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The Impacts Of Inbound Tourism Activities And Macroeconomic Variables On Environmental Degradation In Asean-4

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ABSTRACT

This study aims to analyze the impacts and causal relationship between inbound tourism activities and macroeconomic variables on environmental degradation and to analyze the environmental degradation response due to shocks that occur in inbound tourism activities and macroeconomic variables in four countries with the highest international tourist visits in the ASEAN region of Indonesia, Malaysia, Singapore and Thailand known as ASEAN-4 for Periode 1995-2015. The method used in the research is panel vector error correction model (PVECM). The results showed that inbound tourism activities positively influence in the long-term and short-term environmental degradation in ASEAN-4. Among macroeconomic variables only gross domestic product (GDP) positively affects environmental degradation in the long term and short term whereas energy consumption only affects environmental degradation in the short term. There is a direct causal relationship of inbound tourism activity with environmental degradation and environmental degradation with GDP. Energy consumption and environmental degradation manifest bidirectional causality with a feedback effect. Impulse response function indicates environmental degradation responds negatively to the shocks that occur in Inbound tourism and GDP activities. The positive response is indicated by environmental degradation in case of shock to energy consumption.

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INTRODUCTION

Over the last two decades, the threat of climate change due to increased global warming has been a major environmental challenge. Increased levels of carbon dioxide (CO₂) emissions are considered as one of the main causes of global warming and climate instability. Climate change is an important environmental threat to note in the modern era and described as the world's largest market failures. Greenhouse gases such as carbon dioxide, methane (CH₄) and nitrous oxide (N₂O) emitted through human activities are the largest source of climate change. CO₂ is the main focus of research because it is the main source of greenhouse gases and the longest life cycle gases CO₂ contribution to greenhouse gases amounted to more than 60 percent of the total greenhouse gas effect. Many studies have sought to uncover the factors that determine carbon dioxide emission levels to produce policy options that mitigate climate change (Ohlan, 2017).

One of the most neglected factors in the emission model is the development of tourism. This is due to the perception that tourism greatly contributes to economic development through employment and poverty reduction, especially in developing countries. Tourism has become the world's fourth largest export industry after fuel, chemicals and food (Tugcu, 2014). In particular, tourism contributed for 6 percent of total merchandise and services exports and representing 30 percent of international services trade in 2014. In addition, 9.8 percent of the world's gross domestic product (GDP) comes from the tourism sector during the same period (Ohlan, 2017).

The development of tourism sector in a country could encourage various production activities and improve the economy of the community. In addition, tourism which is a labor-intensive industry is able to encourage the reduction of the unemployment rate through employment (Zhang, 2016). The existence of unem-

ployment has been a barrier to the productivity of a country and can even disrupt the political stability of a country can be overcome through the tourism sector in order to improve the economy.

The impact of inbound tourism on the national economy is becoming increasingly important because of the growing size of the tourist market (Ohlan, 2017). The tourism-led growth hypothesis (TLGH), indicates that the expansion of international tourism activities has resulted in economic growth. The TLGH is directly derived from export-led growth hypothesis (ELGH) which shows that economic growth can be supported not only by expanding human and technological resources within the economy, but also by expanding or increasing foreign exchange earnings (Ohlan, 2017).

Although the tourism sector plays an increasingly important role in economic development. It remains unclear whether the TLGH applies also in the countries of Indonesia, Malaysia, Singapore, and Thailand. The four countries are the countries with the highest number of tourist arrivals and tourism receipts in the last 5 years and tend to be stable and increase annually compared to other ASEAN countries such as Brunei Darussalam, Cambodia, Lao PDR, Myanmar, Phillipines and Vietnam.

The high number of foreign tourists has both positive and negative impact. The negative impacts of tourism boom can not be ignored. It is clear that the tourism boom caused a host of environmental pressures, including increased noise, an impact on biodiversity reduction, and increased greenhouse gas (GHG) emissions. In addition, the increased energy consumption accompanying the tourism boom deserves more attention because of increased tourism activity requires more energy consumption on various aspects such as transportation, catering and accommodation. Furthermore, existing re-

search also document that transportation contributes enormously to CO₂ emissions in the tourism sector.

Research shows that energy use in the tourism sector is very high. Such high energy usage is seen in activities related to tourism activities such as air transportation, accommodation and lighting. The air transportation industry alone consumes 243 million tons of fuel (or 6.3 percent of world production) per year. According to WTO, tourism accounts for 5 percent of global CO₂ emissions and air transport accounts for about 40 percent of total emissions from the tourism industry.

The Environmental Kuznets Curve (EKC) Hypothesis, and STIRPAT or stochastic (STR) models, environmental impacts (I), population or urbanization (P), affluence (A) and technology (T) built have been widely used in the literature to explain pollution levels (Solarin, 2014). EKC shows a positive correlation between the level of a country's development and CO₂ emission levels, so that emissions of income pollutants are increasing in countries with low incomes but declining in high income countries (Shahbaz, M., Kuma, R.R., Ivanov, S., Loganathan, 2015). STIRPAT relies on the assumption that human activities such as urbanization are the driving forces of emissions, and policies to reduce them will improve the quality of the environment.

The relationship of output and energy consumption shows that economic growth and energy consumption can be co determined, because higher economic development requires more energy consumption (Nathan, T. M., Liew, V. K. & Wong, 2016). As it is known that energy consumption is a major source of economic growth and carbon dioxide emissions in the world (Bashir, F., Nasim, I., & Ismail, 2016). Similarly, more efficient use of energy requires higher levels of economic development.

Examines the long-term equilibrium relationship between tourism, energy con-

sumption and environmental degradation proxied by carbon dioxide (CO₂) emissions in Turkey, where it has brought in more than 30 million tourists per year, making it the sixth country the most visited in the world (Katircioglu, 2014). The study results show that tourism and energy consumption are in long-run equilibrium relationships with CO₂ emissions; about 91.01 percent per year, the contribution of carbodioxide emissions to the tourism induction model is from tourism, energy consumption, and aggregate income. Furthermore, the results of impulse response and variance decomposition show that the reaction of energy consumption, and CO₂ emissions, to changes in tourism development is positive and stronger for longer periods. This implies that the development of tourism in Turkey not only resulted in a substantial increase in energy use resulting in considerable increases in climate change, as shown by the econometric analysis of this study. Based on previous researches, this study intend to combine several studies on the international tourism sector, macroeconomic indicators in relation to environmental degradation in Indonesia, Malaysia, Singapore and Thailand (ASEAN-4) countries.

METHOD

The data are obtained from world banks, BP, and Global Carbon atlas and some from internet related. The data used are panel data from 1995-2015 of four ASEAN countries namely Indonesia, Malaysia, Singapore, and Thailand (ASEAN-4).

The determination of the time span of the study is based on the important events occurring in that timeframe, namely the financial crisis that occurred in 1997-1998 and 2008 that impacted almost all Asian countries, then in 2003 and 2005 the Bali bombing event that had an impact on the decline number of foreign tourists to countries in Southeast Asia region. In

addition, in 2004 there was an earthquake sourced in the Indian Ocean and the resulting tsunami radiated across the Indian Ocean, from Indonesia to Sri Lanka and beyond that killed about 228.000 people from 14 countries including Indonesia, Malaysia, Singapore and Thailand. The variables in this study are inbound tourism activities a proxy for International tourism receipts (Current US \$), economic growth projected with GDP (percent annual), the consumption of primary energy (Million Ton) and environmental degradation is a proxy CO2 emissions (Million tons).

This research uses Panel Vector Error Correction Model (PVECM) method. The basic model adopted from Zhang and Gao (2016) is as follows:

$$\ln C_{it} = \beta_1 + \beta_2 \ln T_{it} + \beta_3 \ln E_{it} + \beta_4 \ln Y_{it} + \beta_5 \ln Y_{it}^2 + \epsilon_{it}$$

the above equation is transformed into econometric model of research into

$$CO2_{it} = \alpha_1 + \alpha_2 RCPT_{it} + \alpha_3 GDP_{it} + \alpha_4 E_{it} + \epsilon_{it}$$

Where CO2 is Co2 Emission, RCPT is Tourism Receipts, GDP is Economic Growth, E is Energy Consumption, *i* is Countries, *t* is Time Period, ϵ is Error Terms

FINDINGS AND ARGUMENT

Causality Test Result

Causality test is an analysis used to examine the causal relationship between endogenous variables in VECM. Endogenous variables include carbon dioxide (CO2), tourism receipts (RCPT), gross domestic product (GDP), and energy consumption (E). causality testing is performed using Causality Granger Test by looking at the probability value of test result for each relationship between variables one with other variables. The level of the Granger causal testing is used at a confidence level of 5 percent (0.05) and the length of lag used in the test is lag 2. Where lag 2 is determined or based on the optimum lag test results already tested in the previous test. The result of causality test shown in Tabel 1.

Table 1.
Causal Granger Result

Dependent variable: CO2	
Excluded	Prob.
RCPT	0.0192*
GDP	0.4432
E	0.0006*
All	0.0001
Dependent variable: RCPT	
Excluded	Prob.
CO2	0.7818
GDP	0.0007*
E	0.1968
All	0.0025
Dependent variable: GDP	
Excluded	Prob.
CO2	0.0058*
RCPT	0.0023*
E	0.2342
All	0.0023
Dependent variable: E	
Excluded	Prob.
CO2	0.0036*
RCPT	0.1285
GDP	0.2915
All	0.0231

Note: ,* =qualify of causality

Based on the results of causality test, the relation between tourism receipts variable (RCPT) and carbon dioxide (CO₂) variable qualify of directional causality. The tourism receipts (RCPT) significantly affect carbon dioxide (CO₂). In contrast, carbon dioxide (CO₂) does not significantly affect tourism receipts (RCPT). Directional causality is also shown from CO₂ to GDP, evidenced by a probability value that is smaller than the alpha of 5 percent is 0.0023. There are bidirectional causality between energy consumption (E) and Carbon dioxide (CO₂) and between GDP and RCPT.

Results of causality granger test show bidirectional causality relationship which means that energy consumption and environmental degradation affect each other. Increases in energy use will affect the increase of environmental degradation, and vice versa if there is a decrease in energy usage, there will be decrease of environmental degradation. High concentrations of carbon dioxide in the atmosphere are the government's concern to reduce it so that air quality for life is maintained. The government's efforts to mitigate carbon dioxide emissions will affect energy use, for example by shifting the energy use mix from fossil energy to more environmentally friendly renewable energy. In 2004-2009, ASEAN has achieved a target of 10 percent in increasing renewable and effective energy consumption in carbon dioxide mitigation efforts.

Panel Vector Error Correction Model (VECM) Estimation Results

The result of the VECM estimation will have a significant influence on the lag that has been determined both in the long run and in the short term between independent and independent variables. The determination of partiality was based on comparison between partial t-statistic and t-table at significance level of 5 percent or 0,05.

The result of VECM estimation in long term shows, the variable of tourism receipts and Gross domestic Product (GDP) which have positive and significant effect on. For variable energy consumption (E) no significant effect because t-statistic value is smaller than t-table 1.66412.

In the equation of the vector error correction model, CO₂ presented in Table 2 shows the CO₂ variables significantly affect itself in lag one and lag two. Then the variable tourism receipts lag one significantly affects the CO₂ variable. This is evidenced by the value of t-statistics greater than the value of t-table at a significant level of 5 percent. and the latter is the consumption variable that influences CO₂ in the short term in one or two lag with a significance level of 5 percent.

The effect is significantly indicated on the result of the estimation of vector error correction model, where inbound tourism activities have long-term and short-term effect on environmental degradation. In the long term relationship of inbound tourism significantly influence and have a positive relationship to environmental degradation. Then a positive relationship to environmental degradation also applies to short-term relationships that are on lag one and in lag two. However, significant dislocation is only indicated in one lag which means only Inbound tourism activity in the previous year has a positive effect on environmental degradation in the current period. This is because the period of two years earlier had an effect on the environmental degradation in the previous period or year. Sustainable tourism focusing on improving the tourism sector balanced by taking into account the environment in ASEAN for sustainability has had an impact on reducing tourism sumbahsih in environmental degradation. So the use of facilities and accommodation does not have a prolonged impact on carbon dioxide levels in the air.

Table 2.
Vector Error Correction Model Estimation Results in Long Term and Sort Term

Long-Term		
Variable	Coefficien	t-Statistic
RCPT(-1)	870,8146	3,35827*
GDP(-1)	58,39503	8,66712*
E(-1)	-5,650612	-1,15807
Sort-Term		
Variable	Coefficien	t-Statistic
CointEq1	-0,056694	-1,84671*
CO2(-1)	-0,541516	-5,77924*
CO2(-2)	-0,745214	-7,51353*
RCPT(-1)	97,19364	1,67134*
RCPT(-2)	-40,40463	-0,74186
GDP(-1)	1,166921	0,95490
GDP(-2)	0,774393	1,26292
E(-1)	2,788712	3,22092*
E(-2)	3,283552	3,09776*
C	0,257317	0,07440

Note:*=Significant on t-test (t-table 5% (1,66412))

The results of the research are in line with the research by (Katircioglu, 2014) which shows that tourism has a positive and significant impact on environmental degradation in the long term and in the short term.

Gross domestic product has a positive and significant influence on environmental degradation in the long run. This explains that the changes that occur in the variable gross domestic product will be followed by direct movement at the level of environmental degradation. This is in line with the empirical results of shows that there is a long-term relationship between Gross domestic product and carbon dioxide. The increase in gross domestic product in ASEAN-4 countries will affect the increasing of environmental degradation in ASEAN-4 countries. Economic growth is defined as a process of increasing the capacity of a country's production in the long run in order to meet the needs of people in a country. Technological advances and institutional adjustments greatly affect a

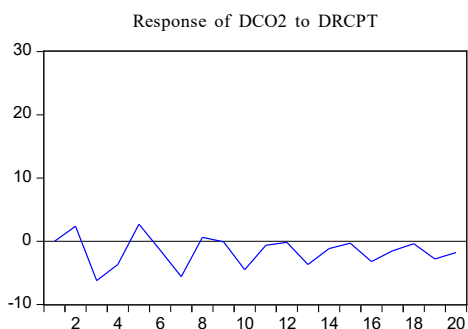
nation's ability to fulfill its needs. It can be interpreted that the economic growth of a country can be seen from the increasing supply of goods, where advanced technology plays an important role in the process of providing these goods. The more advanced tekhnology used, will further increase the degree of economic growth.

The energy consumption variable positively and significantly influence the environmental degradation in ASEAN-4. This means that changes in energy consumption will be followed by changes in the level of environmental degradation in the same direction and in the event of turbulence in energy consumption will be responded strongly by environmental degradation.

Impulse Response Function (IRF) Result

Impulse Response Function is basically used to describe the response of re-

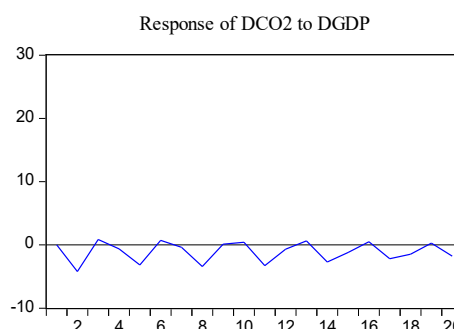
Response to Cholesky One S.D. Innovations



Figur 1.

Response of CO2 to RCPT in ASEAN 4

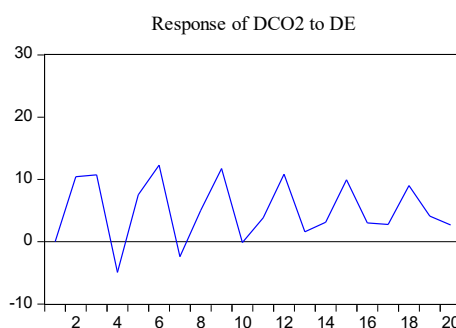
Response to Cholesky One S.D. Innovations



Figur 2.

Response of CO2 to GDP in ASEAN 4

Response to Cholesky One S.D. Innovations



Figur 3.

Response of CO2 to E in ASEAN 4

search variables resulting from shock from research variables, where the behavior of the VECM model used can be seen from the response.

Figure 1 shows the response of carbon dioxide (CO₂) variables due to shock that occurs in tourism receipts (RCPT). CO₂ responds negatively until the end of the period except in periods one and five that respond positively with the highest response also occurs in the five period at 3 percent. The movement of the response fluctuates until the end of the period and tends to be more stable with a negative response in period 10 and towards the equilibrium point.

Figure 2 shows the carbon dioxide (CO₂) response due to shock experienced by the gross domestic product (GDP) variable. In Figure 2 the negative response by the carbon dioxide (CO₂) variable over the

period is determined. Moves fluctuating up to the twentieth period. The highest negative response is shown in the second period of 1 percent.

Figure 3 is the response shown carbon dioxide (CO₂) resulting from the shock that occurs in the variable energy consumption (E). Over a period of one to seven periods tend to respond positively and negatively. In the eighth period tends to stabilize by responding positively to twenty to the variable carbon dioxide (CO₂). The fluctuating movement occurred until the end period with the highest response in the six and eight periods with a response of eight percent.

CONCLUSION

Based on test result which have been done by using panel vector error correction model to know the influence of in-

bound tourism activity and macroeconomic variable to environmental degradation in ASEAN-4, hence got final conclusion as follows: *First*, The tourism receipts variable as a proxy of inbound tourism activities positively influence both in the long term and in the short term against environmental degradation in ASEAN-4. Then on the variable gross domestic product (GDP) as a macroeconomic variable positively and significantly affect the environmental degradation in the long term and not significant in the short term in ASEAN-4. Furthermore, the energy consumption variable which is one of the macroeconomic variables positively affects environmental degradation in the short term, and is not significant in long term in ASEAN-4. *Second*, tourism receipts variable as a description of inbound tourism activities and environmental degradation have a direct causality relationship that is only inbound tourism activity that statistically significant affect environmental degradation. In macroeconomic variables namely gross domestic product and environmental degradation also only have direct causality relationship that is only environmental degradation which significantly affect gross domestic product and not vice versa. Then on the variable energy consumption and environmental degradation shows that in both variables there is a two-way causality relationship that is energy consumption significantly affect environmental degradation and also vice versa environmental degradation significantly affect energy consumption in ASEAN-4. *Third*, impulse response function indicates that environmental degradation cumulatively responded negative from the shock or shock that occurred in the activity of Inbound tourism and gross domestic product. While the cumulative positive response is indicated by environmental degradation in case of shocks to energy consumption, it can be interpreted that strong energy consumption affects environmental degradation in ASEAN-4.

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