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## Article

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# Measuring the Impact of Inbound Tourists, Outbound Tourists and Overall Tourism Growth on Sustainable Ecological Footprint of ASEAN Countries: A Panel Data Analysis

Khunanan Sukpasjaroen<sup>1</sup> and Thitinan Chankoson<sup>2</sup>

## ABSTRACT

The tourism industry is one of the most rapidly developing industries in the world and tourism in the South-east Asian region has been developing in the past few years. The present study focuses on the data from the ASEAN region to study the association among the variables; inbound tourists, outbound tourists, tourism growth and ecological footprint. The period between 1995-2019 was the subject of study. The data for these indicators was extracted from the WDI. The econometric tools of heteroskedasticity, autocorrelation, unit root, cross-sectional dependence were applied in order to evaluate different dimensions of the data. In the estimation of regressors the panel corrected standard error and the one step system of generalized method of moments were used. The results of the estimations reveal that the effects of the regressors were significant. However, inbound tourism and tourism growth showed negative associations with the ecological footprints of the study units. The past and present studies show that the increase in the tourist activities decrease the ecological footprint and thereby increase the environmental quality of the economies. The present study is original and poses major contributions to the academic literature and also has policy making implications.

## KEY WORDS:

Ecological footprint, outbound tourism, inbound tourism, GMM.

**JEL Classification:** Z32, Q56.

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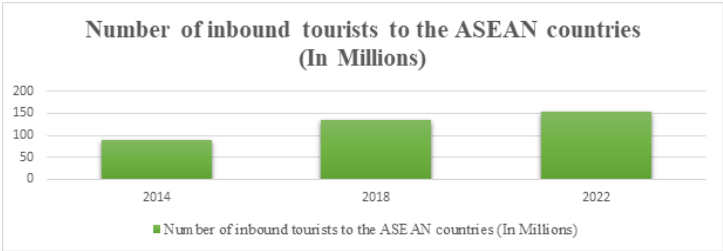
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## 1. Introduction

It is not a new concept and news that the tourism industry promotes the people to leave their comfort zone and travel around for the purpose of taking advantage from their leisure and drive them to recreate. Same like the other countries, tourism is impacting the economic, environmental and social aspect of the ASEAN countries (Jermisittiparsert, 2019; Jermisittiparsert & Chankoson, 2019). The economic impacts can clearly be observed, as people in the ASEAN countries have greater disposable income, the trend of paid holidays is increasing, and socially,

traveling has become a lot cheaper and easier than before (Anser et al., 2020). Many countries, including the ASEAN countries, are investing in their infrastructures and in the facilities that can ensure tourism's growth. Where inbound tourism increases, it is sure that the number of inbound tourists will also increase and so will their spending on hotels, which will expand the employment markets in the ASEAN countries. In order to manage increasing traffic, hotels, accommodation services, transport services and investments in infrastructure, all will increase and will enhance the economic status of the ASEAN countries as it can be seen as well from the past growth in recent years. Increase in inbound tourism and its forecast for the future of ASEAN countries can be seen in Figure 1.

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**Figure 1.** Number of inbound tourists to the ASEAN countries (In Millions) in past and the forecast for 2022.

However, when residents of the ASEAN countries visit other countries and promote outbound tourism, it is also to the benefit of the ASEAN countries, because while doing so, the residents purchase plane tickets, travel insurance and other essentials from their own country of origin, but there is no doubt that an increase in outbound tourism enhances the benefits for other countries (Driha, Escarré, & López). Things become problematic now - with the rise in the concept of sustainable tourism, there has been a lot of pressure on exploring the ecological impacts of tourism. Table 1 shows visitors expenditure throughout 2018 in the ASEAN countries.

Where tourism’s growth has positive impacts such as promotion of awareness, ecotourism, site cleaning tasks, restrictions on the number of tourists at a time, it also has negative impacts. The companies and the departments in the ASEAN countries ecologically impact the Earth with their activities. Construction, using up all resources to build up infrastructure, depleting all of the natural resources to provide facilities to the tourists all contribute to the situation at hand (Harrison, 2015). It is important to shed light on this topic because in the ASEAN countries, tourism

growth is destroying the very components that are important for the tourism industry itself. The quality of environment, no matter if its natural or artificial, is important, so that tourism industry continues to grow while actually saving the ecosystem as well, which will require the tourism industry and departments to work in a sustainable and eco-friendly way (Kaiwa, 2017). The topic is taken up by the researcher to highlight and promote importance of careful and eco-friendly tourism planning in the ASEAN countries as most of the past studies have only emphasized the importance of ecological sustainability but almost none of these have measured the impact of tourism growth on the ecosystem and none of these have suggested remedies for it. So, the current study will perform these tasks with the help of latest techniques and tools. The study aims:

- (a) To explore the impact of inbound tourists on Sustainable Ecological Footprint of ASEAN Countries
- (b) To explore the impact of outbound tourists on Sustainable Ecological Footprint of ASEAN Countries
- (b) To explore the impact of overall tourism growth on Sustainable Ecological Footprint of ASEAN Countries

**Table 1.** Visitors expenditure throughout 2018 in the ASEAN countries (In Millions)

No.	Month	Expenditure
1	January	188,891
2	February	195,263
3	March	189,159
4	April	157,438
5	May	136,710
6	June	148,433
7	July	166,379
8	August	168,046
9	September	140,140
10	October	167,418
11	November	204,025
12	December	253,142

The study is not only applicable and beneficial for the improvement of tourism industry in the ASEAN countries but can also inspire tourism industries worldwide. As the study is going to enhance the knowledge regarding the importance of eco-tourism by highlighting the current impacts of tourism growth (Lee, 2013). The study will be helpful for the tourism industries around the world to change their current environment destroying activities to eco-friendly activities to have a Sustainable Ecological Footprint on this Earth. Moreover, government can also seek information from this study for inculcating improvements in the system and for reining the tourism industry with eco-friendly policies and rules. The next parts of the paper will include literature review, research methodology, data analysis and a section of discussion and conclusion.

## 2. Literature Review

This section of the paper will be all about reviewing the relevant past studies regarding the relationships that exist between the selected variables and the impacts they cast on each other.

### 2.1. The Impact of Inbound Tourists on Sustainable Ecological Footprint of the ASEAN Countries

According to the latest statistics, ASEAN countries have been lately attracting a large mass of inbound tourists, according to a research done, the observed statistics of the inbound tourists was seen to be growing with every passing month and as the revenues grew, the expenditures on the tourists grew as well (Lin & Mao, 2015). There is no doubt that the statistics showed economic benefits to enhance and the revenues increased as well, ASEAN countries gained various opportunities

of development and growth, the infrastructure is better than ever before, the revenue from the inbound tourism also provided opportunities to the ASEAN countries to preserve their environment and their ecosystem. In the recent past years, the ASEAN countries got opportunities to enhance their cross-cultural relationships as well (Luo et al., 2018).

However, according to the sustainability report of 2018, all of these activities and increased inbound tourism, also impacted the environment of the ASEAN countries in an enormous way, with the increasing traffic of inbound tourists, the risks of soil erosion were enhanced, the loss of natural habitats was observed in Thailand and in most ASEAN countries as well. It was observed that in the process of building up a better infrastructure and in providing high class facilities for the tourists, the ASEAN countries and region has lost a lot of its natural resources and has changed with respect to its environment. According to a study, the inbound tourism depends of a lot of factors and the biggest one of them is pure and attractive environment, it has been seen that the inbound tourism is destroying the most important thing that it is dependent on (Qureshi et al., 2019).

There are several questions that are being raised against the tourism industries in the ASEAN countries pointing out their ways of operating and converting all of the natural resources into something of their own benefit, in order to keep the balance sustained, it is very important that the companies and the industry operates in a sustainable way which causes least damage to the ecosystem (Ren, 2018). However, some of the developments and positive trends have not been mentioned by the past studies which will further be clarified with the research done through this study, the studies reviewed have not mentioned the positive aspects mostly, such as how much opportunities the inbound tourism is providing to the ASEAN countries to enhance the quality of the ecosystem and to work on their sustainable ecological footprint idea, this has also provided the ASEAN countries with the opportunity to promote eco-tourism or eco-friendly practices for tourism (Scott & Gössling, 2015). Past studies have also failed to explain that how growing tourism can provide the ASEAN countries with opportunities like raising funds for the betterment of what has been destroyed already and how the balance between the ecosystem and economic aspect can be

stored. Either way, positive or negative, it is clear that the inbound tourists and enhancing tourism is impacting the environment of the ASEAN countries and is also impacting the Sustainable Ecological Footprint of the ASEAN countries where it comes to the impacts of the traffic. So, based on the past studies and repeated results, the hypothesis one can be developed:

H1: The impact of inbound tourists on Sustainable Ecological Footprint of ASEAN Countries is significant.

## ***2.2. The Impact of Outbound Tourists on Sustainable Ecological Footprint of the ASEAN Countries***

Various studies in the past have provided different opinions regarding outbound tourism. Some have been in favor and some have been against outbound tourism (Stylidis et al., 2014). However, a research has mentioned that the outbound tourism is not as much disadvantageous as it is mentioned to be, the study has mentioned different economic benefits such as the economic benefits that occur when the outbound tourists buy the travel tickets and the travel insurance. Moreover, when the tour essentials are bought from the country, these bring benefit as well (Sun et al., 2020).

However, most of the studies have only mentioned these small benefits whilst ignoring that this is causing no benefit to the environment and the ecosystem. As far as the outbound tourism is concerned, it ends up providing and spending resources in the foreign countries (Sun, 2014). As, the bulk of tourists is moving towards the outbound tourism, the national income of the ASEAN countries is transferred out and that will surely cause the revenue to decrease eventually. So, smaller revenue will result in lesser resources as well. This point has not been mentioned in any of the studies - smaller revenue will result reduced spending within the ASEAN countries. In order to restore the balance between the economics and the ecosystem, it is important that a fair amount was spent on restoring the damage that has been done to the environment, in which will also help create an eco-friendly tourism system by the ASEAN countries. Therefore, not only the damage done will be restored but also the upcoming years will include a successful tourism system and a quality environment as well (Sun, 2016). Given the discussion above, the hypothesis number two is given below:

H2: The impact of outbound tourists on Sustainable Ecological Footprint of ASEAN Countries is significant.

### 2.3. The Impact of Overall Tourism Growth on Sustainable Ecological Footprint of the ASEAN Countries

According to the study by Sun and Hsu (2019) tourism growth is taking more from the environment and the ASEAN countries than it is giving back, most of the studies in the past had the practice to portray the beneficial and positive side of the tourism growth only (Sun & Hsu, 2019). Whereas, in the recent years, it has been discovered and highly emphasized, that the environmental damage caused by the growth of tourism and activities is intolerable as it will cause long-term damage to the ecosystem, destroying the idea of a sustainable ecological footprint of the ASEAN countries.

The study by Sun and Pratt (2014) mentioned the disadvantages that are coming along with the growth in the tourism industry. There has been a great trend of exploitation of the natural resources, done by both the tourism industry and the tourists as well. Moreover, the research has also been done on the level of pollution that is caused because of the activities of tourism growth, water pollution has been emphasized again and again, air pollution has been pointed out again and again and no steps are seen to be taken against it out of the revenue that the tourism growth is generating (Tse, 2015). Noise pollution is another big issue which is causing serious damage to the quality of life and ecosystem. Thus, it can be said that most of the activities involved in the growth of tourism are going against the Sustainable Ecological Footprint of ASEAN Countries (Vij & Vij, 2012). However, studies have been failing to emphasize this enough that how musical extravaganza, disturbing the ecological balance, dumping the trashes, destruction of the natural environment because of construction and heating effect through the tourism growth activities is damaging the ecosystem. This results in the formulation of the third hypothesis:

H3: The impact of overall tourism on Sustainable Ecological Footprint of ASEAN Countries is significant.

## 3. Methodology

### 3.1. Data

The current study is focused on the growth of tourism and ecological footprint of the ASEAN region. The tourism has been increasing in the ASEAN region due to the promotional efforts of governmental

and non-governmental tourist organizations. The ASEAN region consists of a total of ten countries; Brunei, Cambodia, Indonesia, Thailand, Singapore, Vietnam, Laos, Philippines, Malaysia and Myanmar. A heterogenous panel data methodology has been used in the study with the purpose of estimating the regressors (Hameed et al., 2018; Ul-Hameed et al., 2018). Annual data has been collected for the member countries, the data for the period 1995-2019 has been collected for this study. The data regarding the indicators has been collected from reputable sources in order to maintain the authenticity and credibility of the study. The data for the last 25 years has been extracted from the databases so that the relationship between tourism growth, tourist flow and ecological footprint can be analyzed and evaluated. The data collection process is of imperative importance in any empirical research and thus the credibility and accuracy of resources and data is necessary, thus the secondary data has been collected from the credible database of WDI.

### 3.2. Variables

The dependent variable in this study is the economic footprint and the main independent variables, that is, the inbound tourism, outbound tourism and tourism growth, and the control variables used in the study are gross domestic product and literacy rate. Ecological footprint is measured in terms of global hectare (gha), inbound tourism, outbound tourism and overall tourism growth is measured through the number of arrivals and the number of departures whereas the overall tourism growth is measured through the change in tourism receipts. Ecological footprint is defined as the requirement of the natural capital i.e. the quantity or amount of the nature required to support an economy. It is an indicator of environmental degradation; the environmental degradation of the ASEAN region is increasing, that is why it is focused upon. The inbound tourism is defined as the visits of individuals to the country who are not residents whereas the outbound tourism is explained as the departure of the residents from the home country to some other place. The tourism industry is increasing, and it is also the cause for the addition of wealth to the countries, however, influx of people can put strain on the ecological capital of

the countries under consideration thus these variables have been included in the study.

On the basis of similar studies and empirical justifications collected from the empirical and theoretical literature the following econometric model is being used and has been deemed appropriate for application by similar studies (Rahman et al., 2019).

$$EFP_{it} = \alpha + \sum \beta_j X_{it} + \sum \delta_j GDP_{dum,j} + \sum \delta_j LIT_{dum,j} + \sum_{j=1} \theta_j Y_j + \varepsilon_{it} \quad (1)$$

In the Equation 1  $\alpha$  represents the intercept or the constant that accounts for the effects of the dependent variable,  $i$  is used to represent the country,  $t$  is used for depiction of the year or period under consideration,  $X_{it}$  is the collective term for the explanatory variables,  $\beta_j$  reflects the coefficient of individual independent variable,  $GDP_{dum}$  and  $LIT_{dum}$  is used to represent the country fixed-effect dummies,  $\delta_j$  represents the coefficient for the fixed-effect of the country created through a dummy variable,  $Y$  is the depiction of the fixed effect of time characterized by year and the term  $\theta_j$  represents the coefficient for time fixed-effect dummy.

Substituting the independent variables in Equation 1 the following expression is generated:

$$EFP_{it} = \alpha + \beta_1 INT_{it} + \beta_2 OBT_{it} + \beta_3 OTG_{it} + \sum \delta_j GDP_{dum,j} + \sum \delta_j LIT_{dum,j} + \sum_{j=1} \theta_j Y_j + \varepsilon_{it} \quad (2)$$

The time fixed effects variable dummy introduced in the equation is used to account for the cross-sectional dependence that might be present as the ASEAN countries are economically, socially and regionally linked. The cross-sectional dependence is a recurring issue in panel data regressions, primarily when the dataset consists of units that are regionally or economically similar. A similar premise is being applied on the ASEAN dataset therefore the country fixed effects are being modelled in the equation. Moreover, a set of diagnostic tests will be performed on the data as the panel data is susceptible to problems like heteroskedasticity, autocorrelation and multicollinearity. Furthermore, the unit root tests (Levin et al., 2002), and the diagnostic tests are being applied on the data in order to maintain accuracy, correctness and vigor of the results.

It is assumed that the panel dataset will be prone to issues of cross-sectional dependence as the countries are closely linked to one another and heteroskedasticity, thus the method used for estimating these explanatory variables must be consistent with these issues are so that the effect of these problems can be moderated. The GMM, generalized method of moments and the dynamic test of PCSE is being used in the study as per the directions of the Prais-Winsten regression method which has a correlated PCSE. Both of the estimation methods account for the time and country fixed effects so that the unobserved heterogeneity can be accounted for. The PCSE estimation method is considered to be efficient for application as the method has the primary assumption that the error terms are correlated across the panel and present heteroscedasticity, therefore the model can deal with the unbalanced and difficult panels (Greene, 2012).

#### 4. Empirical Findings

The first test carried out on the data is the unit root test. The unit root test is performed on the data in order to find the stationary properties of the data and also to find the order of integration (Im et al., 2003). Unit root tests are performed for testing the stationarity properties of the time series. The presence of unit roots causes issues like spurious regressions. The null hypothesis of the test is that there is a unit root (non-stationary) whereas the alternate hypothesis of the test is that there is no unit root (stationary). The LLC unit root test has been used to evaluate the panel unit root properties of the data. The results of the analysis are presented in table 1. It can be seen that the variables economic footprint, gross domestic product and literacy are stationary at level. The \* represents the level of significance at which the null hypothesis is rejected. All variable, namely, EFP, INT, OBT, OTG, GDP and LIT are stationary at the first difference.

The panel data often suffers from the econometric problems and issues like cross-sectional dependence, heteroskedasticity, autocorrelation, multicollinearity. Therefore, evaluating these issues by the application of diagnostic tests is necessary in order to maintain the authenticity of results. The equation 2 is supplemented to various diagnostic tests. These tests are necessary so that the findings are authentic and credible. The modified Wald and Breusch-Pagan/Cook Weisberg test is applied

**Table 2.** LLC Unit Root

Constructs	EFP	INT	OBT	OTG	GDP	LIT
Level	-3.293*	-1.388	-2.398*	-1.294	-3.483*	-4.995**
1 <sup>st</sup> difference	-4.384**	-4.388**	-6.493**	-7.499**	-2.848**	-9.498**

**Table 3.** Diagnostic Checks

Heteroskedasticity	Autocorrelation	Cross-section dependence	Multicollinearity
Modified wald	Wooldridge	Pesaran	VIF
Breusch-Pagan/Cook-Weisberg			
$\chi^2$ -value: 14.38**	F-statistic: 2.99	Test statistic: 5.35*	Mean VIF: 1.80
$\chi^2$ -value: 7.482*			

for heteroscedasticity, the Wooldridge test is performed for checking the autoregressive properties, VIF test and a correlation matrix is constructed for analyzing the correlations and multicollinearity, the cross-sectional dependence test developed by Pesaran (2004) is used for analyzing the cross-sectional dependence. The results of these tests are demonstrated in tables 2 and 3. The null hypotheses for the cross-sectional dependence and heteroskedasticity are rejected as the test results are significant at the 5 percent and 1 percent level. Thus, the cross-sectional dependence and heteroskedasticity demonstrate a strong form presence. The null hypothesis for autocorrelation is accepted as the test results are insignificant and the absence of correlation of the error terms is confirmed.

The variance inflating factor and the correlation matrix are used to evaluate the multicollinearity issue. The correlation matrix is also constructed to evaluate the strength of the relationships among the variables. The value of the VIF factor is less than 10 showing that the data doesn't suffer from multicollinearity. This result is

supported by the correlation matrix as well. The correlation coefficients are positive and less than 0.5 thus weak correlations are present in the study variables. Also, as all of the coefficients are less than 0.8 thus the results of the VIF test are supported and the notion of no multicollinearity is established. Both of the techniques therefore validate the absence of the issue of multicollinearity among the constructs.

As confirmed by the diagnostic tests the data shows presence of strong form heteroskedasticity and cross-sectional dependence. Thus, it was imperative to apply empirical techniques that can deal with these issues and mitigate the effect of these problems and produce vigorous results. The researcher has employed the use of the static estimation technique with correlated PCSE and the dynamic estimation technique using the one step generalized method of moments. The application of both dynamic and static estimations is fundamental for confirming the robustness of the findings. In both of the estimations the country fixed, and time fixed effects have been used to account for the unobserved heteroge-



Table 4. Correlation Matrix

Variables	EFP	INT	OBT	OTG	GDP	LIT
EFP	1					
INT	-.638	1				
OBT	.574	-.500	1			
OTG	-.399	.305	.299	1		
GDP	.599	-.345	.234	.244	1	
LIT	.305	-.277	.488	.399	.433	1

neity. The PCSE estimation follows the assumption that the error disturbances are heteroskedastic and correlated across the panels. Thus, they are equipped to cope with an unbalanced panel.

The results of the analysis are presented in the table. The results show that the effect of the inbound tourists is significant on the ecological footprint, outbound tourist, overall tourism growth as per the PCSE estimation presents significant effects on the ecological footprint of the ASEAN countries. The magnitudes of these estimations show that upon one unit increase of inbound tourists the ecological footprint will decrease by 21 percent, a unit change in the outbound tourists will result in the 13 percent increase of the ecological footprint and overall tourist growth presents a negative relationship with the ecological footprint and showcases an effect of 12 percent. The GMM estimations also present similar results the effects of inbound tourists and the overall tourism growth are negative but significant on the ecological footprint of ASEAN countries. The R squared value shows that the model explains 88 percent of the variance occurring in the dependent variable.

5. Discussion

The present study evaluates the association between the ecological footprint and the tourism indicators like inbound tourism, outbound tourism and growth in tourism. The control variables of GDP and LIT were also included in the study. Katircioglu, Gokmenoglu, and

Eren (2018) studied the effect of tourism development on the environmental quality of the countries that observe significant tourists. The environmental quality has been studied through ecological footprints. The tourism development was found to be negatively associated with the ecological footprints of the observed countries. Thus, pointing out that development of tourism is beneficial for the environmental quality. The study by W. Lin, Li, Li, and Xu (2018) studied the ecological tourism footprints in Shanghai from 2008-2013. The results from this study show that shopping was the most significant activity indulged in by the tourists, the proportion of the energy resources committed to account for the tourists was significant and land resources were analyzed to be depleted the most (Berejena et al., 2020; De Bruyn, 2020; Janssen, 2020; Bai et al., 2020; Gumus et al., 2020). Qureshi et al. (2019) examined the relationship between the air pollutants, ecological biodiversity and international tourism. The results of the study confirm that a u-shaped relationship was present between the inbound tourists and the emissions of nitrous oxide, the tourists initially do not transpose NO but with the progress of time the increase in NO emissions has been observed. Moreover, inbound tourists were associated with increased Co2 emissions and loss of biodiversity, trade openness affects the ecological footprint and actively decreases the NO and SO2 emissions, an increasing relationship between outbound tourists and ecological footprints was observed as well.

**Table 4.** Correlation Matrix

Dependent Variable = EFP	PCSE estimation	Sys-GMM estimation
INT	-0.211** (0.399)	-0.215** (0.3994)
OBT	0.133* (0.675)	0.130** (0.664)
OTG	-0.122** (0.299)	-0.233** (0.468)
GDP	0.299* (0.394)	0.284** (0.405)
LIT	0.239* (0.477)	0.231** (0.377)
Constant	4.388** (0.499)	0.663** (0.488)
R2	0.884** (0.774)	-
Arellano-Bond test for AR (1) (Pr W z)	-	0.332
Arellano-Bond test for AR (2) (Pr W z)	-	0.987
Hansen test of overid restrictions	-	1.373

Other studies that have focused upon the effects of ecological footprint and the tourism indicators have been carried out as well (Kongbuamai et al., 2020; Rico et al., 2019; Abadia Alvarado & De la Rica, 2020; Abdi Zarrin et al., 2020; ; Dlalisa & Govender, 2020). The results of the present study correlate with the previous findings as well. The effect of inbound tourism and tourism growth witnessed a decreasing trend thus showing that increase in these metrics will decrease the ecological footprints and thereby increase the environmental quality of the ASEAN countries.

### 5.1. Limitations and Implications

The present study has a few limitations. First of all, the study has used a small dataset, the data from only the last 25 years has been used. Future researchers are advised to focus on a larger and diversified dataset so the relational and casual effects can be studied deeply. Secondly the study focuses on the tourism indicators only, the economic increase or growth as a result of these tourist activities are also recommended to be studied in

the future.

The study poses important theoretical and policy implications. The study is focused on the tourism development in the ASEAN region and the effects on the environment have been measured as well. These dimensions are of interest to the current researchers; thus, the study makes important theoretical and academic contributions. Moreover, the managers from tourist organizations and policy makers can use the results of this study to formulate policies that are focused on protecting the environment.

## 6. Conclusion

The primary objective of the present study was to evaluate the relationship between the outbound tourism, inbound tourism, tourism growth, and the ecological footprint of the ASEAN region. The ten countries of the ASEAN countries were the unit of analysis and the data from 1995-2019 was collected. The study employed the application of the static generalized method of moments whereas the dynamic estimation technique

applied was the PCSE. The effects of the ecological footprint and the tourism indicators were found to be significant, however the estimates of inbound tourism and tourism growth were reported to be negative. These negative associations show that the increase in the inbound tourists and the growth of tourism in the region will be helpful in mitigating the ecological footprints of these economies and thereby increase the environmental quality of the countries under consideration as well.

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