

**Economic and Non-Economic Influences on Carbon Emissions in ASEAN-6
Countries: Environmental Kuznets Curve (EKC) Analysis**



THESIS

SUBMITTED TO THE FACULTY OF ISLAMIC ECONOMICS AND BUSINESS

STATE ISLAMIC UNIVERSITY SUNAN KALIJAGA YOGYAKARTA

AS ONE OF THE CONDITIONS FOR SUBMITTING THESIS

By:

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**STATE ISLAMIC UNIVERSITY
SUNAN KALIJAGA
YOGYAKARTA
SHARIA ECONOMICS STUDY PROGRAM**

FACULTY OF ISLAMIC ECONOMICS AND BUSINESS

STATE ISLAMIC UNIVERSITY SUNAN KALIJAGA YOGYAKARTA

2024

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ACC *murogatal*
28 Nov 2024

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2024

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(Najma Taralia Farah)

MOTTO PAGE

Success can't be achieved without the blessing of parents and Allah

Dare to start, dare to take risks and challenges



DEDICATION PAGE

Bismillahirrahmanirrahim

By saying thanks to the presence of Allah SWT,
who has given His grace, guidance, and guidance, I dedicate this thesis to:

Parent

To my beloved parents, the late Abah Muhammad Mafruhin, S.Ag, whom I supported and prayed for, and Ibu Hidayatun Khanifah, S.Ag, who always gave support, prayers and the best efforts for her two children.

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Almameter

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And finally, I dedicate this writing to myself who has persevered, convinced myself that I am capable of completing my responsibilities, growing, and developing as a form of appreciation and the result of a learning and growth-up process that will continue.

ARABIC-LATIN TRANSLITERATION GUIDELINES

The transliteration of Arabic words used in the preparation of this thesis is guided by the Joint Decree of the Minister of Religion and the Minister of Education and Culture of the Republic of Indonesia Number: 158/1987 and 0543b/U/1987.

A. Single Consonants



Huruf Arab	Nama	Huruf Latin	Keterangan
ا	Alif	Tidak dilambangkan	Tidak dilambangkan
ب	Bā'	B	Be
ت	Tā'	T	Te
ث	Śā'	Ś	Es (dengan titik di atas)
ج	Jīm	J	Je
ح	Ḥā'	Ḥ	Ha (dengan titik di bawah)
خ	Khā'	Kh	Ka dan ha
د	Dāl	D	De
ذ	Žāl	Ž	Zet (dengan titik diatas)
ر	Rā	R	Er
ز	Zāi	Z	Zet
س	Sīm	S	Es
ش	Syīn	Sy	Es dan Ye
ص	Sād	Ş	Es (dengan titik di bawah)
ض	Dād	Ḍ	De (dengan titik di bawah)
ط	Tā'	Ṭ	Te (dengan titik di bawah)
ظ	Zā'	Ẓ	

ع	Ain	‘	Zet (dengan titik di bawah) Koma terbalik diatas
غ	Gain	G	Ge
ف	Fā’	F	Ef
ق	Qāf	Q	Qi
ك	Kāf	K	Ka
ل	Lām	L	El
م	Mim	M	Em
ن	Nūn	N	En
و	Wāwu	W	We
هـ	Hā’	H	Ha
ء	Hamzah	‘	Apostrof
ي	Yā’	Y	Ye

B. Double consonants because Syaddah is written in doubles

مُعْتَدَّة	Ditulis	Muta’addidah
عَدَّة	Ditulis	‘iddah

C. Single Consonants

All ta’ marbuthah are written with h, whether in a single word or in the middle of a compound word (a word followed by the article “al”). This

provision is not required for Arabic words that have been absorbed into Indonesian, such as prayer, zakat and so on unless the original word is desired.

حكمة	Ditulis	<i>Hikmah</i>
علة	Ditulis	'illah
كرمة الأولياء	Ditulis	<i>Karamah al auliya'</i>

D. Short Vowels and Their Application

All ta' marbutah are written with h, whether in a single word or in the middle of a compound word (a word followed by the article "al"). This provision is not required for Arabic words that have been absorbed into Indonesian, such as prayer, zakat and so on unless the original word is desired.

---َ---	Fathah	Ditulis	A
---ِ---	Kasrah	Ditulis	I
---ُ---	Dammah	Ditulis	U
فعل	Fathah	Ditulis	<i>Fa'ala</i>
ذكر	Kasrah	Ditulis	<i>Žukira</i>
يذهب	Dammah	Ditulis	<i>Yazhabu</i>

E. Long Vowels

Fathah+Alif جاهلية	Ditulis	Ā
Fathah + ya' mati تنسى	Ditulis	Jāhiliyyah
Kasrah + ya' mati كريم	Ditulis	Ā
Dhammah + wawu mati فروض	Ditulis	Tansā
	Ditulis	Ī
	Ditulis	Karīm
	Ditulis	Ū
	Ditulis	Furūḍ

F. Double Vocal

Fatḥah + yā' mati بينكم	Ditulis	Ai
	Ditulis	Bainakum
Fatḥah + wāwu mati قول	Ditulis	Au
	Ditulis	Qaul

G. Consecutive Short Vowels in One Word Separated by Apostrophe

أَنْتُمْ	Ditulis	<i>A'antum</i>
أَعَدْتُ	Ditulis	<i>U'iddat</i>
لَئِنْ شَكَرْتُمْ	Ditulis	<i>La'in syakartum</i>

H. Article Alif + Lam

1. If followed by the letter Qamariyyah, it is written using the initial letter "al"

الْقُرْآنُ	Ditulis	<i>Al-Quran</i>
الْقِيَاسُ	Ditulis	<i>Al-Qiyas</i>

2. If followed by the Syamsiyyah letter, it is written according to the first letter of the Syamsiyyah.

السَّمَاءُ	Ditulis	<i>As-Samā'</i>
مَسَالِشُ	Ditulis	<i>Asy-syams</i>

I. Writing Words in Sentences

Written according to the writing

ذَوِي الْفُرُوضِ	Ditulis	<i>Zawī al-furūd</i>
أَهْلُ السُّنَّةِ	Ditulis	<i>Ahl as-sunnah</i>

FOREWORD

Bismillahirrahmanirrahim

Praise be to Allah SWT who has given His grace, gifts and guidance, so that the author can complete the thesis entitled "Economic and Non-Economic Influence on Carbon Emissions ASEAN-6 Countries: Environmental Kuznets Curve (EKC) Analysis". May peace and blessings always be upon our prophet Muhammad SAW, his family, and his companions. May we all be able to emulate him. Aamiin.

The writing of this thesis aims to contribute to the understanding and development of science, especially in the field of Islamic Economics. Through this research, the author hopes to provide a different perspective, analyze in depth and provide new insights into the research topic raised. The author realizes that this thesis is far from perfect. The entire thesis research process cannot be separated from the support and assistance of various parties. Therefore, with all humility, the author would like to express his gratitude for everything given to:

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Of course, the author's writing is still far from perfect. Therefore, criticism and suggestions from all parties that are constructive can be submitted through taraliafarahnajma@gmail.com for the perfection of this writing. That's all, hopefully this writing can be useful.

Yogyakarta, November 20, 2024

Compiler,



Najma Taralia Farah
NIM. 21108010004

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ABSTRAK

Emisi adalah salah satu dari beberapa aspek lingkungan berbahaya yang memiliki dampak serius terhadap perubahan global dunia. Emisi merupakan polutan yang dihasilkan dari proses pembangunan infrastruktur, peningkatan produksi industri, dan konsumsi sumber daya alam yang tinggi. Namun, dampak negatif dari emisi karbon jika tidak dikelola dengan baik akan menimbulkan masalah besar di masa yang akan datang, terutama terhadap kerusakan lingkungan seperti perubahan iklim, degradasi lingkungan, stagnasi perekonomian, dan penurunan kualitas udara dan air adalah isu-isu kritis yang membutuhkan perhatian dan penanganan lebih lanjut. Hal ini perlu adanya upaya untuk mencari tahu pengaruh emisi karbon untuk meminimalisir dampaknya. Penelitian ini menggunakan analisis data panel gabungan dari cross-section 6 negara ASEAN dengan time series 2015 hingga 2023. Hasil uji spesifikasi model menunjukkan bahwa pendekatan *System Generalized Method of Moments* (Sys-GMM) adalah model terbaik untuk digunakan. Ditemukan bahwa variabel Populasi, Kualitas Pemerintah, Pertumbuhan Ekonomi, Keterbukaan Perdagangan dan FDI (*Foreign Direct Investment*), berpengaruh terhadap emisi karbon. Variabel Populasi, Pertumbuhan Ekonomi, dan Keterbukaan Perdagangan memiliki pengaruh positif dan signifikan terhadap emisi karbon. Sedangkan variabel Kualitas Pemerintah memiliki pengaruh negative dan signifikan terhadap emisi karbon (CO₂). Namun, dalam jangka Panjang variabel kualitas pemerintah berpengaruh negative dan tidak signifikan terhadap emisi karbon dan variabel FDI berpengaruh positif signifikan terhadap emisi karbon di Negara ASEAN-6 dari tahun 2015 hingga 2023.

Kata Kunci: *Emisi Karbon, Populasi, Kualitas Pemerintah, Pertumbuhan Ekonomi, Keterbukaan Perdagangan, FDI*

ABSTRACT

Emissions are one of several dangerous environmental aspects that have a serious impact on global change in the world. Emissions are pollutants resulting from the process of infrastructure development, increased industrial production, and high consumption of natural resources. However, the negative impact of carbon emissions if not managed properly will cause major problems in the future, especially environmental damage such as climate change, environmental degradation, economic stagnation, and decline in air and water quality are critical issues that require attention and further treatment. This requires efforts to find out the influence of carbon emissions to minimize the impact. This research uses combined panel data analysis from a cross-section of 6 ASEAN countries with the time series 2015 to 2023. The results of the model specification test show that the System Generalized Method of Moments (Sys-GMM) approach is the best model to use. It was found that the variables Population, Government Quality, Economic Growth, Trade Openness and FDI (Foreign Direct Investment) had an effect on carbon emissions. The variables Population, Economic Growth, and Trade Openness have a positive and significant influence on carbon emissions. Meanwhile, the Government Quality variable has a negative and significant influence on carbon emissions (CO₂). However, in the long term, the government quality variable has a negative and insignificant effect on carbon emissions and the FDI variable has a significant positive effect on carbon emissions in ASEAN-6 countries from 2015 to 2023.

Keywords: Carbon Emissions, Economic Growth, Population, Government Quality, Trade Openness, FDI

CHAPTER I

INTRODUCTION

A. Background

During this century there has been an increase in carbon emissions (CO₂) which has become a big concern in countries around the world. Global climate change is one of the world's most important problems and biggest challenges due to technological advances. This progress is clearly caused by globalization, which is the path to modernization (Poku, 2016). Additionally, in an effort to maintain a balance between economic growth and environmental quality, the United Nations (UN) has established sustainable development goals (SDGs) in recent decades (Johnston, 2016).

Environmental quality has decreased due to several reasons, one of the factors causing the decline in environmental quality is continuous environmental degradation. This can cause economic growth to grow rapidly (Yamaka et al., 2021). One indicator of a country's success in improving the welfare of its citizens is advanced economic growth, which has occurred in the last few decades, which indirectly drives global change. Some countries have gained significant economic benefits from increased industrial production, increased consumption of natural resources, and infrastructure development. However, there

are negative impacts from economic growth that is not well managed, especially environmental damage such as climate change, environmental degradation, and decreased air and water quality (Akhirul et al., 2020).

The Environmental Kuznets Curve (EKC) approach is an approach that is still relevant to study the relationship between economic growth and environmental quality, namely Wafi Dinilhaq (2024), in his research, found that the EKC theory shows a continuous relationship between environmental quality and growth or per capita income, which is depicted by an inverted U curve. Therefore, the EKC curve also explains the relationship between carbon dioxide emissions and per capita income in the long run, showing how economic activities have caused environmental damage. Although economic growth can reduce environmental damage, the Ecological Kuznets curve or more commonly known as the Environmental Kuznets Curve (EKC) often uses carbon dioxide (CO₂) emissions as an indicator of environmental quality.

Continuous economic growth causes the use of natural resources and waste to increase. Some developing countries attempt to increase economic growth without paying attention to measures to preserve the environment. Therefore, environmental influence is an interesting issue to be debated significantly among stakeholders (regulators and

research researchers) and is something that an agency needs to pay more attention to. Since the environment is closely linked to economic growth, it plays a significant role in the economy (Dira et al., 2023).

Environmental damage will reduce the availability of resources in the production process which can hamper the company's ability and processes to produce goods and services. So, it is important for citizens to have an understanding of the problem of environmental damage which can be analyzed from economic activities to maintain the environment in a sustainable manner in natural balance (Todaro, 2012). Environmental damage is closely related to global warming. Greenhouse gases consist of carbon dioxide (CO₂), methane gas (CH₄), nitrogen gas (N₂O), and other gases that contain fluorine. Gas fertilization effects, which occur when gases melt in the atmosphere, change the radiation balance, and cause the Earth's surface to become warmer, are different from greenhouse gases (Pradesh, 2021).

World Bank (2022) states that one way to find out the causes of environmental damage is to know how much CO₂, or carbon dioxide, is released in the air. CO₂ is a waste gas produced from combustion. Carbon emissions can produce large amounts if seen from the quantity, size of the production process and human activities in daily life that use fossil fuel technology. Some of these activities include industries that

use coal or petroleum, burning rubbish, deforestation, vehicle engines, cement manufacturing, and forest fires.

World Meteorological Organization (WMO) in research Irma & Gusmira (2024), states that the increase in carbon dioxide (CO₂) gas is responsible for more than 80 percent of the total contribution of greenhouse gases to global warming, which damages air quality and triggers a slow increase in the earth's temperature. The process of global warming will also cause an increase in global temperatures, which can cause droughts, floods and an increase in sea levels to the point of submerging small islands. Among other things, the melting of ice at the north and south poles will cause sea levels to rise and cover a lot of land. All of these problems have implications for economic activities and will disrupt the production process. One of the largest producers of carbon (CO₂) emissions is the electricity generation industry, contributing 37 percent globally. The percentage level may increase due to the rapid growth of carbon emissions in the industrial sector, in the next 20 years it is predicted that ASEAN countries will contribute 44 percent of carbon emissions (CO₂) globally (Candra, 2018).

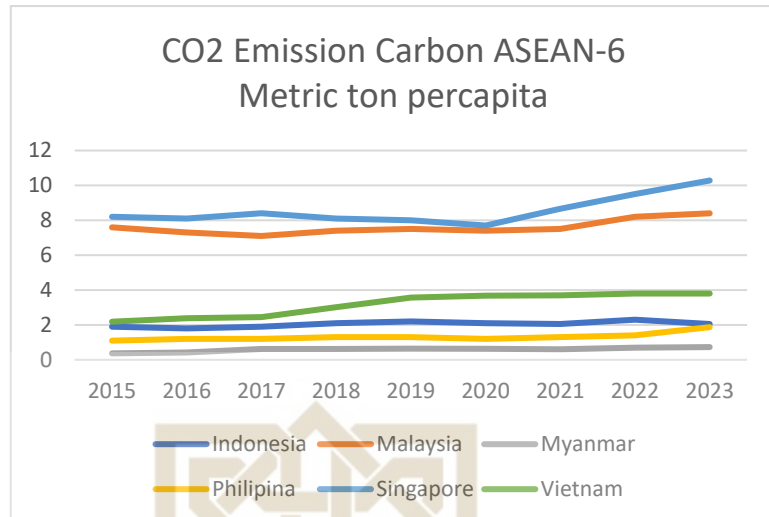


Figure 1. 1 Graph of Carbon Emission Growth for 6 ASEAN countries

Source: *World Bank* (2024) data is processed

CO2 carbon emissions in Figure 1.1 are experiencing growth which tends to be insignificant, due to a decline in environmental quality which is getting worse every year. Based on the data above, Singapore has the highest level of CO2 emissions, namely 10.28 metric tons per capita in 2023 with an average carbon emission of 9.61 metric tons per capita. Every year, Singapore strives to reduce the level of carbon (CO2) emissions which are getting worse due to high economic growth in its industrial sector and increasingly advanced trade. Indonesia has an average growth rate of carbon emissions of 2.3 metric tons per capita in the industrial, trade and agricultural sectors. Malaysia has the highest growth rate of carbon emissions (CO2) at 8.40 metric tons per capita in 2023.

The Philippines has the highest growth rate of carbon emissions (CO₂) of 1.83 metric tons per capita in 2023. Myanmar has the highest growth rate of carbon emissions (CO₂) of 0.7 metric tons per capita in 2022 and 2023 with an average of 0.66. Vietnam has the highest growth rate of carbon emissions in 2022 and 2023 at 3.8 metric tons per capita with an average of 3.6 metric tons per capita. So, based on this data, the country of Myanmar has the lowest carbon emissions growth of 0.66 metric tons per capita because the country of Myanmar is a country with a lower level of industrialization and economic system than other countries and the majority of economic activities in Myanmar still depend on the agricultural sector.

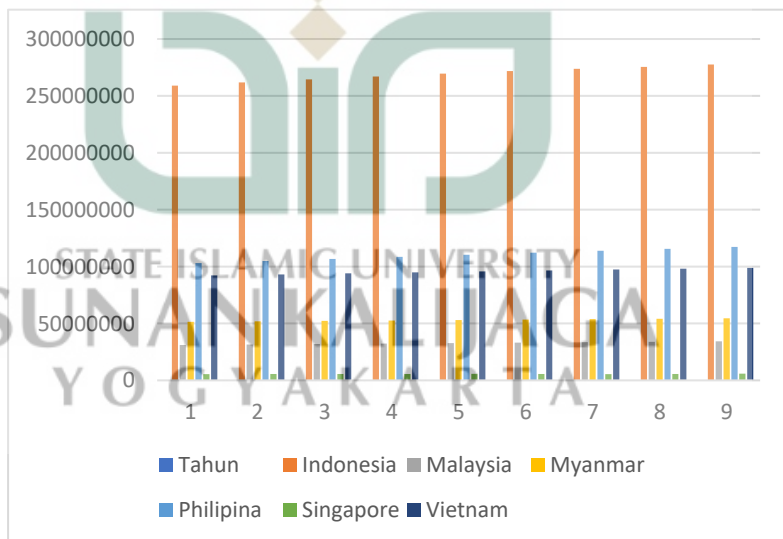


Figure 1. 2 Population graph of 6 ASEAN countries

Source: World Bank (2024), processed

All countries experienced significant population increases, as shown in figure 1.2. One of the six ASEAN countries with the highest population growth rate is Indonesia, with a population of 302592168 people/km². The fluctuating increase in population in Indonesia occurred from 2020 to 2023. Singapore is the lowest country with an increase in population of only 6348853 people/km². The differences in the total population of the ten ASEAN countries above are very significant as a comparison related to research. The fluctuating increase in population in Indonesia occurred from 2020 to 2023. Singapore is the lowest country with an increase in population of only 6348853 people/km². The differences in the total population of the ten ASEAN countries above are very significant as a comparison related to research.

From the picture above, we can see whether previous research and theories regarding population growth have a causality in carbon emissions, with increasing population causing carbon emissions to also increase. Prinadi et al., (2022) also stated that there is empirical evidence that proves that economic and population growth can influence the increase in carbon emissions. This is in line with Danish et al., (2019) found that structural change can lead to economic and population growth, and that incentive-managed use of energy from carbon emissions to the service sector can reduce carbon emissions in

developed countries. By paying attention to ecosystems and environmental sustainability, increasingly advanced and sophisticated technology, and regulatory provisions related to environmental ecosystems, we can reduce excessive energy use. So that carbon emissions (CO₂) have decreased and environmental quality has improved.

The driving factors for increasing carbon emissions (CO₂) in developing countries are the agricultural, transportation and industrial sectors compared to developed countries. In developing countries, efforts to reduce carbon (CO₂) emissions have not been effective and are weak. Developing countries still depend on the use of fossil fuels to meet energy needs. Meanwhile, in developed countries, due to technological progress, developed countries with per capita income have shifted from using fossil fuels to renewable resources (Rachmat, 2018). Between 1917 and 2013, there were drivers of pollution and environmental degradation in 17 African countries. Research conducted based on the Environmental Kuznet Curve (EKC) theory on the economy has a negative influence (Sarkodie, 2018).

Many empirical studies examine several factors that can influence carbon (CO₂) emissions. Example Liu et al., (2022) states that government quality and economic growth contribute positively to

reducing carbon emissions (CO₂), while economic growth variables contribute positively and can even increase the intensity of carbon emissions. A weak institutional framework will not be able to overcome the problem of environmental degradation. Therefore, the influence of government quality on environmental quality needs to be considered. Khan et al., (2023) and Inggia Sari (2023) found that good economic growth or per capita income has an influence on increasing carbon emissions (CO₂).

Kasman & Duman (2015) has shown in his study that economic growth variables influence carbon emissions (CO₂). The findings from these two studies are in line with the idea that economic growth variables influence CO₂ emissions. Adrian (2024) and Wang et al., (2023) shows that economic growth is very helpful, namely having a positive influence on carbon emissions (CO₂). Shahbaz et al (2013) states that there is a long-term relationship between the variables of economic growth and trade openness on carbon emissions (CO₂) from 1975 to 2011. Suhartoko & Dewinta (2023) states that economic growth, direct investment (FDI), and population influence the increase in carbon dioxide emissions. There is research conducted using the Environmental Kuznet Curve (EKC) which found that there is an inverted

U curve with economic growth continuing to increase, unable to increase carbon emissions (CO₂) in the long term (Cristy & Sakti, 2022).

Yao et al., (2019) uses two cointegration panels Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) to assess the relationship between economic growth and carbon (CO₂) emissions in the theory of economic and environmental growth, the Environmental Kuznets Curve (EKC). Data used for research objects in 17 developing countries from 1990 to 2014. Therefore, there is a positive correlation between economic growth and carbon emissions (CO₂). Yamaka et al., (2021) found that developed countries have not been able to control and maintain environmental sustainability as a result of economic growth. This is not in harmony with Rambeli et al., (2021) in his research, he found that developed countries were able to reduce carbon emissions through environmentally friendly economic activities (green economics), while developing countries had not been able to optimize the use of environmentally friendly economic activities. From the things above, it is one of the things that researchers want to study more deeply regarding what can create good economic growth and reduce the increasingly high increase in carbon emissions.

In this research, researchers want to investigate the influence of carbon emissions in ASEAN-6 countries, namely Indonesia, Malaysia,

Myanmar, the Philippines, Singapore and Viet Nam, with several variables, namely economic and non-economic variables. Economic variables consist of Economic Growth (GDP per capita), trade openness (Trade % of GDP), and FDI (Foreign Direct Investment) while non-economic variables consist of Government Quality and Population.

First, using the *Environmental Kuznets Curve* (EKC) theory to explain how economic growth impacts carbon emissions, or environmental damage (Todaro, 2012). *Gross Domestic Product per capita* or better known as GDP per capita, is used by researchers as a representation of economic growth theory to describe economic growth referred to from sources written by (Todaro, 2012).

Next, for an explanation regarding *Foreign Direct Investment* (regarding environmental damage, researchers use the *pollution haven hypothesis* (PHH) theory). *Foreign Direct Investment* as using the *Pollution Haven Hypothesis* (PHH) theory is referred to from research conducted by (Mert & Caglar, 2020) and (Chiriluş & Costea, 2023). The FDI (Foreign Direct Investment) variable is one of the determining factors for environmental damage (carbon emissions). Several considerations why the FDI variable is important in research related to carbon emissions, namely:

First, Foreign Direct Investment (FDI) is one of the efforts for a country to improve economic growth so that it grows better. In addition, direct investment can encourage a country's economic growth through increasing capital flows, job opportunities, export-import, and technological progress. On the other hand, FDI can reduce the level of economic fluctuations. That is why, FDI is relatively unaffected by industrial or economic changes and is expected to contribute to providing sustainable investment for a country (Rahmadiani et al., 2023). When the country concerned implements strict environmental regulatory policies, it will prevent the entry of FDI into the country. However, if the country concerned makes regulations related to the environment easier, it will attract foreign investors to invest FDI (Chen et al., 2024). This makes FDI an important aspect of carbon emissions.

Second, the trade openness variable is also an important aspect in reducing carbon emission levels. This is through open trade, countries can obtain more sophisticated environmentally friendly technology from trading partners in the country concerned. The existence of technology can help the production process be environmentally friendly, and will then reduce carbon emissions. Aligned with Rahmadiani et al., (2023) in his research found that efficiency in the use of technology can have a positive influence on reducing carbon dioxide (CO₂) emissions. Apart

from technology, trade openness can also help reduce carbon emissions by removing trade barriers. Therefore, a country can encourage a more efficient and environmentally friendly flow of goods and services. This can ultimately increase employment opportunities and encourage countries to use greener technologies.

Third, the Foreign Direct Investment (FDI) variable is an independent variable which aims to determine the impact of foreign investment on carbon emissions and can illustrate how important FDI can have an impact on increasing CO₂ emissions. In the Pollution Haven Hypothesis (PHH) theory, direct investment (FDI) is an important factor because countries with intensive production will receive pollution from countries with looser environmental regulations (Mert & Caglar, 2020). Aligned with (Chiriluş & Costea, 2023) found that PHH is an economic theory that states that companies will move production from countries with strong environmental regulations to countries with weaker environmental regulations (with less stringent and inadequate government regulations) to reduce costs. This is because the costs of complying with environmental regulations in the home country are higher than the costs of not complying with regulations in the investor's country. Thus, countries compete for human resources in the weakest

environmental regulations so that businesses become more attractive to investors.

In the non-economic factor variables there are government quality and population. The quality of government has an important role in reducing carbon emissions. Wong et al., (2010) found that government quality through the implementation of regulations such as eliminating fossil fuel subsidies, carbon taxes and feed-in tariffs can reduce carbon emissions. Aligned with Mahjabeen et al., (2020), The role of strong government regulations can reduce carbon emissions by improving environmental quality and economic growth by enforcing efficient resource allocation and attracting foreign investment.

On the other hand, weak government regulations will not be able to overcome the increasing problem of carbon emissions. Therefore, the government's influence on carbon emissions needs to be researched and carried out further considerations. Meanwhile, the population variable in this study is also important because population can also increase CO₂ (carbon dioxide) because an increasing population can increase demand for energy. When demand for these needs increases, CO₂ will automatically increase too. A large population is not balanced with environmentally friendly technology and

sustainable practices, causing a continuous increase in carbon emissions (Rafif et al., 2024).

Seeing the research gap in inconsistent research results, researchers are interested in examining the impact of economic growth and several explanatory variables on carbon emissions with a research focus on ASEAN-6, namely Indonesia, Malaysia, Myanmar, the Philippines, Singapore and Vietnam. According to *World Bank* (2022), ASEAN contributes the second largest carbon emissions in the Asian region with a total of 52,163.35 million metric tons of carbon. Climate is one of the factors that causes an increase in carbon emissions (CO₂) and environmental damage. This is because as the level of carbon emissions increases, the weather will become more extreme. Factors influencing high carbon emissions in ASEAN-6 countries still need to be researched more deeply.

With several research gaps and several considerations above, researchers are interested in conducting research by raising the issue of **"Economic and Non-Economic Influences on ASEAN-6 Carbon Emissions: Environmental Kuznets Curve (EKC) Analysis"**. This research can be considered useful as a medium between literature that focuses on energy, environmental and economic sustainability. Hopefully this

research can be a useful study for making the best decisions in the future.

Based on the background description, this research problem is described in the following questions:

1. Do the population influences carbon emissions in ASEAN-6 countries?
2. Do the quality of government influences carbon emissions (CO₂) in ASEAN-6 countries?
3. Do the economic growth influences carbon emissions (CO₂) in ASEAN-6 countries?
4. Do the trade openness influences carbon emissions (CO₂) in ASEAN-6 countries?
5. Do the FDI (Foreign Direct Investment) influences carbon emissions (CO₂) in ASEAN-6 countries?

B. Research Objectives and Benefits

1. Research Objective
 - a. To find out whether population has an influence on carbon emissions (CO₂) in ASEAN-6 countries.
 - b. To find out whether government quality has an influence on carbon emissions (CO₂) in ASEAN-6 countries.

- c. To find out whether economic growth has an influence on carbon emissions (CO₂) in ASEAN-6 countries.
- d. To find out whether trade openness has an influence on carbon emissions (CO₂) in ASEAN-6 countries.
- e. To find out whether FDI (Foreign Direct Investment) has an influence on carbon emissions (CO₂) in ASEAN-6 countries.

2. Benefits of Research

- a. As a medium between literature that focuses on environmental economics, as well as providing new insights that can enrich understanding of the interaction between economic and environmental aspects, namely carbon emissions (CO₂).
- b. For researchers, it is hoped that the results of this research will be able to provide the benefit of new and broader knowledge regarding the influence of economic factors measured using GDP, government quality and population on environmental quality, namely on carbon emissions (CO₂) in ASEAN-6 countries..
- c. For the government, it is hoped that the results of this research will be able to contribute to designing sustainable policy strategies and provide insight to increase awareness of the importance of environmental sustainability, namely carbon emissions (CO₂) and the economy in the future..

- d. For the academic community, it is hoped that the results of this research will serve as an illustration for future researchers to pass through gaps that have not been researched, thus opening up opportunities for further, more in-depth and broader research regarding the dynamics between the economy and the environment, namely carbon emissions (CO₂).

C. Systematic Discussion

The systematic discussion of the research is as follows:

CHAPTER I contains an Introduction. This is a section that contains: Background, explaining the context and conditions behind this research and why this is important to research. Problem formulation, identifying the main problems to be discussed. Research objectives, explain the main aim of this research and what it wants to achieve. Benefits of research, discussing in detail the benefits that can be obtained from the results of this research. Systematic Discussion, provides a brief overview of the structure and content of this research.

CHAPTER II Conceptual Framework. This is the section that contains: Theoretical Overview, presenting the theoretical framework that supports this research and explaining the key concepts that will be used. Previous Research, summarizes previous research relevant to this topic and highlights important findings. Research Hypothesis, building a

hypothesis based on a theoretical framework and previous research findings.

CHAPTER III Research Methodology. This is a section that contains: Research Types and Approaches, describing the research design used and the reasons behind the choice. Population and sample, describes the process of selecting the population and sample in this research. Data and data sources, explaining how the researcher obtained the data and the reasons why the researcher chose the time period in this research. Research Variables, explains the variables studied and their measurements. Operational definition of variables, more detailed explanation of the variables used in this research. Research Model, explains the econometric model related to research and which will be used in management analysis. Analysis method, describes the method that will be used in this research as well as the stages of the method.

CHAPTER IV Analysis and Discussion. This is the section that contains: Interpretation of Results, explaining the results of data analysis and providing an interpretation of the findings. Relationship with theory, explaining how the findings of this research relate to the theoretical framework that has been put forward. Economic and environmental implications, discussing the implications of research findings for economic policy and carbon (CO₂) emissions.

CHAPTER V Conclusions and Recommendations. This is the section that contains: the conclusion, summarizing the main findings of this research and answering the problem statement. Research Limitations, discussing the limitations faced in this research.



CHAPTER V

CLOSING

A. Conclusion

From the results of the hypothesis test analysis and the discussion that has been described, it can be concluded that Population, Government Quality, Economic Growth, Trade Openness and FDI (*Foreign Direct Investment*), have an effect on environmental damage (measured by CO₂) with a matrix unit of tons per capita in ASEAN-6 countries in 2015-2023, meaning that if there is a change in each independent variable simultaneously, then carbon emissions will also experience changes in ASEAN-6 countries. The Population, Economic Growth, and Trade Openness variables have a positive and significant effect on carbon emissions (CO₂). While the Government Quality variable has a negative and significant effect on carbon emissions (CO₂). However, in the long term, the government quality variable has a negative and insignificant effect on carbon emissions and the FDI variable has a significant positive effect on carbon emissions in ASEAN-6 countries from 2015 to 2023.

B. Implication

From the findings of this study, there are several theoretical, practical or policy implications that the author can write, namely::

1. In theory, the results of this research can provide information to readers, add to academic literature, and references for further research on population, government quality, trade openness, and FDI (Foreign Direct Investment), as factors that can affect the size of carbon emissions, where carbon emissions can cause environmental damage and the environment including the place of all economic activities. This research is also useful as a link or bridge between literature that focuses on energy and carbon emissions (environment) with research that focuses on the economy.
2. In practice or policy, the results of this study can provide a reference for policy makers that all policies or regulations related to population, government quality, economic growth, trade openness, and FDI (Foreign Direct Investment) are very important to maintain environmental quality. The government in ASEAN-6 countries needs to carry out appropriate interventions and regulations in every work program and all activities related to population, government quality, economic growth, trade openness, and FDI (*Foreign Direct Investment*).

C. Limitations and Suggestions

The limitation of this study is that the data used is secondary data, so researchers cannot completely avoid the possibility of errors in calculations. In addition, when viewed from the variables, analysis of

economic factors needs to be added because here the study only takes three main examples, namely economic growth, trade openness, and Foreign Direct Investment. This is intended so that the results of the economic analysis for the future will be deeper. Therefore, suggestions for further research include:

1. Further research is expected to collect primary data to develop a more comprehensive investigation..
2. Addition of independent variables in the non-economic factors section so that the results of economic analysis in future research become deeper and more precise.



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