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Prospect of potential nickel added value development in Indonesia

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Abstract: The effort of increasing mineral added value as a whole both vertical and regional is necessary required to improve the national income and regional development. The added value of nickel could be improved through developing the downstream industry such as stainless steel, non-ferrous alloys, other steel alloys, electroplating and chemicals, besides also its regional added value. The purpose of the study is to clarify the beneficial of nickel added value development for the wealth of the people of Indonesia through the improvement of the nickel sector economic added value which is beneficial for the national economic growth and the enlargement of the regional added value which is mainly beneficial for the welfare of the local people who live within the surroundings of the mine site. In fact, the development of both nickel added values have been carried out by the mining companies, even though it needs encouragement and enlargement within the coming years to increase its role to the economic development nationally as well as regionally or locally.

Keywords: Nickel, Added Value

1. Introduction

Indonesia is blessed to be natural resourceful including minerals such as oil and gas, coal, metallic-, non-metallic-, radio active-minerals, and rock. Since 1970s, Indonesia has produced several varieties of metallic minerals for instance iron sand, bauxite, tin, copper, gold, silver and nickel. Step by step Indonesia developed added value processing technology, e.g., gold/silver, tin, aluminum, copper and nickel. Particularly, nickel has been produced as nickel matte by PT INCO Tbk, fero-nickel by PT Aneka Tambang Tbk and nickel metal would be produced by PT Weda Bay Nickel in 2018 (Figure 1.1). In term of nickel, it is very prospective to develop downstream industry such as stainless steel, non-ferrous alloy, electroplating and so on to obtain its higher added value so beneficial for the national as well regional economy. This program is also included in the Indonesia master plan of enlargement and accelerating economic development (MP3EI) 2011-2025 (Anonymous a, 2011). The three main metallic minerals which are included in the master plan are nickel, copper and bauxite out of 22 main multi-sectors activity programs. Nickel resources in Indonesia are amounted to around 2.8 billion tons of ore (or 43.6 million tons of nickel metal or about 19.8% world nickel metal resouces) and in term of reserves of about 576.9 million tons of ore (or 13.2 million tons of nickel and cobalt metals) (Anonymous b, 2011).

The simple meaning of added value is the result of techno-economic transformation from the initial condition of mineral resources and commodity toward the condition with the greater value of economic, utilization and usefulness than before, then this new condition would contribute positive impact upon the economic, social and culture at the level of global, regional, national and local (Hill, 1997).

As stipulated in the Indonesian Constitution article 33 verse 3 that earth and water and all the materials contained therein must be utilizedd for the welfare of the Indonesian people at the utmost (Figure 1.2). Since the natural resources that is developed into the economic capital through techno-economic transformation and further into social capital for the people as a whole facing their future life brightly and resiliently based on prosperity, security and global environmental approaches. Especially, Indonesia is very densely populated and part of them live in the lagged regions including within the surroundings of the mine sites that mainly located in the remote areas. As a whole, it is encouraged utilizing the mineral resources that

would support both the national economic growth and the regional development especially for the lagged regions. Mostly, the local people in the remote areas live at the level of very low income group. (Soelistijo,2012; Hill, 1997; Izard, 1975; Mangiri, 2000).

The aim of this study is to clarify the potential of the nickel added value, both in the aspect of economic or vetical added value and regional one, in the mining sector development in Indonesia. Its meaning in business as usual, mineral added value is only meant as vertical added value and does not touch the regional one.

The spirit of charity of the mining company to allocate fundings for creating net social gain (NSG) as part of social corporate responsibility (CSR) is expected increasing from

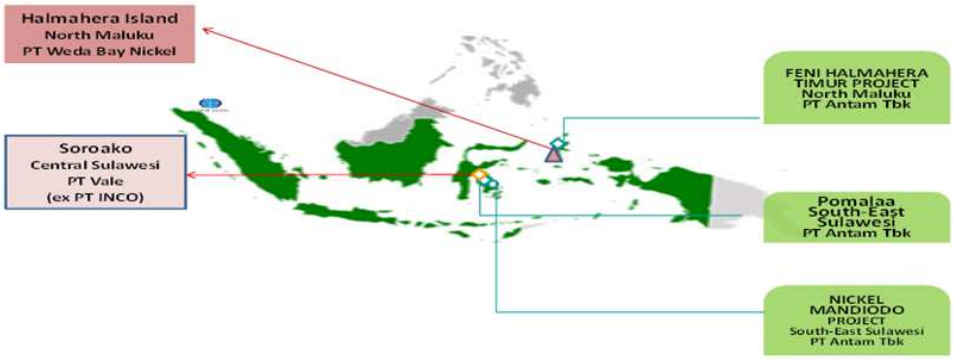

Figure 1.1. *Location of nickel mines in Indonesia*

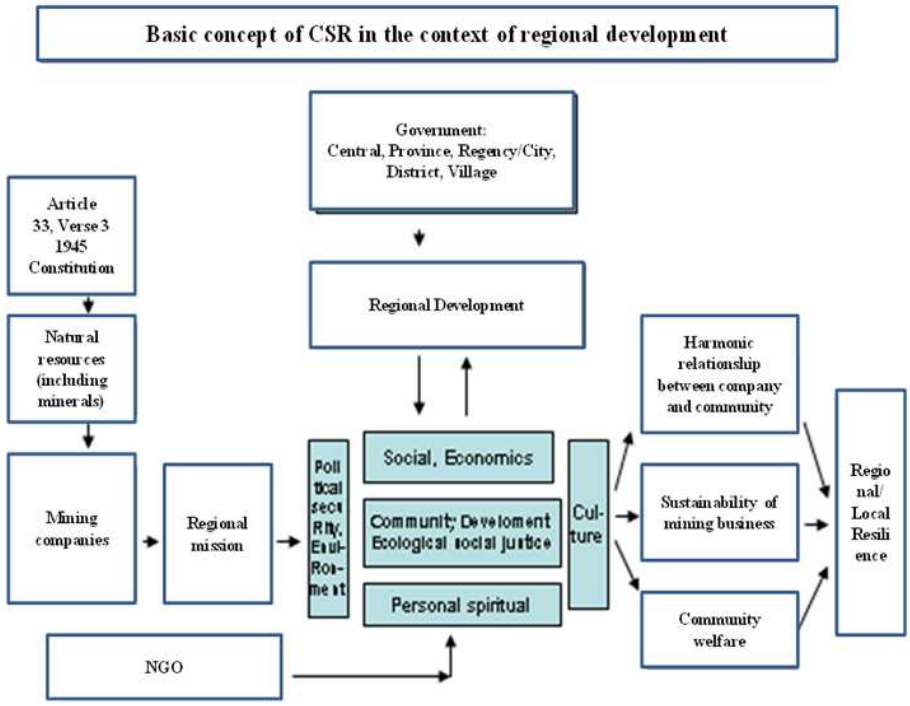

Figure 1.2. *The relationship between the Indonesian Constitution and the mining development in the context of regional development*

time to time within the coming years, however it would be depending on sphere of good corporate governance per se because it is not based on regulation but just persuasion for humankind.

2. Theory and Methodology

The fields of added value in the mineral resource development is that may include sector as well as regional added value.

- Sector added value means the value gained by the process of vertical enrichment and it can contribute to the national income or gross domestic product (GDP) or upstream-downstream added value. This macroeconomic added value could create multiplying effects that could be measured by using economic multiplier and linkages.
- The another added value is regional one meant as the beneficial for the local people coming from such as corporate social responsibility (CSR). The mining company as the servant of the community should implement community development as translation of their CSR for the development of humankind as well. Those two types of added value

could measure the beneficial of the mining activity in the economic field at the level of national as well as regional.

The dimension of added value in the economic development could be divided into sector added value and regional one (Figure 2.1).

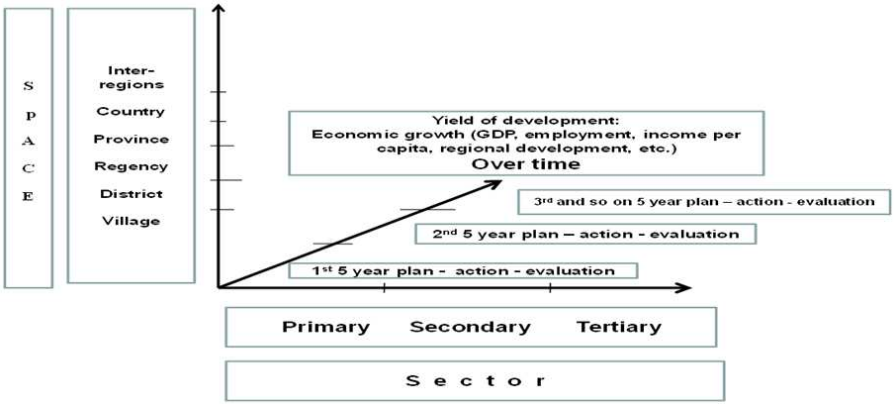

Figure 2.1. *Dimension of added value in the economic development*

Sector added value could be accumulated as GDP (Y) to proceed economic growth.

Y = Consumption (C) + Investment (I) + Government Spending (G) + Export (X) – Import (M); or from the primary input factors:

Y = L (Wages & salary) + D (Depreciation) + T (Indirect business tax) + Sub (Subsidy) + Sur (Surplus).

Other indicators could be expressed as multiplying economics (economic multiplier) . (Miernyk, 1965, 1982; Mangiri, 2000; Richardson, 1979; Isard, 1975; Soelistijo, 1984, 2004; Soelistijo, et al., 2002).

The other added value is in the form of regional development added value (physical and non-physical development) to proceed equitable development across-regions and interregions that may include corporate social responsibility and community development.

Several indicators, among others, are:

> Regional Social Cost-Benefit Analysis

PVNB (Present value net benefit) = $\sum_{m} \sum_{n} Zm\,(1+r)^{n}$;

r= (1-i) / (1-f) -1.

where Zm = Net benefit; r (real rate of return on investment) = (1+i)/(1+f)–1; i= rate of interest; f= rate of inflation. (Soelistijo, 2004; Soelistijo, et al, 2003).

> Net social gain (NSG = R(evenue) – C (ost) + Net External Effects (Bulmer-Thomas, 1982; Pearson, 1974, Soelistijo, 2013).

The simple model of techno-economic transformation could be formulated as the followings:

$Y = f(L,K,R,E,I,Lw,Z,O)_T$

Techno-economic transformation

where

Y = Output (in the forms of goods and services);
f = function;
L = Human resources (labor);
K = Capital;
R = Natural resources (mineral, land, geology, geography);
E = Environment (physical, non-physical (social, culture);
I = Information;
Lw = Law (in the case of Indonesia: Law No.4/2009; MER Ministerial Decree No.11/2012);
Z = Policy (in the case of Indonesia ,e.g.: Constitution 1945 Article 33 Verse 3);
T = Technology.
O = Others

3. Analysis

The realization of the master plan requires some strategy of acceleration of development to achieve the goal of added value, i,e.:

a. Human resource: competent, high culture and competitive.

b. Capital: government ownership in the mining business and downstream industry development.

c. Natural/Mineral resources: strong national bargaining.

d. Environment: physical (infrastructure) and non-physical environment (economic, social, culture) as a whole.

e. Information: supervising the global information (marketing, trading, capital formation).

f. Law: conducive and positive support for enterprise development.

g. Policy: balancing with the potential of mineral resources so beneficial for the national as well as local development.

h. Technology: creating productivity leap.

i. Other variables.

The 3 metallic mineral commodities that included in the 22 main program activities of MP3EI are : Nickel, Copper and Bauxite (Aluminum). The existing mining companies which are competent in nickel are

- PT Aneka Tambang Tbk. (The State-owned company) in South-East Sulawesi Province producing fero-nickel and

North Maluku Province still in project toward producing nickel metal; and

- PT Vale ex PT INCO Tbk. In South Sulawesi producing nickel matte.
- PT Weda Bay Nickel is carrying out the nickel project that would produce nickel metal in 2018 by using hydrometallurgical (Eramet) process in Halmahera Island in North Maluku Province.

These three companies could be expanded in the downstream industries and accompanied by other downstream companies to gain added value of nickel. Tree of nickel industry could be seen on Figure 3.1, where the existing industry is in fero-nickel and nickel matte, and the more downstream that could be developed is in the fields of building, ship, automotive, defense, electronic casing etc.

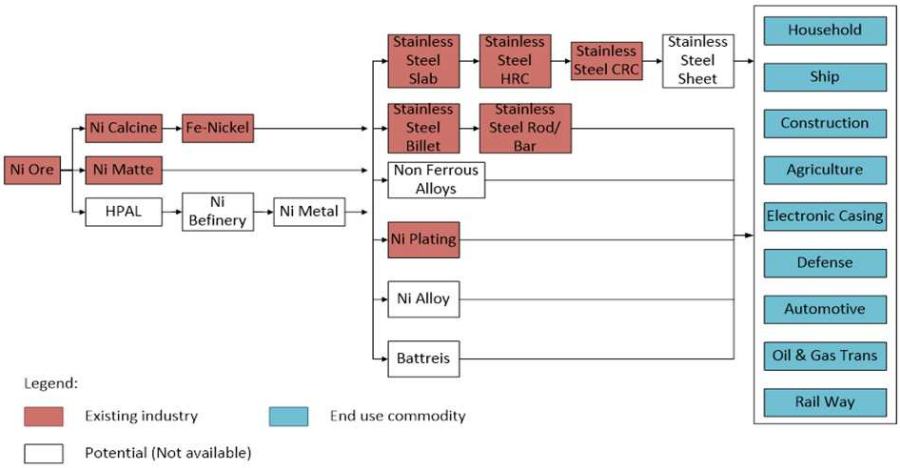

Figure 3.1. *Tree of Nickel Industry*

Especially in the case of stainless steel industry could be very potentially developed to support the downstream industry such as building, oil and gas transportation, automotive, railways, defense that is very prospective in the near future (Figure 3.2).

The present profile of nickel, copper and bauxite industry from upstream to downstream could be seen on Table 3.1. In particular, the case of nickel could be figured out that its resources are about 26 billion tons of ore, reserves 0.6 billion tons of ore, mining production 26.4 million tons of ore. The existing plant is fero-nickel (PT Antam Tbk.) 2.95 million tons/year, Ni in matte (PT Vale ex PT INCO Tbk.) 6.08 million tons/annum, and plan of development is Weda Bay nickel (2016) 6 million tons, NPI PT Antam 0.5 million tons (2014) and Fe-Ni PT Antam 2.95 million tons (2016).

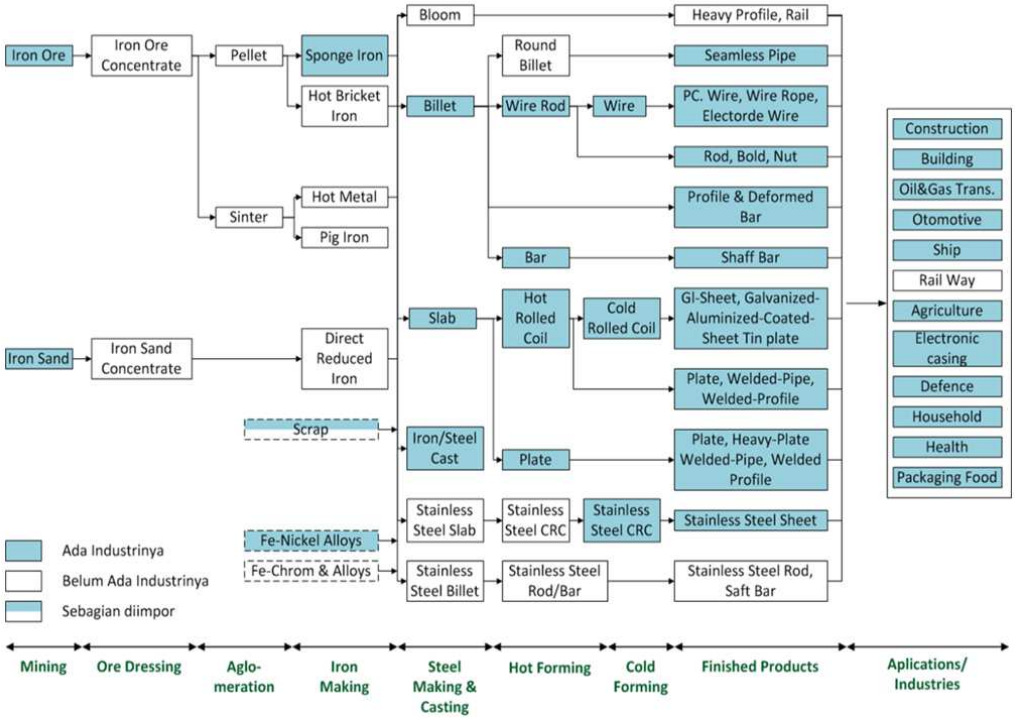

Figure 3.2. *Tree of National Steel Industry*

Table 3.1. *Present Condition of Nickel, Bauxite and Copper in Indonesia*

Commodity	Resource/Reserve (tons ore)		Mining Production (2010)	Processing Industry	Prod. Capacity of
Copper	Resource	4,925,066,645	Cu Concentrate (tons)	**Existing**	
			3,466,770.93	- Smelting Gresik	1,000,000
	Reserve	4,161,388,377		**Plan**	
				- Nusantara Smelting (2014)	800,000
				- Global Investindo (2015)	1,200,000
				- Indosmelt (2014)	400,000
				Total Capacity	**3,400,000**
				Balance	**66,771**
Bauxite	Resource	551,961,397	Bauxite (tons)	**Plan**	
			5,490,356.83	- SGA PT Antam (2014)	4,000,000
				- CGA PT Antam (2014)	1,100,000
	Reserve	179,503,546		- Harita Prima Abadi (2014)	2,000,000
				Total Capacity	**7,100,000**
				Balance	**8,390,357**
Nickel	Resource	2,633,500,434	Nickel ore (tons)		
			26,380,000	**Existing**	
				- FeNi PT Antam	2,950,000
	Reserve	567,914,000		- Ni in Matte PT INCO	6,080,000
				Plan	
				- Weda Bay Nickel (2016)	6,000,000
				- NPI PT Antam (2014)	900,000
				- FeNi PT Antam (2014)	2,950,000
				Total Capacity	**18,880,000**
				Balance	**7,500,000**

Source: Ministry of Mineral and Energy Resources, Indonesia, 2012, re-updated.

Table 3.2. *Price trend of nickel*

Year	Price (US$/Ton)
1990	5,560
2000	5,650
2005	14,777
2011	22,909
2025*)	25,000 – 52,000

Price of nickel ore is US$25/Ton, the added value of nickel metal is greater than that of 200 times in 1990 and 1000 times in 2011
***) Based on linear projection and moving average.**

Price trend of nickel was US$ 5,560/ton in 1990 increased almost three times up to US$ 14,777/ton in 2000, and US$ 22,909 in 2011 or 4 times greater. And it is predicted that the price would be US$ 25,000/ton or more in the year of 2025 due to the ever increasing demand for nickel to meet the demand of its downstream industry (Table 3.2, Figures 3.3 and 3.4).The linear equation of the historical regression is Y= 923.6 x +2E+06, R2 = 0.520, where Y is price trend and x is years (1990-211). And this equation would be used for projection of price up to the year of 2025, besides also by using moving average.

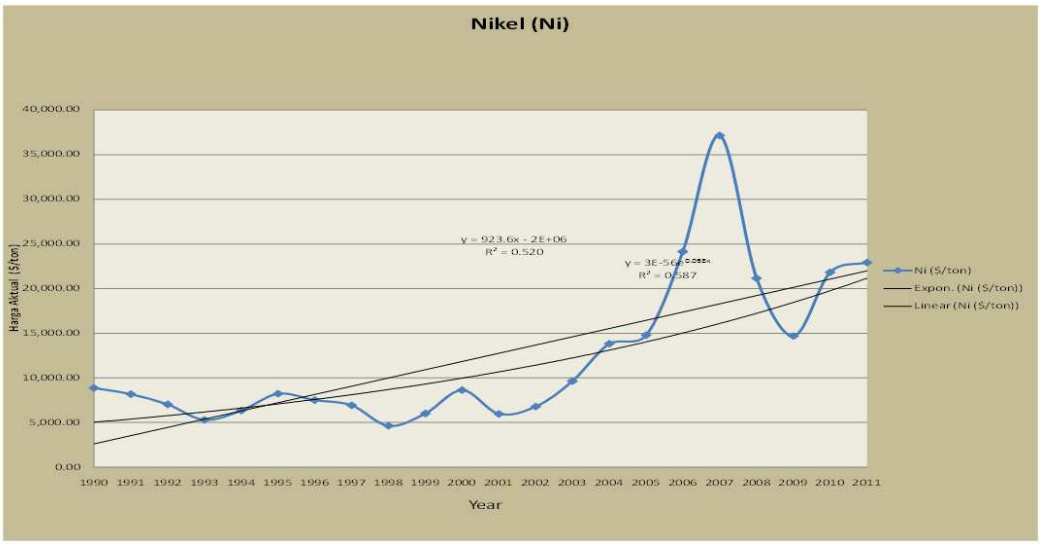

Figure 3.3. *Graph of Nickel price trend, 1990-2011*

Comparison between nickel and other mineral commodities, the trend of price within 1990-2012-2025 could be seen on Figure 3.4, by using moving average projection. It shows that the price of this group of mineral commodities tends to increase 2-3 times or more up to the year of 2025.

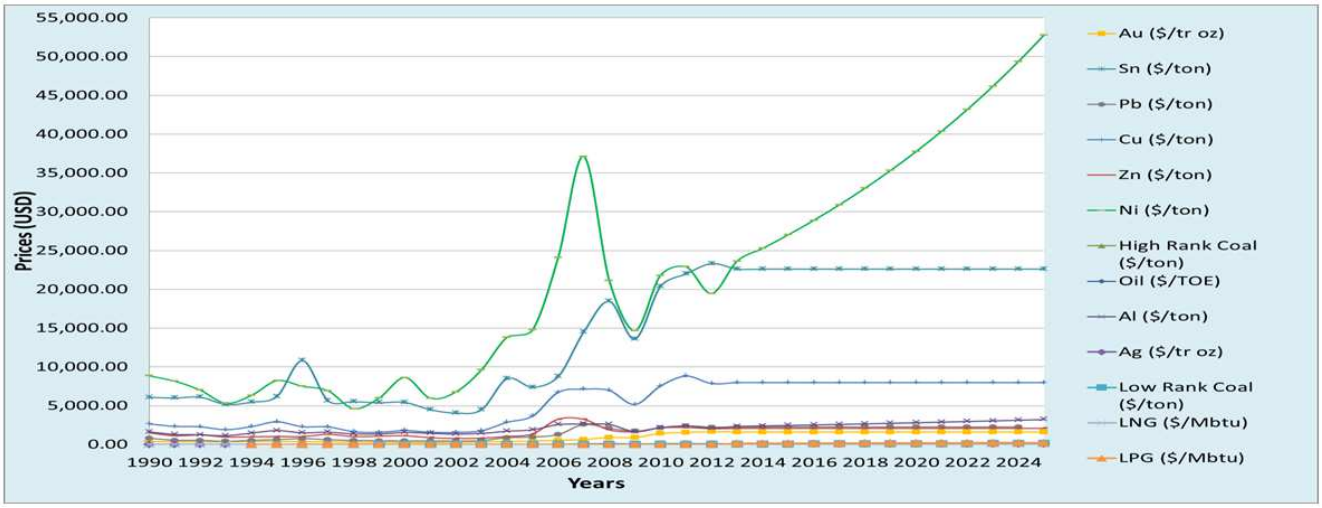

Figure 3.4. *Trend of the several mineral commodities up to 2025*

The potential users of nickel metal among others, are the industry of stainless steel, alloy steel, non-ferrous alloys, other steel alloys, electroplating and chemicals (Table 3.3).

Stainless steel industry is the largest nickel consuming downstream industry, and this track could be followed by Indonesia.

Table 3.3. *World nickel production and industrial consumption*

World nickel production		**Industrial Consumption**	
Region	%	Industry	%
America	24	Steenless steel	65
Asia	19	Non-ferrous alloy	12
Europe	37	Othe steel alloys	10
Oceania	15	Electroplating	8
Africa	5	Others inc. chemicals	5
Total	**100**	**Total**	**100**

Source: International Nickel Study Group, 2008.

Contribution of hard mineral and coal, where nickel in it, to the Indonesia GDP since 1970s, 1980s, 1990s up to the present tends to increase from less than 1% (out of IDR 12.6 trillion in 1970s) to 2% up to 6.77 % in 2011 out of the GDP of IDR 7,422 trillion (Table 3.4). The average declining share of oil and gas from 16% per annum by the year of 2000 down to 11% per year beyond 2000 was compensated by the increasing share of coal and (hard) minerals including nickel from 1.64% up to 5.9% per annum within the same periods. Even though the price of oil was increase, however, followed by the declining the quantity of production, from around 1.5 bilion barresl per day by the year of 2000 down to less than 1 billion barrels per annum beyond the year of 2000 due to the declining oil reserves. In this case the current share of nickel is of about 0.2% per annum. In addition that both the quantity and the price of coal and hard minerals were increase within the last 10 years and on.

Table 3.4. *Contribution of mineral (oil, gas, coal and hard mineral) to the Indonesian GDP (based on current price)*

Year	**GDP IDR Trillion**	**Oil, gas, mineral and coal**		**Oil and gas**		**Mineral and coal**	
		IDR Trillion	**%+)**	**IDR Trillion**	**%+)**	**IDR Trillion**	**%+)**
1970s	12.60	20-91	19.80	2.40	19.05	0.10	<1
1980s	101.70	15-97	20.56	19.64	19.31	1.27	1-2
1983	73.70	15.97	21.67	15.35	20.83	0.62	0.84
1985	94.49	19.50	20.64	18.84	19.94	0.66	0.70
1989	167.18	27.27	16.31	24.73	14.79	2.54	1.52
1990	196.92	33.86	17.59	29.92	15.19	3.94	2.00
1995	454.51	51.60	11.35	44.53	9.80	7.07	2.55
1997	627.69	59.99	9.55	49.66	7.91	10.33	1.64
1999	1109.98	144.51	13.02	106.39	9.58	38.13	3.43
2000	1389.77	167.69	16.77	117.16	13.43	50.54	3.34

Year	GDP IDR Trillion	Oil, gas, mineral and coal		Oil and gas		Mineral and coal	
		IDR Trillion	%+)	IDR Trillion	%+)	IDR Trillion	%+)
2005	2774.28	309.01	16.06	177.61	11.35	131.41	4.75
2006	3339.22	366.52	16.13	200.08	11.15	166.44	4.98
2008	4948.69	541.33	15.86	283.28	10.65	258.05	5.20
2009	5606.20	592.06	10.56	254.95	4.55	337.11	6.01
2010	6446.85	719.71	11.15	290.47	4.49	429.24	6.67
2011	7422.78	879.51	11.90	371.82	5.16	507.68	6.77
2012	8241.86	970.60	11.77	382.70	4.64	587.90	7.13
Average 1970-1999			17.75		16.33		1.64
Average 2000-2012			13.40		11.51		5.86

Source: Badan Pusat Statistik, Indonesia, 1970's, 1980's, 1990's, 2000's-2012; Directorate General of Mineral and Coal, Indonesia, 2011; +) re-calculated.

Trend of commodity share in the Indonesia balance of trade between oil/gas and non-oil and gas (where hard minerals and nickel in it) could be seen in Figure 3.5 and Table 3.5. It can be seen that the Indonesian balance of trade (BOT) was still positive and steady especially within the last deacade. The increasing average export growth rate from 6.0% within 1984-1999 up to 23.42% in 2000-2011 was followed by the greater increasing import growth rate from 4.16 up to 42.38 per annum within the same periods. Then the Government of Indonesia would launch the prohibition the exporting mineral as raw material since 2014, under the spirit of how to increase the mineral added value. The regulation was released in the year of 2012 but would be valid in 2014. The average growth rate of import (42.30%) is greater than the average growth rate of export (23.42%) within the last dedace, it indicates that the demand for the imported capital goods, raw materials and consumptive goods is very high required by the increasing growth of development.

Figure 3.5. *Graph of the trend of commodity share in the Indonesia balance of trade*

Table 3.5. *Progress of Indonesia balance of trade of commodity 1984 – 2011 (US$ million)*

Year	Total export (US$ million)	Total import (US$ million)	Total BOT*) (US$ million)	Oil and gas BOT (US$ million)	Non-oil and gas BOT (US$ million)	Export growth rate (%)+)	Import growth rate (%)+|
1984	21,887.8	13,882.1	8,005.1	13,231.3	(5,315.6)	3.51	(15.10)
1985	18,280.7	10,259.0	8,321.6	11,436.2	(3,114.6)	(15.11)	(26.10)
1986	14,805.0	10,718.4	4,086.6	7,190.2	(3,103.6)	(20.11)	4.48
1987	17,135.6	12,370.3	4,756.3	7,488.1	(2,722.8)	15.74	15.41
1988	19,218.5	13,248.5	5,970.0	6,772.5	(8,025.0)	12.16	7.10
1989	22,158.9	16,359.6	5,799.3	7,483.6	(1,684.3)	15.30	23.48
1990	25,675.3	21,837.1	3,838.2	9,150.6	(5,312.4)	15.87	33.48
1991	29,142.4	25,868.9	3,237.5	8,584.6	(5,311.1)	13.50	18.46

Year	Total export (US$ million)	Total import (US$ million)	Total BOT*) (US$ million)	Oil and gas BOT (US$ million)	Non-oil and gas BOT (US$ million)	Export growth rate (%)+)	Import growth rate (%)+|
1992	33,966.9	27,279.7	6,687.2	8,555.8	(1,868.6)	16.55	5.45
1993	36,823.0	28,327.8	8,495.2	7,575.3	919.9	8.41	3.84
1994	40,053.4	31,983.5	8,069.9	7,326.2	743.7	8.77	12.90
1995	45,481.0	40,628.7	4,789.3	7,553.6	(2,764.3)	13.39	27.03
1996	49,814.9	42,928.5	6,886.3	8,126.3	(2,239.9)	9.68	5.66
1997	53,443.6	41,679.8	11,763.8	7,968.4	4,065.4	7.28	(2.91)
1998	48,847.6	27,336.9	21,510.7	5,218.4	16,292.3	(8.60)	(34.41)
1999	48,665.4	24,003.3	24,662.1	6,111.1	18,551.0	(0.37)	(12.19)
2000	62,124.0	33,514.8	28,609.2	8,347.1	20,262.1	27.66	35.30
2005	85,660.0	57,700.9	27,959.2	1,773.8	26,185.3	19.85	15.67
2008	137,020.4	129,197.3	7,823.1	1,426.7	6,396.4	17.26	87.75
2011	203,496.6	177,435.0	26,061.1	775.5	25,285.5	28.97	30.79
Average 1984-1999						6.00	4.16
Average 2000-2011						23.42	42.38

BOT (balance of trade) = export – import.
Source: Indonesia Ministry of Trade, 1984-2012, +) re-calculated.

Table 3.6. *Surplus multipliers of the Indonesia economic sectors (based on I-O Table 2005 updataed in 2008)*

Priority	Sector	Surplus multiplier
I	Other downstrean processing industries	4.32
II	Industry of food and beverage	3.35
III	Electricity, gas and water	3.02
IV	Construction	2.77
V	Restaurant and hotel	2.60
VI	Transportation and Communication	1.91
VII	Livestock	1.78
VIII	Services	1.75
IX	Government administration, Defence	1.74
X	Agriculture plants	1.58
XI	Trade	1.56
XII	Fishery	1.47
XIII	*Mining/Quarrying*	*1.45*
XIV	Financial institution, real estate, business services	1.43
XV	Forestry	1.42
XVI	Pady	1.40
XVII	Other food plants	1.37

Surplus multiplier is calculated by using formula: SMj = {∑vj bij / vj} / kj bij, based on Input-Output Model (the 2005 Indonesian I-O Table updataed in 2008), where SMj = surplus multiplier of sector j, vj = added value direct coefficient of sector j, bij= Leontief inversed matix, and kj= capital or depreciation direct coefficient.

In principle, it is shown that beyond 2008 the share of oil and gas declines and the role of non-oil and gas increases, where the role of hard minerals in the non-oil and gas is dominant. It is intended that within the coming years the development of the coal and hard mineral downstream industries should be encouraged and enlarged through the government regulation that the export of mineral as raw material is not allowed any longer. In fact, that the surplus multiplier of the other (downstream) industries is very high of 4.32.

In fact the economic surplus multiplier of mining sector is not very high (1.45), it means that its added value needs to enforce through developing the downstream industry (Table 3.6). It means that its added value needs to enforce through developing the downstream industry including the downstreanm industry which consumes nickel metal such as stainless steel, besides other metallic and coal industry like copper, bauxite, and coal liquefaction and gasification as well.

From the view of regional added value it is found out that the linkage effects of the mining industry on the regional or local social economics using NSG model still need to encourage. The Net Gain Coefficient comes up with 2.54% up to 4.60% (Table 3.7). It means that the NGC shows how much portion of the mining companies revenue contributes their share to the wealth of the local community. For instance, the increasing productivity of capital (Y/K, where Y is GDP and K is capital formation) from 9.61 in 1993 up to 9.81 in 2006 and productivity of labor (Y/L, where Y is GDP and L is labor) from 58.33 in 1993 up to 89.68 in 2006 in South Sulawesi where PT INCO (now is PT Vale Indonesia) operates the nickel mining could also create net social gain (NSG) with net gain coefficient (NGC) from 1.7% in 2000 up to 2.6% in 2006 for the local people in the forms of excess payment, and several slinkages in terms of fiscal, final demand, technological, backward and forward ones (Soelistijo, 2011a, 2013; PT Aneka Tambang Tbk, 2004; PT INCO, 2005). Nickel minings are located in

the provinces of South-East Sulawwsi (PT Aneka Tambang Tbk (the State-owned Company), South Sulawesi (PT INCO Tbk then continued by PT Vale Indonesia), and North Maluku in Halmahera island (PT Weda Bay Nickel Indonesia/PT WBNI). These three locations of nickel ore mines are well recpectively developed by PT Aneka Tambang that produces 20,000 tons of nickel metal per annum in the form of fero-nickel, PT INCO (PT Vale Indonesia) of around 80,000 tons of nickel metal per year in the form of nickel matte for the time being, and PT WBNI would be of 70,000 tons of nickel (and cobalt) metal since the year of 2018 by using hydrometallurgical process (Eramet). So that, Indonesia would produce nickel metal at least 170,000 tons per annum since the next 2018. And this is expected that it could drive the Indonesian economy nationally as well as regionally. Hopefully, it is planned that Indonesia would be able to develop stainless steel plant within the coming decades in the effort of increasing the downstream nickel added value. (Soelistijo, 2013).

Table 3.7. *The linkage effect of nickel mining companies in Indonesia on the regional or local social economies using NSG model*

Variable	Soroako nickel mine (PT INCO/PT Vale Indonesia) (South Sulawesi Province)	Gebe nickel mine (PT Aneka Tambang Tbk) (North Maluku Province)	Pomalaa nickel mine (PT Aneka Tambang Tbk) (South-East Sulawesi Province)
Output (IDR billion)	8677.8	108.2	106.9
Input (IDR billion)	n.a.	107.1	106.7
1. Economic rent (IDR billion)	1.6	0.1	0.8
2. Net External Effect (NEE) (IDR billion)	219.0	4.8	4.1
Consisted of:			
- Backward and forward linkages		0.6	0.6
-Fiscal linkage		2.9	0.8
-Final demand linkage		1.1	2.4
-Technological		0.2	0.3
3. Net Social Gain (NSG) (IDR billion)	220.6	4.9	4.4
4. Net Gain Coefficient (NGC)	0.0254 (2.54%)	0.0460 (4.60%)	0.0421 (4.21%)
Total asset (IDR billion)	n.a.	n.a	69.8
5. Economic rent ratio	n.a	0.1	0.748

Source: Soelistijo, 2013. NSG = R – C $\pm$ NEE, NGC = NSG/ R; where NSG is net social gain, R = revenue, C = cost, NEE= net external effect equals econmic rent + excess payment + backward linkages + foward linkages + fiscal linkagrs + final demand linkages + technological linakges; and NGC is net gain coefficient.

CSR study program was just initiated by Mineral Technology Development Center (MTDC) in the early 1990s and resulted CSR studies of the only several mining companies.

It is intended that the every mining company in cooperation with the related research institutions and universities to carry out CSR studies from now and on to anticipate the update data and information due to its important evaluation for the national interest for frontier development.

In fact, Directorate General of Mineral and Coal as the competent institution in this program, just initiating pilot CSR studies project in 2013 in cooperation with the universities and research institutions, and the result has not yet come up.

4. Concluding Remarks

The effort of increasing mineral added value as a whole both vertical and regional is necessary required *to improve the national income and regional development.*

The added value of nickel could be improved through developing *the downstream industry such as stainless steel, non-ferrous alloys, other steel alloys, electroplating and chemicals,* besides the regional added value. Actually, the present contribution of hard mineral (and coal) to the Indonesian economy is around 6.0% - 7.0% of GDP, where nickel as part of hard mineral contributing about 0.2% of GDP. Besides, it is believed that if the mining companies which generally operates in the remote areas also contributing regional development, so that they will be directly developing the lagged regions through regional development program in the forms such as their CSR programs (with Net Gain Coefficient (NGC) of the nickel mining of about 2.5-4.6% or greater) in the coming years especially in the developing countries like Indonesia.

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