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The Influence of ASEAN Agreement on Transboundary Haze Pollution for Emission Changes in Indonesia

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ABSTRACT

Environmental degradation is one of the many environmental problems that need to be faced by every country in the world. Both developed and developing countries can find environmental degradation problems in various conditions and phenomena. One of the environmental problems in Southeast Asia is related to smog. Indonesia is one of the countries with high cases of smog pollution, this is because the vast forest area with massive land clearing makes forest fires frequent. respond. The ASEAN Agreement on Transboundary Haze Pollution is an agreement to control haze pollution that occurs in the Southeast Asian region. This study uses secondary data originating from the Indonesia Central Statistics Agency (BPS) with a quantitative method approach. This study seeks to find the phenomenon of environmental pollution, economy, and emission developments in Indonesia. It was found that energy emissions, FOLU, and forest fires were the three emissions that were not affected by the ASEAN Agreement on Transboundary Haze Pollution policy. The policy that Indonesia needs to take is to improve energy emission, fire disaster and FOLU control.

INTRODUCTION

The environment is one of the tools that drive the economy of a country. One of the measuring tools, namely the economic indicator of a country is the Gross Domestic Product (GDP). GDP is the net value of final goods and services produced by various economic activities in a country in a period. The calculation of GDP is related to the use of natural resources, where the calculation used uses a value-added or production approach. Therefore, the size of a country's GDP also depends on the management of the country's natural resources and production factors. The existence of limitations in the management of natural resources and the provision of these factors causes the size of GDP to also be affected. Natural resources that are well managed by continuously making efforts to preserve the environment have an attraction for potential investors and stakeholders. The advantage referred to here is the confidence of investors and stakeholders that the state and its companies will not get environmental problems or claims from the community in the future. From the trust that arises in the community, there will be an increase in the quality of environmentally friendly products, thereby increasing economic profits.

This causes all countries do not have a strong portion to maintain their personal sovereignty at the expense of the interests of the international community. This means that there is a strong relationship between a country's foreign policy, the understanding of a country's internal and external sovereignty, and international legal instruments commonly used by each country (Mushkat 2014). This international law, an example of environmental policy, in the era of globalization participates in

influencing the direction of economic development policies in all countries, in the local, national or regional context (Atkinson 2014; Listiningrum 2018). Against the background of the occurrence of large forest fires in the period, 1996-1997 in Indonesia (Sumatra and Kalimantan) caused thick smog to spread to Malaysia, Singapore, and Thailand (Subekti 2020; Yani and Robertua 2018; Zulhafiy et al. 2021). On the other hand, The urgency of the ASEAN Agreement on Transboundary Haze Pollution sees that when the dry season occurs a natural event of the east monsoon, so the wind is dry with low rainfall causing land clearing (Palanissamy 2013; Sarok and Nizam 2019). It means that land renewal that is burned will cause thick fog and the movement of the wind to the north causes fog smoke to cover the countries in the north.

So that the wind is dry with low rainfall causing land clearing or land renewal that is burned will cause thick fog and the movement of winds to the north causes smog to cover countries in the north. Aspects of weather and climate are aspects beyond human supervision and control. As for developing countries, this is difficult to realize because of the complex problems in developing countries, especially about technological innovation which still cannot outperform the development of developed countries. (Firmansyah, Rizqulloh, and Maulana 2021; Rizqulloh and Firmansyah 2021). In its development, Indonesia was the last country to declare itself to ratify the ASEAN Agreement on Transboundary Haze Pollution in 2014 with the issuance of Law Number 26 of 2014 concerning Ratification of the ASEAN Agreement on Transboundary Haze Pollution (ASEAN Agreement on Transboundary Haze Pollution). With the signing of this agreement, all Southeast Asian countries have ratified it to immediately control environmental pollution, especially forest fires (Purwendah and Mangku 2018). The issue of smoke pollution at the regional level was discussed in a meeting of the ASEAN Ministers of the Environment and was later embodied in the agreement of the ASEAN Ministers of the Environment on June 19, 1990.

This agreement was then signed by all ASEAN members in Kuala Lumpur, Malaysia on June 10, 2002. The AATHP was then first ratified by Malaysia in December 2002 and followed by 5 other countries in 2003. After 6 member countries ratified then on November 25, 2003, AATHP becomes come into force or officially applies in the Southeast Asia region. Until 2010 AATHP has been ratified by 9 countries. Ironically, Indonesia as one of the countries causing the haze problem only signed the convention in 2002 and did not ratify it for 12 years. The AATHP was then first ratified by Malaysia in December 2002 and followed by 5 other countries in 2003. After 6 member countries ratified then on November 25, 2003 AATHP became a come into force or was officially enforced in the Southeast Asia region. Until 2010 AATHP has been ratified by 9 countries. Ironically, Indonesia as one of the countries causing the haze problem only signed the convention in 2002 and did not ratify it for 12 years. The AATHP was then first ratified by Malaysia in December 2002 and followed by 5 other countries in 2003. After 6 member countries ratified then on November 25, 2003 AATHP became a come into force or was officially enforced in the Southeast Asia region. Until 2010 AATHP has been ratified by 9 countries. Ironically, Indonesia as one of the countries causing the haze problem only signed the convention in 2002 and did not ratify it for 12 years.

In its development, it is found that the various developments of each type of emission are graphically found. In view of controlling emissions not only from industrial efficiency or consumption, it is also necessary to regulate policies on a national scale. Control by using this government policy can be a cutting-edge process in addition to using an efficient approach and technological adaptation which is still expensive and long-term. The policy process can be judged to better address emissions by minimizing negative impacts in the short term.

The problem of Transboundary Haze Pollution (THP) has occurred since the 1980s caused by forest and peatland fires in Indonesia. The forest fires in Indonesia in 1997 made the issue of THP not just a matter of natural events but began to show securitization actions from ASEAN member countries, especially Singapore and Malaysia. To overcome the THP problem, in 2002 all ASEAN member countries signed the ASEAN Agreement on Transboundary Haze Pollution (AATHP) in which each country needed to ratify the agreement (Murad et al. 2010; Sarok and Nizam 2019). The presence of AATHP should be welcomed by

Indonesia because it can help to solve problems. However, Indonesia was the last country to ratify the AATHP agreement.

Over time since 1990, forest fires are one of the biggest threats in the ASEAN region. The ASEAN Agreement on Transboundary Haze Pollution (AATHP) was formed in 2002 and entry into force in 2003. Meanwhile, Indonesia only ratified the regulation in 2014. AATHP aims as the basis for member countries' commitments to work on transboundary air pollution and jointly tackle the problems caused by smoke pollution. The continued occurrence of smoke pollution in some areas of Southeast Asia shows that the implementation of the ASEAN Agreement on Transboundary Haze Pollution has not been maximized according to its main objective, namely to overcome the problem of transboundary haze pollution in Southeast Asia. However, air pollution due to forest fires is against the principles of international environmental law. Policies that are rational in the environmental sector, according to environmental changes can be influenced by policies which are one of the impacts of environmental governance. In its journey, smog will cause problems for a country, namely (1) forest fires create ecological losses, (2) smog poses a threat to public health, (3) smog disrupts economic and tourism activities, and (4) smog cross-border will threaten diplomatic relations between countries.

The scope of Indonesia's life includes the space, where the Unitary State of the Republic of Indonesia with Archipelago Concepts carries out its sovereignty, sovereign rights, and jurisdiction. This means that the Government is obliged to manage the environment which includes policies for structuring, utilizing, maintaining, recovering, monitoring, and controlling the environment within the scope of the Indonesian environment. Therefore, the government has a function as the control holder in these environmental management activities. In general, a resource is defined as something that has economic value and the ability to fulfill or handle something. Indonesia's natural resources constitute 25 percent of the country's total wealth assets that generate profits for development funding (The World Bank 2006). In the policy process carried out by Indonesia in ratifying the ASEAN Agreement on Transboundary Haze Pollution (AATHP), there are several values of rationality in several strategic aspects that can benefit Indonesia in resolving the haze. These aspects include the existence of multinational cooperation, then the ratification is carried out to fulfill the obligation to be responsible for the aggrieved party (Tao, Su, and Fang 2022).

In its development, strong and binding policies are needed so that they can be beneficial, such policies are in line with ongoing bureaucratic and public management practices and can be adjusted (Firmansyah 2021). This responsibility is also aimed primarily at the Indonesian people who are affected and make demands on the government. Finally, the ratification was carried out by Indonesia because AATHP can be the basis for strengthening environmental regulations and policies. AATHP approval consists of 32 (thirty-two) Articles and 1 (one) attachment. The subject matter of the AATHP approval, among others, regulates monitoring, assessment, prevention, preparedness, national emergency response, technical cooperation, and scientific research related to forest and/or forest fire control including fire suppression. The legal and political powers contained in this agreement are binding and can influence international political communication effectively. The importance of this political communication is a view that in carrying out policies it is necessary to support both domestic political communication and foreign political communication (Firmansyah, 2021).

International law is one of the legal instruments that regulate several aspects of the values and norms of international relations to create safe conditions for each country. In addition, international law is closely related to the sovereignty of each country in shaping legal aspects and legal norms. The link between state sovereignty and international law is contained in the formalization of Article 2 of the United Nations Charter and the 1970 United Nations General Assembly Declaration as part of classical international law understanding (Sefrani 2016). This study aims to determine the impact of the implementation of the ASEAN Agreement on Transboundary Haze Pollution in 2014 on the development of emissions that occurred in Indonesia. This research is needed to see before (pre) used 2010-2013 and after (post) which used is 2014-2017. The benefit obtained from this research is to find only mass emissions that are affected by the ratification of the ASEAN Agreement on Transboundary Haze Pollution in 2014 by using the

concept of comparison. This comparison concept will find which emissions are controlled after the ASEAN Agreement on Transboundary Haze Pollution is ratified, as well as which emissions do not change after the same regulation is ratified. By looking at this, it can be a contribution to measuring how much influence the ratification of the ASEAN Agreement on Transboundary Haze Pollution has on emission control that occurs especially in Indonesia.

MATERIALS AND METHODS

This study uses secondary data obtained from the Indonesian Central Statistics Agency. Research with secondary data is used using data issued by third parties. This study focuses on the comparison between before and after the implementation of international law in the form of the ASEAN Agreement on Transboundary Haze Pollution. The data used are emissions in the energy sector, IPPU, agriculture, waste, FOLU, and forest fires (hereinafter Karhutla). For the data processing process, the variables before and after were formed with reference to the ratification of the ASEAN Agreement on Transboundary Haze Pollution in 2014. The sample used was 2010-2017 with before (pre) used 2010-2013 and after (post) which used is 2014-2017. Variables are formed into two types, namely, pre and post variables, so that in processing 6 pairs are formed, namely pair 1 consisting of *energipre* and *energipost*, pair 2 consisting of IPPUpre and IPPUpost,

This study uses a quantitative approach with a non-experimental which is a study that focuses on empirical elements in researching a phenomenon (Firmansyah and Maulana 2021). As for the different tests using the Paired Sample T-Test analysis or the Two-Sample Difference Test in pairs. The same subject is used but has a different treatment, which can be used in comparative analysis with normally distributed data (Sirkin, 2005). The normality test measures the normality of the data distribution, while the normality test hypothesis using the Shapiro-Wilk test is as follows:

1. If the significance value (Sig.) is greater than 0.05, the research data is normally distributed.
2. On the other hand, if the significance value (Sig.) is less than 0.05, the research data is not normally distributed.

Paired Sample T-Test shows whether the tested sample has a certain impact before and after being given treatment. The formula used is as follows.

$$t=\frac{\bar{x}_1-\bar{x}_2}{\sqrt{\frac{{s_1}^2}{n_1}+\frac{{s_2}^2}{n_1}-2r\left(\frac{S_1}{\sqrt{n_1}}\right)\left(\frac{S_2}{\sqrt{n_2}}\right)}}$$

Where $\bar{x}_1$ is the mean of sample 1, $\bar{x}_2$ is the mean of sample 2, S_1 is the standard deviation of sample 1, S_2 is the standard deviation of sample 2, ${s_1}^2$ is the variance of sample 1, ${s_2}^2$ is the variance of sample 2 and r is the correlation between the two samples. The formulation of the hypothesis of this research is as follows.

H_0 : $\mu^{sb} = \mu^{ss}$ which means that there is no average difference between the pre-ratification and post-ratification variables. This shows that the ratification of the ASEAN Transboundary Haze Pollution does not have an impact on mitigating environmental damage in Indonesia

H_a : $\mu^{sb} \neq \mu^{ss}$ which means that there is an average difference between the pre-ratification and post-ratification variables. This shows that the ratification of the ASEAN Transboundary Haze Pollution has an impact on mitigating environmental damage in Indonesia

The analysis requirements are if the value of Sig. (2-tailed) < 0.05 then H_0 is rejected and H_a is accepted. On the other hand, if the value of Sig. (2-tailed) > 0.05 then H_0 is accepted and H_a is rejected.

RESULTS AND DISCUSSION

The data used in this study are energy consumption, energy emissions, IPPU emissions, agricultural emissions, waste emissions, FOLU emissions, and forest fire emissions. The data found from the source of the Indonesian Central Statistics Agency are as follows:

Table 1. Emissions Development Data in Indonesia (thousand tons of CO2), 2010-2017

No.	Year	Energy	IPPU	Agriculture	Waste	FOLU	Forest and land fires
1	2010	453.235	36,033	104.501	87,669	383,405	51,383
2	2011	507,357	35,910	103.161	91.853	427,310	189,026
3	2012	540.419	40,078	106,777	95.530	487,928	207.050
4	2013	496,030	39.110	106,814	100,515	402.252	205.076
5	2014	531,142	47,489	107.319	102.834	480,033	499,389
6	2015	536,306	49,297	111,830	106.061	766,194	802.870
7	2016	538,025	55,307	116,690	112.351	545,181	90.267
8	2017	558,890	55,395	121,686	120.191	282,098	12,513

Source: Central Bureau of Statistics

To see if there is a difference in the average before and after the ratification of the ASEAN Agreement on Transboundary Haze Pollution, which was ratified in 2014, the Paired Sample T-Test analysis tool was used. Paired Sample T-Test shows whether the paired sample experiences a significant change. The results of the Paired Sample T-Test are determined by the significance value. The following is the hypothesis used.

H_0 : $\mu^{sb} = \mu^{ss}$ which means that there is no average difference between the pre-ratification and post-ratification variables. This shows that the ratification of the ASEAN Transboundary Haze Pollution does not have an impact on mitigating environmental damage in Indonesia.

H_a : $\mu^{sb} \neq \mu^{ss}$ which means that there is an average difference between the pre-ratification and post-ratification variables. This shows that the ratification of the ASEAN Transboundary Haze Pollution has an impact on mitigating environmental damage in Indonesia.

The decision-making guidelines in the Paired Sample T-Test based on the significance value (Sig.) of the SPSS output results are as follows if the value of Sig. (2-tailed) < 0.05 then H0 is rejected and Ha is accepted. On the other hand, if the value of Sig. (2-tailed) > 0.05 then H0 is accepted and Ha is rejected. To test whether the research data are normally distributed, the authors use the Kolmogorov-Smirnov normality test method. On the other hand, to determine the pre-and post-ratification impacts, energy consumption data is used, and greenhouse gas emission data includes Energy, IPPU, Agriculture, Waste, FOLU, and Forest Fire emission data. The results of the normality test using the Shapiro-Wilk test are as follows:

Table 2. Normality Test Results

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
EnergiPre	0.214	4	.	0.982	4	0.915
EnergyPost	0.349	4	.	0.836	4	0.184
IPPUPre	0.294	4	.	0.838	4	0.190
IPPUPost	0.300	4	.	0.827	4	0.160
AgriculturePre	0.292	4	.	0.862	4	0.266
AgriculturePost	0.160	4	.	0.992	4	0.966
WastePre	0.146	4	.	0.997	4	0.988
WastePost	0.213	4	.	0.958	4	0.766
FOLUPre	0.232	4	.	0.930	4	0.593
FOLUPost	0.197	4	.	0.988	4	0.948
KarhutlaPre	0.385	4	.	0.714	4	0.017
KarhutlaPost	0.260	4	.	0.914	4	0.504

a. Lilliefors Significance Correction

It was found that the value of Sig. the Saphiro-Wilk column has a value of > 0.05, namely EnergiPre of 0.195, EnergiPost of 0.184, IPPUPre of 0.190, IPPUPost of 0.160, AgriculturePre of 0.266, AgriculturePost of 0.966, Pre-waste of 0.988, Post-waste of 0.766, FOLUPre of 0.593, FOLUPost of 0.948, KarhutlaPre is 0.017, KarhutlaPost is 0.504. With the value of Sig. > 0.5, it can be concluded that the data is normally distributed and the paired sample t-test is tested for the next stage.

Table 3. Test Results of Paired Sample Statistics

Pair	Post-Pre	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EnergiPre	499260.25	4	36001.658	18000.829
	EnergiPost	541090.75	4	12221.342	6110.671
Pair 2	IPPUPre	37782.75	4	2129.052	1064.526
	IPPUPost	51872.00	4	4084.608	2042.304
Pair 3	PertanianPre	105313.25	4	1796.918	898.459
	PertanianPost	114381.25	4	6193.382	3096.691
Pair 4	LimbahPre	93891.75	4	5459.866	2729.933
	LimbahPost	110359.25	4	7653.642	3826.821
Pair 5	FOLUPre	425223.75	4	45507.086	22753.543
	FOLUPost	518376.50	4	199524.224	99762.112
Pair 6	KarhutlaPre	163133.75	4	74936.480	37468.240
	KarhutlaPost	321259.75	4	269125.394	184562.697

Data processing using SPSS by using the paired sample t-test. The results of statistical descriptive processing are shown in table 4. The results of descriptive statistics show information about the sample mean, number of samples (N), standard deviation, and standard error mean. As for table 4 for descriptive statistics, it is found in the energy sector emissions that the EnergiPre<EnergiPost value is 499260.25 <541090.75 so there is a difference. For IPPU sector emissions, it was found that the IPPUPre value <IPPUPost was 37782.75 < 51872.00 so there was a difference. For agricultural sector emissions, it was found that the value of Agriculture Pre < Agriculture Post was 105313.25 < 114381.25 so there was a difference. For the emission of the waste sector, it was found that the value of Pre-Waste <Post Waste is 93891. 75 < 110359.25 so there is a difference. For emissions in the FOLU sector, it was found that the value of FOLUPre<FOLUPost was 425223.75 < 518376.50 so there was a difference. And finally, for forest and land fire sector emissions, it was found that the value of KarhutlaPre>KarhutlaPost was 163133.75 > 351259.75.25, so there was no difference.

Table 4. Paired Sample Correlation Test Results

Pair	Pre & Post	N	Correlation	Sig.
Pair 1	EnergiPre&EnergiPost	4	0.178	0.822
Pair 2	IPPUPre&IPPUPost	4	0.960	0.040
Pair 3	AgriculturePre&Agriculture Post	4	0.766	0.234
Pair 4	WastePre&WastePost	4	0.989	0.011
Pair 5	FOLUPre&FOLUPost	4	0.339	0.661
Pair 6	KarhutlaPre&KarhutlaPost	4	-0.368	0.632

The next output is shown in table 4 regarding data correlation. It was found that interrelated correlations were found in the variables for pair 2 (IPPUpre&IPPUPost), and pair 4 (LimbahPre&WastePost). Meanwhile, unrelated correlations were found in the variables for pair 1 (EnergiPre&EnergiPost), pair 3 (AgriculturePre&AgriculturePost), pair 5 (FOLUPre&FOLUPost) and pair 6 (KarhutlaPre&KarhutlaPost). The last output is found in table 5 which shows the results of the paired samples test. The t table value is found with a confident interval (CI) of 0.05 and a degree of freedom of 3, so the t table value is 3.182.

Table 5. Paired Sample t Test Results

Mean, Std. Deviation and Std. Error Mean				
Pair	**Pre & Post**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Pair 1	EnergiPre&EnergiPost	-41830.500	35895.650	17947.825
Pair 2	IPPUPre&IPPUPost	-14089.250	2125.050	1062.525
Pair 3	AgriculturePre&AgriculturePost	-9068.000	4953.858	2476.929
Pair 4	WastePre&WastePost	-16467.500	2395.919	1197.959
Pair 5	FOLUPre&FOLUPost	-93152.750	189018.946	94509.473
Pair 6	KarhutlaPre&KarhutlaPost	-188126.000	402768.355	201384.177

95% Confidence Interval of the Difference (Lower and Upper)			
Pair	**Pre & Post**	**95% Confidence Interval of the Difference**	
		Lower	**Upper**
Pair 1	EnergiPre&EnergiPost	-98948.490	15287.490
Pair 2	IPPUPre&IPPUPost	-17470.678	-10707.822
Pair 3	AgriculturePre&AgriculturePost	-16950.694	-1185.306
Pair 4	WastePre&WastePost	-20279.942	-12655.058
Pair 5	FOLUPre&FOLUPost	-393924.074	207618.574
Pair 6	KarhutlaPre&KarhutlaPost	-829020.331	452768.331

t, df, and Sig. (2-tailed)				
Pair	**Pre & Post**	**t**	**df**	**Sig. (2-tailed)**
Pair 1	EnergiPre&EnergiPost	-2.331	3	0.102
Pair 2	IPPUPre&IPPUPost	-13.260	3	0.001
Pair 3	AgriculturePre&AgriculturePost	-3.661	3	0.035
Pair 4	WastePre&WastePost	-13.746	3	0.001
Pair 5	FOLUPre&FOLUPost	-0.986	3	0.397
Pair 6	KarhutlaPre&KarhutlaPost	-0.934	3	0.419

Table 5 provides the results of the analysis regarding the paired-sample t-test differences results. The output used in this study can be seen from the determination of the value of Sig. (2-tailed) were excluded from the model. In addition, it can also be seen by comparing the calculated t value resulting from the output with the t table. In facilitating understanding and retrieval of research results, table 6 is formed in determining hypothesis testing from the findings produced in table 5.

Table 6. Hypothesis Determination Results

No.	**Variable Name**	**t count**	**t table**	**decision**
1	Pairs 1 EnergiPre – EnergiPost	-2,331	±3.182	Not Affected
2	Pair 2 IPPUPre – IPPUPost	-13.260	±3.182	impact
3	Pair 3 AgriculturePre - AgriculturePost	-3.661	±3.182	impact
4	Pairs 4 WastePre – WastePost	-13,746	±3.182	impact
5	Pair 5 FOLUPre – FOLUPost	-0.986	±3.182	No impact
6	Pairs 6 KarhutlaPre – KarhutlaPost	-0.934	±3.182	No impact

In the two sectors above, Indonesia has succeeded in overcoming problems in the IPPU emission sector, agricultural emissions, and waste emissions. However, in the sector of energy

emissions, FOLU emissions, and forest fires, Indonesia has shortcomings in the management of forest and land fire disaster mitigation (Karhutla). Indonesia with natural conditions that are prone to disasters, of course, must have readiness in planning and preparing for disaster management, especially when the disaster has an impact on the wider community and even other countries which in this case will affect the diplomatic process between countries. Indonesia as one of the countries that contribute to forest fire emissions has a responsibility to overcome this problem. The ASEAN Agreement on Transboundary Haze Pollution after ratification, it shows indications of better management of environmental damage than before, but in cross-border Forest Fire Emissions, it still occurs. Therefore, continuous handling and prevention efforts are needed to ensure that forest and land fires in Indonesia can be overcome and an important aspect that can help overcome forest and land fire prevention is the existence of effective disaster mitigation management.

The environment is everything, both living things, objects, and conditions, including humans and their behavior that influences the survival of humans and other living things (Kammerlander and Schulze 2021; Karaduman et al. 2020). The more life increases, the population increases, and the exploitation of natural resources to meet various human needs, this is not only happening in Indonesia, but also in other parts of the world. So that many environmental problems arise, including global warming, reduced natural resources, environmental pollution of both water, soil, and air, and other problems, all of them attracted more and more attention (Bouznit and Pablo Romero 2016; Hamit-haggar 2012; Jia et al. 2021; Tietenberg and Lewis 2009). Earth's atmosphere is never free from changes in composition, and temperature, and its self-cleaning ability has always varied since the earth was formed. The increasing number of people is accompanied by increased human activities, especially in the field of transportation and industry (Arvin and Lew 2011; Can and Korkmaz 2019). This is predicted to be the cause of an increase in the earth's temperature or called global warming (Asongu and Odhiambo 2021; Khodamipour, Shahamabad, and Shahamabad 2022).

The main reason for environmental degradation and the existence of an environmental crisis is the fact that the relationship between humans and the environment is deteriorating due to the rapid exploitation of natural resources, technological development, and industrial expansion that needs the control of the government (Alvarado and Toledo 2017; Tan et al. 2022; Zhou et al. 2020). The entire impact of human activities on planet earth over the last few decades, especially the industrial revolution has resulted in a continuous increase in greenhouse gases (especially CO2 emission) caused by burning fossil fuels(Ali, Audi, and Roussel 2021). The effects of environmental pollution can be seen after the emergence of serious health problems and ecological disturbances (Anwar and Younis 2020; Butnariu 2018).

Industrial development coupled with energy consumption using environmentally unfriendly technologies, especially in developing countries, has increased greenhouse gas emissions. The use of fossil energy will increase the concentration of greenhouse gases, especially carbon dioxide (CO2 emission). Energy consumption in Indonesia is differentiated by energy user sector including industrial, household, transportation, commercial, and other sectors. Among the high energy use is electricity which is a basic need needed for households, industry, and government in economic and social activities. With the depletion of fossil energy reserves (petroleum, natural gas, and coal) but in sustainability, the energy consumption will be increase, which poses a threat to the development of the Indonesian economy. Therefore, various efforts need to be made to encourage efficient use of energy accompanied by an intensive search for new fossil energy sources and the development of alternative energy that is renewable resources(Wang and Dong 2019).

Natural resources have the potential to improve the economic level of the community(Ali et al. 2021; He et al. 2022; Ibrahiem and Sameh 2021). There is a lot of potential available in nature that can be utilized by humans in meeting needs, improving living standards, and the economy. Often the use of existing natural resources is not followed by preserving the environment so in the long term this will certainly harm the community itself. When viewed from an environmental perspective, it is under heavy pressure as a result of economic growth. This can be seen from the indicators of environmental pollution, both water pollution, air

pollution, and forest damage. Water pollution in Indonesia is getting worse. Water pollution in Indonesia causes a loss of IDR 45 trillion per year (Asian Development Bank, 2008). The 2015 Paris Agreement reinforces that transformation. Territorial climate governance is now a combination of nationally determined contributions (NDCs) and international monitoring, and verification (Bernstein and Hoffmann 2018). Environmental agreements also occur in ASEAN countries such as the ASEAN Agreement on Transboundary Haze Pollution which functions to control environmental pollution, especially forest fires. The greatest damage or threat to natural forests in Indonesia is illegal logging, conversion of forest functions to plantations, forest fires, and forest exploitation for both residential development, and industry, and due to encroachment. In addition, population density in an area also tends to affect the quality of the environment. Water quality, especially river water, tends to decline due to increased household waste, and new land clearing will expand to meet the needs of the growing population (Sharma, Kautish, and Uddin 2020). It is not enough if development only concentrates on improving the quality of the economy, but by destroying the environment.

Disaster mitigation is an effort to overcome and overcome the occurrence of disasters as well as efforts to prevent them. Disaster mitigation management is the process of planning, organizing, directing, and implementing strategies so that disasters that occur can be overcome, overcome, and prevented. In 2019, the Coordinating Ministry for Human Development and Culture in its article the Government Prepared a 2020 Karhutla Prevention and Handling Strategy which was planned at the Ministerial Special Coordination Meeting on Improving Forest and Land Fire Control (Karhutla) at the Manggala Wanabakti Building, ministry of environment and forestry, Jakarta on December 6, 2019, which aims to formulate government programs and strategies in implementing the prevention of Kahutla in 2020. The central government also emphasized that the regional government and the central government will immediately carry out disaster mitigation and according to him, prevention of forest and land fires is the best way compared to extinguish fires. However, this prevention effort was not emphasized further in the following years.

Efforts made by local governments in preventing forest and land fires are still in the socialization stages as in Arifin (2020) which states that the Pontianak City Regional Disaster Management Agency to prevent haze is to carry out socialization of Perwa (mayor regulations), namely socialization of increasing togetherness and one-way command in disaster management, socialization through coordination in uniting perceptions to act in disaster management. The implementation of this socialization must be reviewed periodically with the concept of effective disaster mitigation management as well. According to the Health Office of Sarolangun Regency that effective disaster mitigation must include three elements including; hazard assessment, warning, and preparation. With good disaster mitigation management, forest and land fire prevention can be handled and Emissions from forest fires will decrease.

The high economic growth and energy consumption in this region have made many parties begin to consider especially in Indonesia and generally ASEAN as one of the world's economic powers. In its development, energy growth can affect economic growth, but in two different categories. The two categories are renewable and non-renewable energy. Renewable energy and non-renewable energy have a significant positive relationship to economic growth. This is indicated by non-renewable energy having greater growth than renewable energy and will create a balance toward environmentally friendly energy. Therefore economic growth influences energy consumption. Energy consumption, both non-renewable energy and renewable energy, has been regulated by an energy regime in the form of a policy, which this regime aims to ensure the security of the domestic energy supply (Asongu and Odhiambo 2021).

CONCLUSION

From 1997 to 1998 several Southeast Asian countries had some problems ranging from fiscal, and monetary to environmental problems in controlling emissions. In this case, regional collaboration is needed to realize commitments to improving the environment to reduce emissions and environmental pollution that occurs. Environmental Kuznets Curve (EKC) is a curve that shows the relationship between economic growth and CO2

emissions which states that there will be a decrease in CO2 emissions within a certain turning point which will cause economic growth to contribute to the reduction of CO2 emissions.

In this study, it was found that energy consumption, FOLU, and forest fires (Karhutla) did not have a significant impact on the implementation of the ratification of the ASEAN Agreement on Transboundary Haze Pollution in Indonesia. Furthermore, it was found that IPPU, agricultural emissions, and waste emissions are emissions affected by the ratification of the ASEAN Agreement on Transboundary Haze Pollution in Indonesia. On a macro level, Southeast Asian countries have economic growth that can reduce CO2 emissions, but the other main variables, namely energy consumption and population growth, have a positive correlation so that increased energy consumption and population growth will continue to contribute to increasing CO2 emissions. On the other hand, sectorally, Indonesia can control emissions from energy, IPPU, agriculture, and waste but has not been able to control emissions arising from FOLU and forest fires. So that the pure EKC hypothesis that will form an inverted U still cannot be realized in developing countries and still supports some previous studies that prove that developed countries have the opportunity to create quality economic growth and reduce emission pollution.

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