Since the declined in coal production in stages (green line), then GDP until 2030 Paser go down (blue line). GDP declined in 2017 to 2030 followed by the mineworkers migrating out from Berau. From this phenomenon, social and economic interaction that was established since 1993 will be lost. Social and economic interaction in Berau will return to the state as it was before 1993, where local communities interact with economic value that is smaller than the multiplier effect caused by mineworkers.

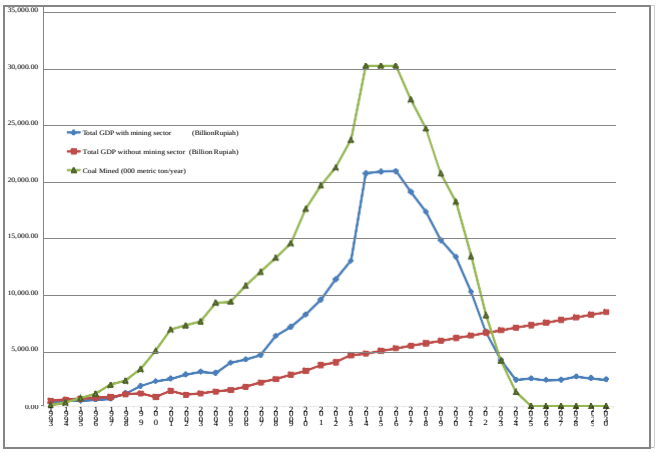


Figure 4. GDP of Berau 1993-2013 and GDP prediction of Berau 2014-2030 (billion rupiahs)

Figure iv illustrates the contribution of the mining sector in Berau will finish in 2024 due to the completion of mining pt bc. Since the decline in coal production in stages (green line), Berau GDP until 2030 go down (blue line). GDP declined in 2017 to 2030 followed by the mineworkers migrating out Berau. This resulted in social and economic interaction that was established since 1993 will be lost. Social and economic interaction in Berau will return to the state as it was before 1993, where local communities interact with economic value that is smaller than the multiplier effect caused by mineworkers.

Researchers describe the condition of Paser and Berau if the mining sector does not become the backbone of the development. Prediction Paser GDP and

Berau GDP will grow with positive gradient (see figure iii and iv in red line). However, conditions on the ground indicate that the dependency of both cities with mining sector is too high. Stakeholders such as regent, the public, and private sectors have to spend a great willingness and consistent to left from mining sector dependency.

4.3. Human Resources Quality

The quality of human resources in Paser and Berau is portrayed in public education. Figure v shows education profile Paser and Berau, which amount 74.96% of the total population only junior high school (see table iii which had simplified in figure v).

Table 4.3 average of people education level in Paser dan Berau

Graduated Education	2008	2009	2010	2011	2012	2013
No/never/not graduated SD yet	26,97%	23,68%	17,30%	23,88%	21,52%	20,63%
Graduated SD	32,14%	33,99%	36,20%	32,20%	30,06%	30,15%
Graduated SLTP/equal	21,14%	19,42%	22,50%	18,13%	20,41%	19,42%
Graduated SLTA/equal	17,34%	18,02%	17,50%	19,13%	22,47%	24,35%
Diploma/undergraduate	2,41%	4,89%	6,50%	6,66%	5,54%	5,45%
Total	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%

Source : bps kab. Paser, (2010-2013); bps kab Berau,(2010-2013); susenas, (2013)

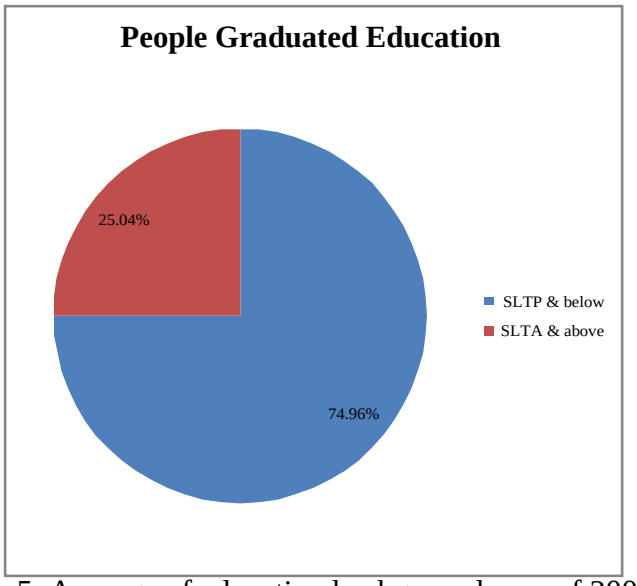


Figure 5. Average of education background year of 2009-2013

Education background shows the quality of the workers, then low levels of education have relatively low competitiveness. These workers will be much engaged in the informal sector. One of the many informal sectors filled by workers like this is farming, casual workers, trade of agricultural products, consumer goods trade.

Low levels of education tend to use natural resources to meet their self-interest. Meeting the needs of others who use the same natural resources are not taken into consideration. Therefore, the natural resources as objects suffer to meet individual needs.

Coal as a non-renewable natural resource has been mined since 1993 and shift the agricultural sector GDP has not been used for an increase in capital human resources. Sustainable development in the soft definition (salim, 1991; suparmoko, 2012), namely the transformation of non-renewable natural resources to human resources does not occur either in Paser and Berau. Therefore, the development in Paser and Berau today can be categorized not sustain.

Managing resource for future needs is relatively unplanned today. This causes potential depletion of its natural resources to meet the needs of future generations. One example of ineffective utilization is the choice of plants in plantations. The ratio of workers compared with the cultivated land area for plantation in Berau is 0.87 persons / ha, whereas the rubber productivity of 405.05 kg / ha. If it is assumed rp75.000,00 rubber prices per kg, so the economic value of that rubber plantation land is 30,4juta rupiah.

Another example of the land use was developed by farmers with agricultural undergraduate education. Those farmers cultivate the mushroom in the land 60 m^2 only. His activity gets the omzet from mushroom cultivation is nine million rupiah per month.

4.4. How The Ghost Town Can be Created

The ghost town phenomenon in Paser and Berau will occur as the decline in GDP due to the mining sector ended. Social and economic interaction from the miners and their families will be reduced in number. Miners who worked at PT KJA and pt bc will migrate out Paser and Berau. This phenomenon happened in petangis mine (located at kecamatan of pasir belengkong, kabupaten Paser) ten years ago, namely, coal mine operated by pt bhp kendilo Indonesia since the year 1993-2005. The area around the mine petangis bustling with activity miners and their families, and people who interact socially and economically, suddenly stopped when petangis mine end to coal mining operations. Miners migrated out of the area and it back into a deserted village from the bustle of the social and economic activities.

The termination of mining in Paser and Berau decrease the frequency of people who migrated to Paser and Berau for mining business. Activities directly related to accommodation, transport and hospitality business to serve the workers, experts, businesspersons and miner would be gradually reduced until none. It is that ghost town phenomenon, namely the cessation of social and economic interaction since the end of mining activities in Paser and Berau.

Ghosttown phenomenon would happen in Paser and Berau different from the ghost town phenomenon in America and Europe. There were happened to ghost town, which has legacy abandoned land that contaminated, by used oil, empty houses, and brownfields. While ghost town in Paser and Berau is the loss of the interaction between the miner and the local community are interdependent lives in accordance with the law of supply and demand.

A socio-economic survey in Paser and Berau showed that there have been no else sectors of such as manufacturing, agriculture, plantation, forestry would be grown to replace the mining sector in Paser and Berau,. Paser district currently has 11 039 hectares of agricultural land and 81 932 hectares of plantation land (oil palm, rubber, coconut, cocoa, and pepper). Berau has 9216 hectares of agricultural land and 30 752 hectares of plantation land (oil palm, rubber, coconut, cocoa, coffee and pepper). Natural resources-based agriculture may be leading the city to reduce the risk of economic downturn when the mining ended. Palm, rubber, coffee, cocoa can be upgraded to seed the processed products if any processing industry.

Manufacturing industry requires the human capital so that the industry was able to work effectively and efficiently according to economics law. When the reflect on current conditions by 74.96% of the population below the junior high educational background, human capital for the processing industry in Paser and Berau is not eligible to be used as capital for the manufacturing industry. It strengthens cedefop (2009) opinion that the content of sustainability needs to be embedded in education and training at all levels to promote clean production and consumption.

V. CONSLUSION

Paser and Berau have developed into a mining town that has a high economic growth since 1993, but the coal exploitation cannot be transformed into quality human resources until now, as evidenced by the 74% of junior high school educated. Hence, that development in Paser and Berau become an unsustainable city.

PT KJA and PT BC terminate coal mining operations would resulted the economic collapse by decline in GDP and migrating thousand miners in Paser and Berau. This raises the economic collapse as ghost town phenomenon, though different from the phenomena that occur in the ghost town other mines in the United States and europe.

The ghosttown phenomenon with economic collapse can be reduced by improving the quality of human resources for manages renewable resources existing in Paser and Berau. Stakeholders (government, private, and community) should be coordinated to accelerate development in the agricultural sector and manufacturing industry, by improving the quality of human resources, to create new economic rents, as a substitute for economic rents generated by the mineworkers.

REFERENCES

Berau Coal, PT. (2012). *Dokumen Rencana Pascatambang PT Berau Coal.* Jakarta.

BHP Billiton Indonesia. (2005). *Hutan Petangis : hutan sekunder, tambang, taman hutan raya*. Jakarta: PT Jayakarta Agung Offset.

Blm.gov (2014). *Ghost towns/historic mines*. 25 September 2014. 7 hlm. Retrieved from http://www.blm.gov/pgdata/etc/medialib/blm/mt/blm_information.Par.42819.File.dat/Ghost%20Towns.pdf.

BPS Berau. (2007). *PDRB Menurut Lapangan Usaha Kabupaten Berau.* BPS Kabupaten Berau.

BPS Berau. (2009). *PDRB Menurut Lapangan Usaha Kabupaten Berau.* BPS Kabupaten Berau.

BPS Berau. (2014). *Berau dalam angka*. **Error! Hyperlink reference not valid.**.

BPS Berau. (2015). *Kabupaten Berau dalam Angka 2014.* BPS Provinsi Kalimantan Timur.

BPS Kab. Paser (2013). *Kabupaten Paser dalam Angka 2012.*

BPS Paser. (2015). *Kabupaten Paser Dalam Angka 2014.* BPS Provinsi Kalimantan Timur.

BPS Pasir (2001). *Ikhtisar Statistik Kabupaten Pasir. Statistical Summary of Pasir Regency*. Katalog BPS 1402.6401 Pemerintah Kabupaten Paser Tanah Grogot: Badan Perencanaan Pembangunan Daerah.

BPS Pasir. (2005). *Produk Domestik Regional Bruto Kabupaten Pasir Menurut Lapangan Usaha 2000-2004*. Katalog BPS 9205.6401. Pemerintah Kabupaten Pasir: Badan Perencanaan Pembangunan Daerah, BPS Pasir.

Cedefop. (2009). *Future skill needs for the green economy.* Luxembourg: Publications Office of the European Union.

Clauss-Ehlers, C.S., Levi, Lopez., L. (2002). *Violence and community, terms in conflict: an ecological approach to resilience. journal of social distress and the homeless* **11**(4): 265-278.

Direktorat Jenderal Mineral dan Batubara. (2014). *Paparan Direktorat Teknik dan Lingkungan Mineral dan Batubara pada Pertemuan Inspektur Tambang di Seluruh Indonesia*, 12 Mei 2014.

Kideco Jaya Agung, PT. 2012. *Dokumen Rencana Pascatambang PT Kideco Jaya Agung Blok Susubang-Uko*. Jakarta.

Kideco Jaya Agung, PT. 2012. *Dokumen Rencana Pascatambang PT Kideco Jaya Agung Blok Roto-Sumarangau.* Jakarta.

Kideco Jaya Agung, PT. 2012. *Rencana Reklamasi Lima Tahunan Periode 2013-2017 PT Kideco Jaya Agung Blok Roto-Sumarangau.* Jakarta.

McNeil, Claire and Silim, Amna. (2012). *Further education? Tertiary education and growth in the UK's new economy.* UCU report.

Salim, E. (1991). *Pembangunan Berkelanjutan.* Jakarta: Prisma.

Santoso,Singgih. (2000). *SPSS Statistik Parametrik.* Jakarta: PT. Elex Media Komputindo.

Shields, Deborah J., Solar, Slavko V. (2000). *Challenges to sustainable development in the mining sector. mining and sustainable development ii challenges and perspectives44 _ UNEP Industry and Environment – Special issue 2000 ISSN 0378-9993 Industry and Environment*. **Volume 23** Special Issue (2000).

Suparmoko, M., Ratnaningsih, M. (2012). *Ekonomika Lingkungan-Edisi Kedua*. Yogyakarta: BPFE.

Suparmoko, M., Sudirman, D., Setyarko, Y., Wibowo, H. S. (2014). *Valuasi Sumberdaya Alam dan Lingkungan*. Edisi Pertama. Yogyakarta: BPFE.

World Bank. (1996). *Toward environmentally sustainable development in sub-Saharan Africa: a World Bank agenda. Development in practice.* Washington, D.C. : The World Bank.