

ANALYSIS OF TERM OF TRADE (TOT) FOR INDONESIA BAUXITE

ANALISIS TERM OF TRADE (TOT) BAUKSIT INDONESIA

HARTA HARYADI

R & D Centre for Mineral and Coal Technology
Jalan Jenderal Sudirman 623 Bandung 40211,
Ph. 022 6030483, fax. 022 6003373
e-mail: hartah@tekmira.esdm.go.id

ABSTRACT

Indonesia does not have a processing unit for bauxite. As a result all raw materials are exported. In contrast, the alumina is imported to fulfill the domestic need for aluminum industry. In terms of evaluating bauxite export, term of trade (TOT) analysis was conducted. Method used to calculate the TOT is carried out using net barter of TOT formula. The parameter include the export price compared to the import one. If the bauxite price increases and the import price decreases, the TOT is surplus. Contrarily, if the export price decreases and the import price increases, the TOT is deficit. To calculate the ratio of the export volume against the import volume used the grass barter of TOT. The measured parameter is the export volume compared to the import one. If the export volume increases and the import decreases, the TOT is surplus. On the other hand, if the export volume decreases and the import volume increases, the TOT is deficit. In 2003, the net barter of TOT was 0.07 and the grass barter of TOT was 87,874, but in 2010, the net barter of TOT was 0.09 and the grass barter of TOT was 5,809.53. Results of the TOT values indicate that Indonesia was still the exporter of bauxite raw material with an average of export value was lower than that of the import one, although its volume was significant due to the very low price. Indonesian bauxite export value will increase, if the processing unit immediately established.

Keywords: term of trade (TOT), bauxite, alumina, export, import, foreign trade balance

SARI

Sampai saat ini, Indonesia belum memiliki industri pengolahan bauksit, sehingga produksi bauksit seluruhnya diekspor dalam bentuk mentah, sementara alumina terus diimpor untuk memenuhi kebutuhan industri aluminium di dalam negeri. Untuk mengetahui kondisi perdagangan ekspor bauksit dilakukan analisis Term of Trade (TOT). Metode yang digunakan untuk menghitung TOT adalah rumus Net barter of TOT dengan mengukur harga ekspor bauksit dibandingkan dengan harga impornya. Apabila harga ekspor bauksit naik tetapi harga impor menurun, TOT menguntungkan (surplus). Sebaliknya, apabila harga ekspor menurun sedangkan harga impor bauksit meningkat, TOT merugi (defisit). Rasio volume ekspor terhadap volume impor dihitung dengan rumus Grass barter of TOT. Parameter yang diukur adalah volume ekspor bauksit dibandingkan dengan volume impornya. Apabila volume ekspor bauksit naik dan volume impor menurun, TOT menguntungkan (surplus), sebaliknya apabila volume ekspor menurun sedangkan volume impor bauksit meningkat, TOT bauksit merugi (defisit). Pada 2003 diperoleh nilai Net barter of TOT sebesar 0,07, sedangkan nilai Grass barter of TOT sebesar 87.874. Pada 2010 diperoleh nilai Net barter of TOT sebesar 0,09, sedangkan nilai Grass barter of TOT sebesar 5.809,53. Dari hasil nilai TOT tersebut menunjukkan bahwa Indonesia masih merupakan negara pengekspor bahan mentah bauksit dengan rata-rata nilai ekspor yang diperoleh lebih rendah dari nilai impor (defisit), walaupun volumenya sangat besar karena harganya sangat rendah. Apabila industri pengolahan bauksit menjadi alumina segera dilaksanakan, kemungkinan akan meningkatkan nilai ekspor perdagangan bauksit nasional, yang pada akhirnya akan meningkatkan TOT bauksit Indonesia.

Kata kunci : term of trade, bauksit, alumina, ekspor, impor, neraca perdagangan luar negeri

INTRODUCTION

Indonesian bauxite resources include hypothetical (119.59 million tons of ore, 45.39 million tons of metal), inferred (174.95 million tons of ore, 76.92 million tons of metal), indicated (27.40 million tons of ore, 12.19 million tons of metal), and measured resources (349.61 million tons of ore, 134.65 million tons of metal), while the number of inferred mineral resources that are known (82.10 million tons of ore, 38, 19 million tons of metals). The proven reserves is 97.40 million tons of ore, 34.88 million tons of metal. Total of Indonesia bauxite resources are 1,028.292.619 tons with the content of Al_2O_3 ranges for 27 to 55% (Geological Resource Center, 2010). Indonesian bauxite is available as Riau Islands, Bangka-Belitung, West and Central Kalimantan. In 2009, world bauxite resources were 38.80 billion tons. Indonesia retains 1.028 billion tons of bauxite. The largest country is Guinea performing 8.60 billion tons of bauxite, followed by Australia (7.90 billion tons), Vietnam (5.40 billion tons), Jamaica and Brazil (2.50 billion tons), China (2.30 billion tons), and India (1.40 billion tons).

Although Indonesia has a large resources, the material does not provide significant benefits to the national income, due to the entire bauxite is exported raw material, especially to China and Japan. On the contrary, Indonesia imports alumina from Australia to fulfill the aluminum needs for PT. Inalum smelting industry. In 2003 the imported alumina reached 439.37 thousand

tons and continued until the year 2009 (586.55 thousand tons). It is assumed that the imported alumina may be derived from bauxite Indonesia. During 2003-2010, Indonesian bauxite commerce became deficit due to such condition. As a results, the natural income decreased. The import also diminished the endurance and competitiveness of local industries as well as infected a financial loss to the country due to the added value of bauxite processing belonged to the importer countries.

During 2003-2010, exports of Indonesia's bauxite continues to increase. Bauxite is exported to many countries in the form of ore, after processing by the importing countries it will be re-imported by Indonesia in the form of alumina which must be purchased at a price higher than the current price of exported bauxite (TOT is deficit). This is due to the absence of the upstream industry which processes bauxite into alumina in this country. This condition causes TOT deficit, which indirectly makes Indonesia losses its foreign exchange as well as causes a loss of large amount of bauxite resources.

Data from Directorate General of Mineral and Coal (2011) shows that volume of bauxite export increased to 1.09 million tons in 2003. Whereas in exports enormous increased occur in 2007 namely 17.03 million tons, but in 2009, the exports decreased to 10.08 million tons and in 2010, increased to 15.24 million tons (Table 1). As results, the TOT value is < 1 and Indonesian foreign exchange value is very large due to deficit

Table 1. Supply and demand of Indonesian bauxite from 2003 to 2010

Commodity	Unit	2003	2004	2005	2006	2007	2008	2009	2010
a. Production (*)	ton	1.262.705	1.330.827	1.441.899	9.000.339	15.406.045	13.005.502	15.083.258	15.595.049
b. Import (**)									
- Bauxite	ton	2.330	1.630	2.320	1.541	1.620	1.880	1.170	1.436
- Alumina		439.370	496.510	541.460	561.790	514.180	527.280	586.550	627.430
c. Eksport (**)									
- Bauxite	ton	1.093.965	1.326.559	1.617.566	1.536.542	17.031.809	12.480.310	10.083.258	15.236.492
- Alumina		5	600	710	170	570	20	70	108
d. Consumption (***)	ton	245.556,40	272.567,60	302.550	335.830,50	247.480	734.422,45	817.250,20	-

Source: - Directorate General of Mineral and Coal, 2011 (*)
 - The Central Bureau of Statistics (2010 a, b, c, d), reprocessed (**) and (***)
 - Ministry of Commerce, 2010 (**)

Description : - Alumina consists of aluminum hydroxide and other aluminum oxide
 - Since 2007 most of bauxite production and export came from Bauxite Riau Islands, West Kalimantan Province, and Bangka Belitung Province.

in payment balance referring to such problems, the alumina smelter needs to immediately established as well as PT. Inalum aluminum smelter needs to be nationalized.

The dominant factors affecting bauxite price is the fluctuation of the demand from alumina processing plant and aluminum smelter. In 2001, the bauxite price reached to US \$ 17 per ton and the alumina reached to US\$ 152 per ton, while the aluminum went to US\$ 1,468 per ton (Directorate General of Mineral and Coal, 2011). In 2010, the bauxite price increases to US\$ 26 per ton, alumina to US\$ 266 and aluminum to US\$ 3,620 per ton (Table 2).

This study aimed to evaluate the TOT for Indonesia such an analysis calculates the net and losses of Indonesian bauxite foreign trade.

METHODOLOGY

Data for TOT analysis includes a quantitative data of Indonesian bauxite export and import either primary or secondary data. However, the data also derived from several bauxite companies.

To calculate the ratio of export prices against import prices (Net barter of TOT) is used the formula:

$$Tc (N) = \frac{Px1/Px0}{Pm1/Pm0}$$

Tc = TOT commodity (net barter of TOT);

P = index price;

X = export price;

M = import price;

1 = given year;

0 = base year.

The measured parameters is the export price compared to the import one. If the export price increases but the import prices decrease the TOT is good. On the contrary, if the export price decreases, and the import price increases result in declining the TOT.

To calculate the ratio one, Gross barter of TOT employ following formula:

$$Tc (G) = \frac{Qx1/Qx0}{Qm1/Qm0}$$

Tc = TOT commodity (Gross barter of TOT);

Q = index volume;

X = export volume;

M = import volume;

1 = given year;

0 = base year.

RESULTS AND DISCUSSION

In 2003, the volume bauxite export were was 1,093 million tons and the price was U.S. \$ 19 per ton. The export value was U.S. \$ 20.78 million. In the same year the alumina import was smaller

Table 2. The price of bauxite, alumina and aluminum (2001-2010)

Year	Bauxite US\$/Mt	Trend (%)	Alumina US\$/Mt	Trend (%)	Aluminium US\$/Mt	Trend (%)
2001	17,00	-	152,00	-	1.468,00	-
2002	17,00	0,00	146,25	-3,95	1.350,00	-8,04
2003	19,99	17,59	262,00	79,45	1.432,00	6,07
2004	18,00	-9,95	396,00	51,15	1.716,00	19,83
2005	17,00	-5,56	445,00	12,37	1.844,00	7,46
2006	18,00	5,88	430,00	-3,37	2.569,00	39,32
2007	20,00	11,11	325,00	-4,41	2.638,00	2,69
2008	22,00	10,00	350,00	7,69	2.857,00	8,30
2009	25,00	13,64	255,00	-27,14	3.419,00	19,67
2010	26,00	4,00	266,00	4,31	3.620,00	5,88
Average		5,19		6,86		11,24

Source : Directorate General of Mineral and Coal (2011)

than that of the exports. It was around 439.37 thousand tons at the price of U.S. \$ 262 per ton and the obtained value was U.S. \$ 115.11 million. The net barter of TOT in 2003 was as follows:

$$T_{2003} = \frac{Px_1/Px_0}{Pm_1/Pm_0} = \frac{19}{262} = 0.072$$

In the same year, export volume amounted to only 5 tons of alumina, while the volume of imports reached 439,370 tons. From these data, the obtained value of TOT (for gross barter of TOT in 2003), amounting to:

$$T_{2003} = \frac{Qx_1/Qx_0}{Qm_1/Qm_0} = \frac{439,370}{5} = 87,874$$

In 2010, the bauxite export increased to 15,236 million tons and the export price was U.S. \$ 26 per ton. The export value was US\$ 396,148 million. Alumina imports at this time as smaller than that of the exports. It was around 612,420 thousand tons at the price of US\$ 266 per ton and the obtained value was US\$ 162,903 million. The calculated TOT was:

$$T_{2010} = \frac{Px_1/Px_0}{Pm_1/Pm_0} = \frac{26}{266} = 0.097$$

In 2010, the volume of alumina exports only amounted to 70 tons, while the volume of imports reached 586,550 tons. From these data, the obtained value of TOT (for gross barter of TOT in 2010, amounting to:

$$T_{2010} = \frac{Qx_1/Qx_0}{Qm_1/Qm_0} = \frac{627,430}{108} = 5,809$$

such calculations inform:

- a. the total export was 60,406,501 tons. However, its value was only US\$ 1,363,253,017 due to the very low export price (US\$ 20.63 per ton) as the Indonesian bauxite was exported in the form raw material;
- b. the alumina import only reached 4,279,560 tons with the import value around US\$ 1,458,382,770 due to the high import price (US\$ 341.00 per ton) and the imported product was a manufactured a goods;

- c. During 2003-2010, a deficit in balance of trade occurred around US\$ 95,125,753. As a results, Indonesian revenue decreased;
- d. Exporting bauxite as raw material based until 2011. On the other hand, Indonesia users industries required manufactured goods either intermediate or finished goods. Such as industries continued to develop and resulted in increasing the import sector for 439,000.37 tons in 2003 to 612,000.42 tons in 2013. This condition reduced Indonesian foreign exchange up to US\$ 1,458,382,770 and for 612.42 thousand tons of imported alumina and the price US\$ 262 /ton, Indonesia has to spend US\$ 162.90 million.
- e. Referring to such conditions, Indonesia lost some profits. By implementing Law No. 4 Year 2009 in 2014 which emphasizes all mining products should be sold in the form of manufactured goods, will result in gains a positive TOT value and other benefits, such as optimizing the mine value (economizing the foreign exchange, increasing the employment) well as increasing state revenues.
- f. Although the volume of alumina import is lesser than that of the bauxite export, its price is more expensive than the bauxite it self. In 2010, exports of Indonesian bauxite reached 15.23 million tons and is similar to US\$ 396.148 million for the bauxite price of US\$ 26 per ton. Compared to Indonesian alumina import which shows smaller amount than the export one around 612.42 thousand tons, with a value of US\$ 162.90 million, with the price of alumina in 2010 amounted to US \$ 266 per ton. The value of alumina import seems to be bigger than that of the export one.

The TOT calculation of Indonesia bauxite can be seen in Table 3.

CONCLUSIONS AND SUGGESTIONS

Conclusions

1. In 2003, the net barter of TOT was 0.07, while the gross barter of TOT was 87,874. In 2010, the net barter of TOT was 0.09, while the gross barter of TOT was 5809.53.

Table 3. Results of TOT calculation for Indonesian bauxite

Year	Bauxite export (ton)	Bauxite price US\$/ton	Export value US\$	Alumina import (ton)	Alumina US\$/ton	Import value US\$	Bauxite TOT
2003	1.093.965	19	20.785.335	439.370	262	115.114.940	0,072519
2004	1.326.559	18	23.878.062	496.510	396	196.617.960	0,045455
2005	1.617.566	17	27.498.622	541.460	445	240.949.700	0,038202
2006	1.536.542	18	27.657.756	561.790	430	241.569.700	0,04186
2007	17.031.809	20	340.636.180	514.180	325	167.108.500	0,061538
2008	12.480.310	22	274.566.820	527.280	350	184.548.000	0,062857
2009	10.083.258	25	252.081.450	586.550	255	149.570.250	0,098039
2010	15.236.492	26	396.148.792	612.420	266	162.903.720	0,097744
	60.406.501	20,625	1.363.253.017	4.279.560	341	1.458.382.770	0,064777
	Total	Average Price	Total	Total	Average Price	Total	Average

- TOT calculation for bauxite results in 2003-2010 was low due to the bauxite is sold in raw material form. As a result, the selling price was also low. Not significant impact to the country related to this situation.
- In 2010, bauxite price was US\$ 26.00 per ton. If the material was processed into alumina, it could be sold at a price of US\$ 266.00 per ton. If alumina was processed into the aluminum, then its value would be US\$ 3,620.00 per ton.
- Indonesia is still the exporter country for bauxite. Although the export volume is very large due to the low price. The average export value is lower than that of the import one.
- In acting mining regulation No. 4/2009 will help to increase the added value of bauxite material as it states that no more exports raw material. The raw material should be processed to be manufactured goods to fulfill domestic and export needs.

Suggestion

- In terms of going added value, banning the export of raw material should be fully implemented.

Indonesia should immediately establish facilities for processing and refining bauxite

material notably in West Kalimantan. If such facilities have been available next TOT for bauxite will be bigger than 1 and the export value will be positive. Moreover, if alumina manufacturing can also be made in this country. As a result, Indonesia may also serve as alumina supplier country.

- Factors for improving TOT include:
 - harmonizing the policy(es) between local and central governments, notably prevent the overlapping of mining authorization area, land use and licensing;
 - providing incentives, such as tax holiday and exempting of import duty on capital goods, to accelerate the smelter establishment;
 - performing special economic zone to support smelter projects;
 - strong relationship between the up- and downstream of national mineral industries;
 - minimizing the limitation of infrastructure at smelter site.
 - anticipating demand escalation for cost production stakeholders that causing high cost production.
- Needs consistent an strict control to the implementation of Law No. 4 Year 2009 and Minister Regulation No. 7 Year 2012 on added value as bauxite is non renewable material.

REFERENCES

- Amir, M.S, 2004. *Seluk Beluk dan Teknik Perdagangan Luar Negeri*, Jakarta, 394 hal.
- Badan Pusat Statistik, 2010 a. *Statistik Industri Besar Sedang*, Jakarta, 498 hal.
- Badan Pusat Statistik, 2010 b. *Statistik Impor 2004-2010*, Jakarta, 148 hal.
- Badan Pusat Statistik, 2010 c. *Statistik Ekspor 2005-2010*, Jakarta, 214 hal.
- Badan Pusat Statistik, 2010 d. *Statistik Industri Besar dan Sedang 2005-2010*, Jakarta, 527 hal.
- Direktorat Jenderal Mineral dan Batu Bara, 2011. *Statistik Potensi dan Neraca Sumber Daya Mineral, dan Batu Bara*, Jakarta, 92 hal.
- Direktorat Jenderal Mineral, Batubara, dan Panas Bumi, 2009. *Indonesia Mineral, Coal, Geothermal and Groundwater Statistics*, Jakarta, 124 hal.
- Dinas Pertambangan Propinsi Kepulauan Riau, 2010. *Pertambangan Propinsi Kepulauan Riau*, Kepulauan Riau, 87 hal.
- Kementerian Perdagangan, 2010. *Perdagangan ekspor dan impor Indonesia*, Jakarta, 208 hal.
- Mineral Information Institute, 2010. *World Bauxite Producers*. 40 hal.
- Pusat Sumber Daya Geologi, 2010. *Sumber daya Mineral dan Batubara di Indonesia*, Bandung. 187 hal.
- Ratya A. dan Michael R., 2009. *Bisnis dan Perdagangan Internasional*, Jakarta, 196 hal.
- Sugiarto dan Herlambang T., 2006. *Ekonomi Makro Teori, Analisis dan Kebijakan Dalam Bisnis Manajemen dan Keuangan*. Gramedia, Jakarta, 296 hal.
- Tambunan Tulus Th. dan Kuznets, 2004. *Perdagangan Internasional dan Neraca Pembayaran, Teori dan Temuan Empiris*, LP3ES Jakarta, 217 hal.