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TRADE AND ENVIRONMENT IN INDONESIA: CASE STUDY OF ASEAN-CHINA FREE TRADE AGREEMENT

Muhammad Azizurrohman*¹ and Romi Bhakti Hartarto²



AFFILIATION:

¹ National Chiayi University, Taiwan (R.O.C.).

² Universitas Muhammadiyah Yogyakarta, Indonesia.

*CORRESPONDENCE:

m.azizur96@gmail.com

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Abstract: In recent decades, the debate about the impacts of economic globalization through free trade has become attention to public policy. One important issue to address is related to environmental quality. It has been fifteen years since ASEAN-China Free Trade Agreement (ACFTA) was firstly signed and the total trade flows between ASEAN countries and China have grown around US\$ 20 billion per year. Under the ACFTA commitment, tariff rates for exports from China to ASEAN countries have been reduced gradually and so have the tariff rates of ASEAN exports to China. This paper attempts to investigate whether expanded trade causes environmental damage in Indonesia. As the main largest economy in ASEAN, Indonesia has greatly contributed to the pollution released in ASEAN area. Using industrial pollution projection system developed by World Bank in 1995, it has been found that the estimated amounts of pollution have been increasing by approximately five times in Indonesia after fifteen years of ACFTA implementation. Even though the share of export of most polluting sectors has been decreasing, its contribution on the pollution intensity remains the largest. Since chemicals become the most polluting sector with its rapid growing in export to China, this sector needs to be considered in trade negotiations in order to lessen negative impacts of trade to the environment.

Keywords: Internal Control Weaknesses, Local Government Size, Local Government Complexity, Human Development Index, Technological Use.

JEL Classification: F13, Q53, F18

Introduction

In recent years, trade liberalization has brought the issue of the relationship between trade and environment whether it has positive or negative impact on the environment. The production of goods, either they are exported or imported, would have environmental impacts like other production. With expanded trade, it is generally believed that the trading nations would be beneficial through increasing efficiency and greater wealth.

However, what if the expanded trade leads to environmental degradation? Since trade always involves two or more nations, the burden of environmental externalities can be transnational and it will cause significant problems when international trade agreements do not explicitly include any regulations for environmental protection.

There are many ways that expanded trade may encourage the entire world production which leads to increase the pollution intensity and environmental damage. Trade activities always involve energy use to transport goods overseas resulting on air pollution. For example, the Kenyan exporters of horticulture products deliver the flowers to Europe by jet in which the energy consumed in jet fuel causes environmental issue. On the other hand, displacing peasant with larger-scale export agriculture and growing crops focusing on export also will damage the environment. They will use their economic power to demand environmentally damaging input subsidies which lead to over-irrigate, over-mechanize, and overspray (Harris, 2004). Over-spraying the crops through pesticides will cause harmful effects for health. The harvested products will contain the leftover of hazardous chemicals which are dangerous to consume.

Even though expanded trade seems to have negative impacts on the environment, it also has beneficial effects. Based on theory of comparative advantage, trade encourages the trading nations to be more efficient in exploiting their resources and avoiding the waste. Trade expansion can spread the environmentally friendly technology to many developing countries through replacing the high-polluting power plants with modern, highly efficient ones. Transnational companies also play important role by introducing efficient technologies to develop cleaner process for industrial sectors. Hence, the relationship between trade and environmental quality is somewhat complicated and needs to investigate further.

Previous studies have discussed about trade liberalization and environmental issues since 1970s, particularly after some trade negotiation rounds. Trade expansion is strongly related to rapid growth of the global economy which leads to gradual degradation in the environment. The relationship between economic growth and environmental damage was theoretically depicted through Environmental Kuznets Curve (Grossman and Krueger, 1991). This concept predicted three stages of environmental decay that it would rise at lower income levels, attain a maximum level at turning point income, and then decline. During the first stage, the nation is positioned at the early phase of industrialization and development, which is characterized by exploitation of natural re-sources and dirty technologies for production, causing the environmental decay. As time goes by, quality of life improves since people wealthier and they tend to demand for an environment-friendly society, making the government to pay attention on how to preserve environmental quality. Shafik and Bandopadhyay (1992) confirmed this proposition by finding a consistent and significant relationship between income and environmental quality indicators. An initial rise in income would be followed by an increase in pollution matter such as sulfur dioxide and then declined once the economy attained a given level of income. Grossman and Krueger (1995) predicted that the turning point of income would come before \$8,000 income per capita. Generally, this relationship has been established only in some areas of environmental degradation with immediate and visible effects, such as air pollution.

The net effect of trade liberalization on environmental quality can be decomposed into three components: composition effect, scale effect, and technique effect (Grossman and Krueger, 1991). The composition effect occurs when trade is more open, causing

specialization which makes a country to export products with abundant resources and import products with relatively scarce resources. The magnitude of the composition effect is based on the comparative advantage of the country whether it is in pollution-intensive sectors or less polluting sectors. The positive impact on local environment would emerge if a country exports less polluting sectors after trade liberalization. The scale effect comes from enhanced economic activities which are hazardous to the environment since it produces additional emissions. The technique effect takes place when cleaner production techniques are introduced which lead to lower level pollution per unit of output. Then, the net effect for the environment is based on the combination of those components, not the individual component. It can be positive if the scale effect is less than the composition and technique effects, and negative if the opposite holds.

Some studies argued that trade liberalization has brought positive environmental consequences. Grossman and Krueger (1993) found that more liberal trade through easier access to US market has generated income growth in Mexico to the level that was powerful enough to encourage the government for environmental protection. Since Mexico was characterized by labour-intensive industry and agriculture sectors in their export, pollution reduction was inevitably to take place. Antweiler et al (1998) supported the argument that freer trade leads to pollution reduction as shown by their estimation that a rise in GDP per capita by 1 percent from trade liberalization will decrease the sulfur dioxide concentration about 1 percent.

Meanwhile, opposite results have been found in other studies, particularly in developing countries. Developing countries are likely to specialize and export pollution intensive sectors due to their characteristics of lack of environmental regulations with greater capacity to absorb pollution. In this case, trade liberalization could hamper environmental quality. Copeland and Taylor (1994) concluded that liberalized trade increases pollution levels in South countries with low level of human capital and decreases pollution levels in North countries with high level of human capital. Cole et al. (1998) estimated that the emissions in five pollutants (nitrogen dioxide, sulphur dioxide, carbon monoxide, suspended particular matter, and carbon dioxide) in most developing countries would increase after Uruguay Round of trade negotiations.

Based on the previous studies, trade liberalization may have positive or negative impacts on the environment depending on comparative advantage of the country. Policy coordination among trading partners is very limited and the environmental issues are generally neglected in trade agreements. Hence, linking better environmental management with trade negotiation is necessary to maintain the sustainability of the environment. This study will provide better understanding of the environmental consequences of Free Trade Agreements (FTAs) in the case of negotiation and implementation of ASEAN-China Free Trade Agreement (ACFTA).

The relationship between ASEAN and China has dramatically changed over the last 20 years. Initially, China was considered as a potential threat to ASEAN economies. However, since China has dynamic and enormous economy with its growing demand for ASEAN products, ASEAN views that China will be primary export market in the future

which makes the members to benefit from freer trade with China. From China's perspective, China wanted to make ASEAN as its source of raw materials for industrialization (Bernardino, 2004).

As time goes by, ASEAN and China built official contract together in 1991, a dialogue partner in 1996, ASEAN-China Joint Cooperation Committee and ASEAN-China Cooperation Fund in 1997, and followed by a series of ASEAN-China summits with its peak of ASEAN+3 summit in November 2000 discussing freer trade along with Japan and Korea (Hing and Jalilian, 2008). On November 2002, China and ASEAN member states signed the Framework Agreement on Comprehensive Economic Cooperation covering investment and trade in goods and services, with acceleration of tariff reduction and elimination on eight agricultural products (live animals, fish, dairy products, meat and edible meat offal, live trees, vegetable and fruits and nuts, and other animal products) namely Early Harvest Program (EHP) and a three-year time frame for implementation starting in 2004. Then, the Trade in Goods Agreement was signed in November 2004 which require both parties to gradually reduce and eliminate applied Most Favoured Nation (MFN) tariff rates on tariff lines not covered by EHP within the agreed time frame.

These tariff reduction or elimination programs classify traded goods into two groups: normal track and sensitive track. In the normal track formula, the MFN tariff rates of products listed are gradually reduced or eliminated from 1 January 2005 to 2010 for the ASEAN-6 (Indonesia, Malaysia, Philippines, Singapore, Thailand, and Brunei) and China, and to 0% for newer ASEAN countries (Lao PDR, Cambodia, Myanmar, and Vietnam) by 2015, as shown in Table 1.

Normal Track required each party to reduce to 0-5% the tariff rates for at least 40% of its rates lines no later than July 1, 2005, the tariff rates for at least 60% of its tariff lines no later than January 1, 2007, and the elimination of its tariff lines no later than January 1, 2010. Since January 1, 2010, zero tariffs have been fully implemented on 6,682 tariff posts in 17 sectors: 12 in manufacturing and five in the agriculture, mining and maritime sectors.

In the sensitive track, products listed are required to have their applied MFN rates reduced to end rates by mutually agreed dates. Tariff lines in the sensitive track are then divided into the Sensitive List and Highly Sensitive List. The MFN tariff rate for tariff lines on the Sensitive List should be reduced to 20 percent no later than January 1, 2012 for ASEAN-6 and China and January 1, 2015 for newer ASEAN countries. The tariff reduction to 0 to 5 percent should be done no later than January 1, 2018 for ASEAN-6 and China, and January 1, 2020 for newer ASEAN members. Meanwhile, for products in Highly Sensitive List, the tariff lines should be reduced to no more than 50 percent no later than January 1, 2015 for ASEAN-6 and China, and January 1, 2018 for newer ASEAN countries. Table 2 and 3 summarize the tariff reduction schedules.

Table 1 Normal Track Formula

X: Applied MFN Tariff Rate	ACFTA MFN Tariff Rate			
	2005	2007	2009	2010
$X \geq 20\%$	20	12	5	0
$15\% \leq X < 20\%$	15	8	5	0
$10\% \leq X < 15\%$	10	8	5	0
$5\% < X < 10\%$	5	5	0	0
$X \leq 5\%$	standstill	standstill	0	0

Source: ICRA Indonesia Comment (2011)

Table 2 Sensitive Track Formula for ASEAN-6 and China

	No later than January 2012	No later than January 2018
Sensitive List	20%	0-5%
Highly Sensitive List	-	< 50%

Source: Hing and Jalilian (2008)

Table 3 Sensitive Track Formula for New ASEAN Countries

	No later than January 2015	No later than January 2018	No later than January 2020
Sensitive List	20%	-	0-5%
Highly Sensitive List	-	< 50%	-

Source: Hing and Jalilian (2008)

These reduced trade barriers will favorably provide access to the Chinese market and expand the export opportunities for countries producing goods with high demand in China such as raw materials and agricultural products.

This opportunity would make Indonesia potential to be one of the major beneficiaries of ASEAN-China Free Trade Area (ACFTA) since Indonesia is the largest ASEAN economies and abundant in resources. In the context of Indonesia-China trade relationship, particularly after lower and eliminated tariff since 2005, China became the second largest trading partner of Indonesia in terms of export value following Japan, with mineral products such as coal as the major contributor. Indonesia's exports to China grew at the average annual rate of 11.56 percent during 2005-15.

In relation to this, little research has been carried out in the context of environmental consequences of free trade in a specific country. This study aims to fill this knowledge gap by assessing the possible implications of trade on the environment from the perspective of a specific country, which is Indonesia in this case. Then, ACFTA was selected as a case study to estimate the possible impacts of FTA on any change in the trade flows and the environment through the use of trade-environment matrix.

Research Method

To evaluate whether freer trade will lead to environmental degradation, the method has to be able to measure the environmental consequences of production activities caused by trade, and consider the interaction between trade, income, and environmental quality (Hing and Jalilian, 2008). In this study, we employed an adjusted method to estimate the effects of trade on pollution levels based on industrial pollution projection system from Wheeler et al. (1999) in World Bank. This method classified trade sectors into three categories based on the amount of pollution emitted by their production and developed trade-environment matrices to estimate pollution intensity. Through this method, we can indicate the impact of trade on one feature of environmental deterioration which is pollution. Even though this study realizes the shortcomings of using only pollution data to indicate the impact on the environment, this can be an initial point for further research.

The adjusted method in this study estimated industrial emissions to the air, water and land and also the sum of emissions to all mediums using value of output, value added, and employment. To measure the impacts of trade on pollution levels, we use pollution intensity levels for all media emitted by physical volume of output valued at one million USD (see Table A.1 in Appendix). Then, trade sectors are classified into three categories based on the pollution emission using the Harmonized System (HS) for product classification: most polluting sectors or pollution-intensive sectors, referring to those with total toxic pollution of more than 1,500 pounds per million USD of production; moderately polluting sectors, referring to those with total toxic pollution level of 500 to 1,500 pounds per million USD of production; and least polluting sectors, referring to those with toxic pollution of less than 500 pounds per million USD of production (see Table A.2 in Appendix).

Then, this study will construct a trade-environment matrix using data from the export trade matrices from Indonesia to China by assuming that increasing exports will lead to increase production and a simultaneous change in pollution levels. In the trade-environment matrix, the rows classified traded sectors based on their level of pollution emission. The first column records time frames in the trade relationship between Indonesia and China; pre-agreement (2000); MFN tariff rates (2005); zero tariffs implementation (2010); and ASEAN Economic Community (2015). The second column depicts the relative share of the product to total trade, while the third column presents estimated pollution intensity (EPI). It is calculated from World Bank study by Wheeler et al (1999) to measure the pollution level generated by the value of final products in million USD by multiplying each value in the first column with its respective pollution intensity factors.

Result and Discussion

Table 4 presents a trade-environment matrix for Indonesia's exports to China. It suggests that Indonesia exported about \$3.3 billion of the most polluting sectors to

China in 2015, or 21.9 percent of total exports, with pollution intensity generated by the production estimated at 25 million pounds.

Even though its portion of total exports has been decreasing, its pollution intensity has been quintupled after fifteen years of ACFTA implementation and its contribution to pollution intensity still remained the largest. This significant increase is mostly due to the dramatic acceleration of export growth in chemicals sector in response to greater demands from China.

Table 4 Trade-environment matrix for Indonesia’s exports to China

Description	Value in USD million				Share (%)				EPI (thousand pounds)			
	2000	2005	2010	2015	2000	2005	2010	2015	2000	2005	2010	2015
Base metals	25.1	360.4	438.8	631.4	0.9	5.6	2.8	4.2	225.9	3243.6	3949.2	5682.6
Chemicals	258.1	700.0	1194.2	1167.5	9.3	10.8	7.6	7.8	3226.3	8750.0	1492.7	1459.3
Plastics, hides, & leather	102.4	113.4	229.6	252.1	3.7	1.8	1.5	1.7	261.5	310.0	607.3	715.3
Pulp & Paper	561.2	554.6	853.1	1248.1	20.3	8.6	5.4	8.3	1964.2	1941.1	2985.9	4368.4
Most polluting sector	946.8	1728.4	2715.7	3299.1	34.2	26.7	17.3	21.9	5677.9	1424.7	2246.8	2536.0
Machinery & electrical appliances	74.0	300.1	555.4	447.5	2.7	4.6	3.5	3.0	37.0	150.1	277.7	223.8
Mineral products	1035.4	2947.1	7434.3	4978.6	37.4	45.6	47.4	33.1	828.3	2357.7	5947.4	3982.9
Textiles & apparel	126.4	137.5	300.9	668.8	4.6	2.1	1.9	4.4	88.5	96.3	210.6	468.2
Rubber products	31.0	341.0	1416.1	507.2	1.1	5.3	9.0	3.4	37.2	409.2	1699.3	608.6
Vehicles	5.6	42.2	55.2	62.3	0.2	0.7	0.4	0.4	4.5	33.8	44.2	49.8
Misc. manufactured articles	8.1	16.0	29.6	57.4	0.3	0.2	0.2	0.4	4.9	9.6	17.8	34.4
Moderately polluting sector	1280.5	3783.9	9791.5	6721.8	46.3	58.6	62.4	44.7	1000.3	3056.5	8197.0	5367.7
Vegetable products	13.9	47.1	164.3	252.6	0.5	0.7	1.0	1.7	0.3	0.9	3.3	5.1
Wood & wood articles	305.8	79.5	266.5	859.9	11.1	1.2	1.7	5.7	122.3	31.8	106.6	344.0
Optical, precision & musical instrument	1.5	8.1	24.5	93.0	0.1	0.1	0.2	0.6	0.6	3.2	9.8	37.2
Stone/cement/ceramics	21.2	35.5	33.0	10.6	0.8	0.5	0.2	0.1	6.4	10.7	9.9	3.2
Prepared foodstuffs	160.4	705.5	2555.2	3248.8	5.8	10.9	16.3	21.6	32.1	141.1	511.0	649.8
Footwear	3.4	15.9	56.2	314.1	0.1	0.2	0.4	2.1	1.7	8.0	28.1	157.1
Live animals	32.8	58.0	84.2	244.9	1.2	0.9	0.5	1.6	0.7	1.2	1.7	4.9
Antiques & works of art	0.1	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Least polluting sectors	539.1	949.6	3184.7	5024.7	19.5	14.7	20.3	33.4	164.0	196.8	670.4	1201.1

Source: Calculation based on trade data from UN Comtrade

Since the production activities in these sectors generate less pollution than the pollution intensive sectors, the pollution effects of these exports were less significant, as shown by the EPI level of 5 million pounds. Nevertheless, the amount of pollution emitted by these exports was about five times larger in 2015 than in 2000. This is mainly due to the improving export performance of mining from rising prices with its peak in 2010, particularly coal as the major contributor in the mineral sector representing around 30 percent of the total export to China.

The trade-environment matrix also demonstrates that Indonesia generated about one-third of its total exports to China from the least polluting sectors. Even though the share of the least polluting sectors has been increasing after fifteen years of the ACFTA implementation, the future effect of these trade sectors on pollution levels is likely to be infinitesimal concerning that the estimated EPI of just around 1 million pounds.

Conclusion

This study has exposed the general pat-tern of trade and environmental quality in Indonesia as the largest economies in ASEAN after the implementation of ACFTA. ACFTA has led Indonesia to shift the pattern of its export basket to China. It has been found that after fifteen years implementation of ACFTA, the share of most polluting sectors in total export has been declining from 34.2 percent to 21.9 percent, while the share of least polluting sectors in total export has been increasing from 19.5 percent to 33.4 percent. However, the estimated pollution is still high, even quintupled from 6.8 million pounds to 31.9 million pounds over fifteen years. The significant rise in the estimated pollution mostly came from higher demand of the chemical products by China particularly after the implementation of ACFTA. It has been recorded that the export value of chemicals to China has been gradual-ly increasing, leaving the estimated pollution growing quickly. Even, the contribution of pollution generated by chemical sector to-ward total estimated pollution reached 45.8 percent. Since ACFTA does not contain agreement for cooperation on environmental problems due to trade liberalization, chemical sector is necessary to be considered in trade negotiations in order to mitigate negative impact of freer trade to the environment since it is categorized as most polluting sector with significant increase in the export production.

In summary, this study asserts that trade could be a source of environmental issues, particularly in countries without strong regulatory frameworks or management system. Hence, this study recommends that environmental issues need to be considered in trade negotiations between ASEAN and China in order to lessen any negative impact of trade to the environment.

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Appendix

Table A.2 Summary of pollution intensity classification by sector

	Category 1	Category 2	Category 3
	Most polluting sector	Moderately Polluting Sector	Least polluting sector
Definition	ToxTot ≥ 1500pnds/USD million	500 pnds/USD million < ToxTot < 1500pnds/USDmillion	ToxTot ≤ 500pnds/USD million
Section (HS)	Metals (HS71-83), Chemicals (HS 28-38), Plastics (HS39), Pulp and paper (HS47-49), Hides and leather (HS41-43)	Machinery and electrical appliances (HS84-85), Mineral products (HS25-27), textiles and apparel (HS 50-63), Rubber products (HS 40), Vehicles (HS 86-89) misc. Manufactured articles (HS 93-96)	Vegetable products (HS6-14), Wood and wood articles (44-46), Opticals, precision and musical instruments (HS 90-92), Stone/cement/ceramics (HS 68-70), Prepared food stuffs (HS15-24), Footwear (HS 64-67)

Source: Hing and Jalilian (2008)

Table A.1 Pollution Intensity by medium with respect to total value of output (Pollution in pounds/1987 USD million)

ISIC	Description	ToxAir	ToxWat	ToxLand	ToxTot
351	Industrial chemicals	5646.3	1972.6	14318.1	21936.9
372	Non-ferrous metals	2988.3	116.1	7921.0	11025.3
371	Iron and steel	985.2	350.2	5647.1	6982.4
323	Leather products	1532.4	64.1	3548.7	5145.2
341	Pulp and paper	2208.5	554.2	893.7	3656.4
353	Petroleum refineries	607.9	45.8	2574.1	3227.8
352	Other chemicals	1393.7	39.9	1578.9	3012.5
356	Plastic products	1896.0	4.6	561.7	2462.4
381	Fabricated metal products	829.3	43.8	916.9	1789.9
332	Furniture, except metal	1390.6	1.0	125.3	1516.9
361	Pottery, china, earthenware	456.3	1.0	746.6	1203.8
383	Electrical machinery	596.1	6.2	596.1	1198.5
355	Rubber products	768.0	1.9	406.6	1176.5
369	Other non-metallic mineral prod.	407.8	6.8	600.1	1014.6
321	Textiles	511.6	94.6	304.4	910.6
384	Transport equipment	552.5	2.1	238.4	793.0
390	Other manufactured products	403.6	5.2	177.1	586.0
354	Misc. Petroleum and coal products	398.1	11.7	117.2	526.9
382	Non-electrical machinery	301.1	7.5	199.3	507.9
385	Professional & scientific equipment	329.9	1.0	163.2	494.1
324	Footwear, except rubber or plastic	472.4	0.1	14.0	486.4
342	Printing and publishing	413.1	0.0	55.8	468.9
331	Wood products, except furniture	317.2	1.0	73.8	392.0
362	Glass and products	211.5	17.1	136.1	364.8
314	Tobacco	271.8	1.8	26.9	300.6
311	Food products	47.7	13.4	183.0	244.1
313	Beverages	84.5	12.5	65.7	162.8
322	Wearing apparel, except footwear	12.7	0.0	4.8	17.5

Source: Wheeler et al (1999)