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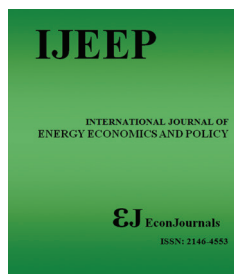
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The Effects of Environmental Quality on Indonesia's Inbound Tourism

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ABSTRACT

In recent years, Indonesia's inbound tourism grew slowly. This study examined the effects of quality of environment on inbound tourism in 32 provinces over the period 2009-2018. We utilized several indices of environmental quality such as water quality index (WQI), air quality index (AQI), and environmental quality index (EQI). Meanwhile, our dependent variable, inbound tourism, is measured in terms of incidence and duration of stay. Previous studies acknowledged that there was a potential endogeneity between quality of environment and tourism. Therefore, instrumental variable (IV) in a static panel dataset was carried out in the estimation. The results showed that both WQI and EQI were positively and significantly correlated with the demand for inbound travelers. Furthermore, we found that there was a positive and significant relationship between AQI and length of stay of inbound visitors.

Keywords: Environmental Quality; Inbound Tourism; Indonesia

JEL Classifications: Q500, Q530, Z300

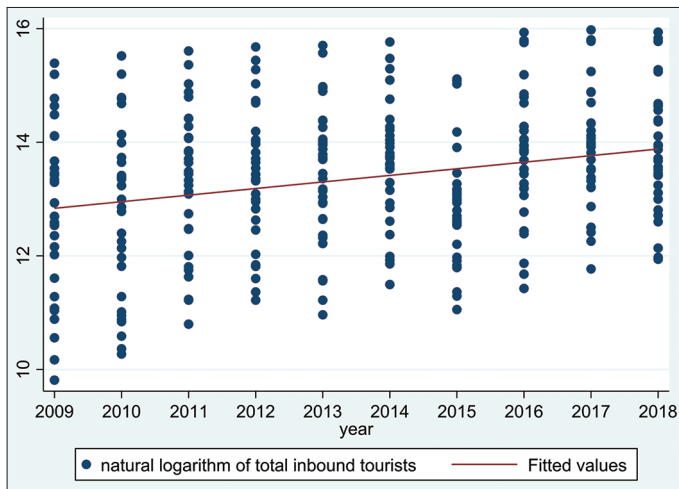
1. INTRODUCTION

Given to the COVID-19 global pandemic that already disrupted tourism industry in every corner of the world, many travelers visit Indonesia every year for several leisure activities such as culture, language, food, world heritage sites, and marvelous scenery. The growth of tourism sector has trickled down to other sectors such as hotel, restaurant, transportation, and retail. According to the Central Bureau of Statistics (BPS), the total contribution of tourism sector to Indonesia's Gross Domestic Product (GDP) accounted for around 4% of the total economy in 2018. As stated in the 2019 National Action Plan of Tourism, in the next 5 years, the Government of Indonesia (GoI) planned to double this number to 8% of GDP. This ambitious plan indicates that Indonesia needs to attract more domestic and foreign visitors, lifting the current number of inbound tourists to double to about 20 million.

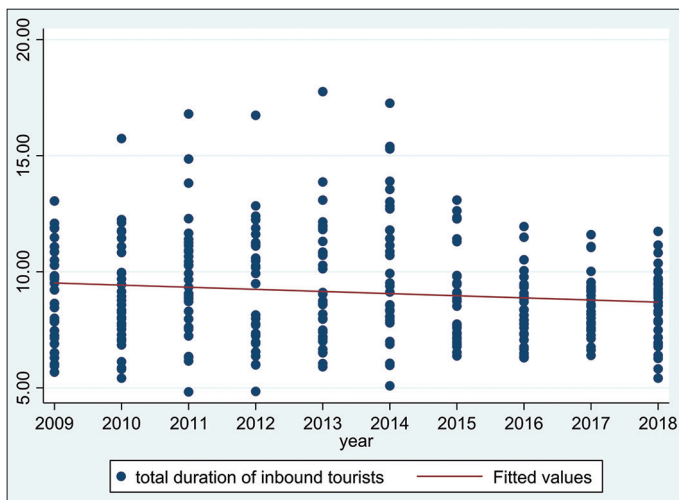
Moving to the performance of tourism sector in Indonesia, Figure 1 shows that the number of inbound tourists in Indonesia improved significantly between 2009 and 2018. On the early of 2009, a

series of terrorist attacks, specifically targeted to the foreigners, seemingly halted the arrival of foreign tourists in Indonesia. From 2009 onwards, with the improved capacity of the country's special counter-terrorism squad, the GoI managed to ensure the issue of national security. Such a condition brings a positive impact on the Indonesia's macroeconomic growth, particularly related to travel and tourism sector. However, as the COVID-19 global pandemic forced more countries to carry out travel restrictions, the arrival of foreign tourists in Indonesia plunged around 90% to just about 160 thousand in June 2020 (BPS, 2020). Therefore, one predicts that tourism sector in Indonesia will need at least 2 years from the beginning of 2020 to be fully recovered.

In spite of the positive trend on inbound tourism, Figure 2 reveals that the duration of stay of inbound tourists in Indonesia declined significantly from 2009 to 2018. Such a trend is somehow counterintuitive as the 2019 World Economic Forum's Report on travel and tourism highlighted several factors that made Indonesia's position jumped from rank 42nd in 2017 to 40th in 2019. Those were related to the improvement in the indicator

Figure 1: Trend on Indonesia's inbound tourists

Source: Authors' calculation

Figure 2: Length of visit of inbound tourists

Source: Authors' calculation

of enabling environment, which constitutes health and hygiene, human resources and labour market, safety and security, ICT (information, communication, and technology) readiness, and business environment, as well as the indicator of natural and cultural resources that correspond to biodiversity and the presence of several heritage sites. Beside those indicators, Indonesia had several competitive advantages in terms of price, international openness, and prioritization of travel and tourism. However, the report stated that Indonesia must put their attention on infrastructure sector since it is still categorized as a persistent problem that can deteriorate investment climate.

Apart from connectivity issue, the report also stated that Indonesia did not place enough emphasis on the issue of environmental sustainability. For example, the GoI only treated a minimal fraction of the used water and waste recycle, while both policy and implementation in managing deforestation and protecting the endangered species were limited (Waluyo et al., 2019; Digidowiseiso and Sugiyanto, 2020). Hence, both central and local government should take environmental quality as a crucial determinant in the decision-making process of potential tourists

since it can determine the competitiveness of tourism destination (Zhang et al., 2015; Becken et al., 2017). However, in developing countries with some prominent tourist destinations, improving quality of environment can be a major challenge as they already faced other problems such as urbanization, population pressure, and industrialization. According to Chen et al. (2017), besides the existing environmental problems such as waste disposal and water pollution, air pollution has long been regarded as a universal concern that received a major proportion within environmentalists around the world. Thus, instead of the quantity, policymakers should put more attention on the quality of economic growth, which is partly determined by the performance of natural environment.

Based on the aforementioned background, our study aims to fill the gap in the current literatures by examining the effect of environment quality on Indonesia's inbound tourism over the period 2009-2018 comprehensively. Almost all of empirical studies only examine the impact of air pollution and or air quality index on tourism (Dong et al., 2019; Xu and Dong, 2020). While few studies neglect another environmental aspect such as water pollution and or water quality index as a driver of tourism. Therefore, our study will provide a thorough investigation between quality of environment and inbound tourism. Additionally, with regards to our dependent variable (i.e. tourism), our study can be viewed as a complementary research that specifically focusses on the number of visitors (Chen et al., 2017; Keiser et al., 2018; Liu et al., 2019). In this regards, we argue that the level of tourism affected by environmental quality can be measured in terms of visitors' incidence and their duration of stay. Hence, this study will not only capture the possible heterogeneities among groups of tourist, but it will also explain the decision-making process of inbound tourists. Moreover, our study will take into account the issue of endogeneity between environmental quality and tourism. By incorporating several control variables in the estimation, our study thus will provide a more accurate and reliable result.

The rest of the paper is organized as follows: Section I depicts literature review on environment quality and tourism. Section II presents the data and methodology used in this research. Section III reports empirical results based on the econometric model. We also provide concluding remarks as the next section.

2. LITERATURE REVIEW ON ENVIRONMENTAL QUALITY AND TOURISM

In principle, the development of tourism can be driven by the sustainability of natural resources in a country such as water and forestry (Gössling and Hall, 2006). Thus, policymakers should optimize the use of environment to promote economic development. Some studies examine the impact of environmental quality on economic growth (Oh, 2005; Lee and Chang, 2008). Those particular investigations show that tourism was not a superior good and service. Rather, it was widely enjoyed by the general public as a secondary one. Albeit for the tourism-growth nexus, it is important to note that the perception of visitors on

tourism industry has changed dramatically, where the changes in climate or weather conditions can be a main driver of tourism (Sajjad et al., 2014; Wang et al., 2018). On one side, should the environmental quality in the host country are in critical condition, the number of inbound tourists will reduce. On the other side, if the conditions of environment in the home country are poor, then this will increase the number of outbound visitors. Therefore, the impact of environmental quality on tourism can be measured in terms of source of a country.

The relationship between quality of environment and tourism becomes much more interesting and complex when the estimations utilize various metrics of tourism. In this context, some studies lay stress on individual visitors such as travel behaviour, travel intention, and destination choice (Becken et al., 2017), well-being and quality of life (Agarwal et al., 2018), visitors' satisfaction (Wu et al., 2018), and the image of destination (Peng and Xiao, 2018). Meanwhile, others draw attention to the demand of global tourist such as the arrival of tourists (Zhou et al., 2018), the number of visitors (Liu et al., 2019), international tourism receipts (Sajjad et al., 2014), urban activities (Yan et al., 2019), and the demand of outbound tourists (Wang et al., 2018). In this study, our investigation will put emphasis on global tourist demand, particularly related to number of inbound visitors and their duration of stay.

As explained in the previous section, many empirical studies put their concerns on air quality and or air pollution as a proxy of quality of environment. Clearly, haze pollution not only deteriorates the visibility of air, but it also lowers tourists' health. These phenomenon bring a negative effect on the tourists' travel experiences. Consequently, quality of air is a major determinant to the sustainability of tourism in a country. Since the daily trend of haze pollution levels appears to be increasing in some developing and developed countries, many empirical studies have tried to examine the effect of air pollution on tourism. A consensual conclusion is that air pollution significantly reduces the number of inbound tourists (Anaman and Looi, 2000).

Basically, studies on the air pollution-tourism nexus can be elaborated in terms of micro and macro perspective. In the former (i.e. a micro-level), based on a survey of China residents in the U.S. and Australia, Becken et al. (2017) proved that the perceived risk of air quality in China is negatively correlated with the plan to visit and image of destination. In line with this argument, Peng and Xiao (2018) found a significant negative effect of air pollution on travel satisfaction and destination image. Meanwhile, in the latter (i.e. a macro-level), Deng et al. (2017) showed that the industrial gas emissions in provinces of China were significantly and negatively correlated to the inbound tourism industry. In another study, Xu and Reed (2017) highlighted a high level of air pollution that contributed to a low degree of inbound tourism in China. Meanwhile, a statistical evidence presented by Zhou et al. (2018) shows that a percentage point increase in the air pollution index will reduce the number of inbound tourist arrivals by 0.25%.

Following the logic of these aforementioned studies, we hypothesize that the quality of environment in Indonesia, measured by air and water quality index, is positively and significantly

correlated with the number of inbound tourists and their duration of visit. Additionally, since the previous examinations failed to incorporate the endogeneity issue of environmental quality, that led to either an overestimation or an underestimation of the results, in this study, we take reverse causality into estimations in a static panel dataset.

3. DATA AND EMPIRICAL FRAMEWORK

In this study, the annual records of Indonesia's inbound tourism and duration of stay are obtained from Indonesia's Central Bureau of Statistics (Table 1). We also incorporate information about number of accommodation and rainy days, crime rates, levels of population, GRDP (Gross Regional Domestic Product) per capita, and size of road network over the period 2009-2018 from the National Socio-Economic Survey (SUSENAS, Survei Sosial Ekonomi Nasional) at inter-regional level in Indonesia, which is compiled by the national statistical agency (BPS, Badan Pusat Statistik). In addition, we utilize several metrics of environmental quality such as water quality index (WQI), air quality index (AQI), and environmental quality index (EQI) over the period 2009-2018 from the collaboration project between Indonesia's Ministry of Environment and Forestry and BPS. Moreover, we also use sanitation index resulted from a joint research between Indonesia's Ministry of Public Works and BPS over the period 2009-2018.

With regards to Table 2, it is clear that on average, the number of inbound tourists in Indonesia is relatively good, while the average of length of stay for each province is quite high. On indicator of environmental quality, despite the presence of a modest level of EQI and a higher-than-average level of AQI, both WQI and sanitation levels are in critical level. The crime rates, number of rainy days and accommodation, and size of road network are

Table 1: List of variables on tourism equation

Variable name	Description	Variable Source
lintou	Natural logarithm of total inbound tourists	Central Bureau of Statistics
tdos	Total duration of stay of inbound tourists	Central Bureau of Statistics
ipa	Water quality index (WQI)	Central Bureau of Statistics
ipu	Air quality index (AQI)	Central Bureau of Statistics
iklh	Environmental quality index (EQI)	Central Bureau of Statistics
laccom	Natural logarithm of accommodation	Central Bureau of Statistics
lcrime	Natural logarithm of crime rates	Central Bureau of Statistics
lrain	Natural logarithm of number of rainy days	Central Bureau of Statistics
san	Sanitation index	Central Bureau of Statistics
lroad	Natural logarithm of road network size	Central Bureau of Statistics
lgrdppc	Natural logarithm of GRDP per capita	Central Bureau of Statistics
lpop	Natural logarithm of population	Central Bureau of Statistics

also, on average, quite moderate. Such conditions are attenuated by higher-than-average levels of GRDP per capita and levels of population.

Moving to the quality of environment-inbound tourism nexus in Indonesia, Figure 3 exhibits a negative trend. This simple correlation among two variables may give a hint that both domestic and foreign visitors are not able to perceive the level of environment quality in Indonesia. In other words, most of inbound travelers have no information about this condition before traveling (Liu et al., 2019).

In contrast, Figure 4 shows the environmental quality-length of stay relationship in Indonesia. In a simple correlation, all metrics of quality of environment are positively associated with duration of stay of inbound travelers. The result does not come as a surprise. Based on the logic of empirical studies, the better levels of environmental quality in a country, the longer the duration of stay from inbound tourists.

In estimating the effect of environmental quality on tourism, we utilize the instrumental variable (IV) in a static panel dataset to mitigate the issue of reverse causality. In this context, we use regional dummy since the development of infrastructure mostly took place in the island of Java, which finally affects environmental

quality. Furthermore, natural logarithm of distance is employed in the estimation since the geographical distance between capital cities of province and theirs states determine the degrees of investment, which in turn affect quality of environment.

The dependent variable of Tou_{it} is measured in terms of incidence of inbound tourists and length of stay. Therefore, the following benchmark model at cross-province level will be used:

$$Tou_{it} = \beta_0 + \beta_1 EQ_{it} + \beta_2 X_{it} + \epsilon_{it} \tag{1}$$

where the subscript i denotes the province; t denotes observation period, which is 2009-2018; X_{it} is a vector of control variables that are assumed to have an influence on tourism; and ϵ_{it} is the corresponding error term. The main interest throughout this article lies in the coefficient β_1 , which measures the impact of the quality of environment on tourism.

The control variables are based on the current literatures related to the drivers of tourism in many countries—such as number of accommodation and rainy days, sanitation index, crime rates, levels of population, GRDP (Gross Regional Domestic Product) per capita, and size of road network (Dong et al., 2019; Xu and Dong, 2020).

Table 2: Summary of statistics on tourism equation

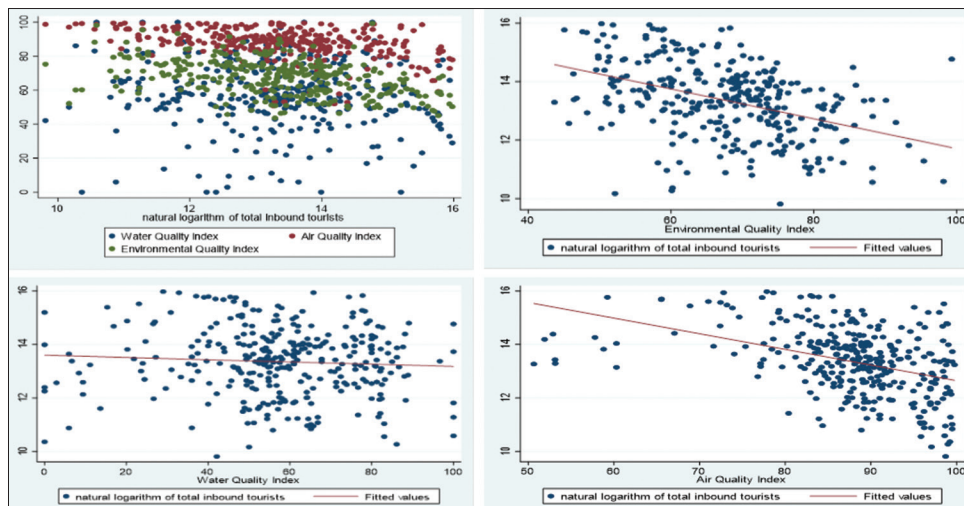
Variables	Obs	Mean	Std. deviation	Min	Max
lintou	320	13.36	1.25	9.81	15.98
tdos	320	9.11	2.26	4.83	17.76
ipa	320	57.44	19.87	0	100
ipu	320	87.83	8.81	50.65	99.76
iklh	320	67.62	10.45	43.67	99.32
lacom	318	3.35	1.25	0	6.31
lcrime	320	5.07	0.59	2.64	6.32
lrain	320	5.13	0.27	4.22	5.62
san	320	57.49	15.03	14.98	91.14
lroad	320	3.57	0.79	1.60	5.05
lgrdppc	320	10.10	0.66	7.86	11.80
lpop	320	15.24	0.99	13.51	17.70

Source: Authors' calculation

4. EMPIRICAL RESULTS

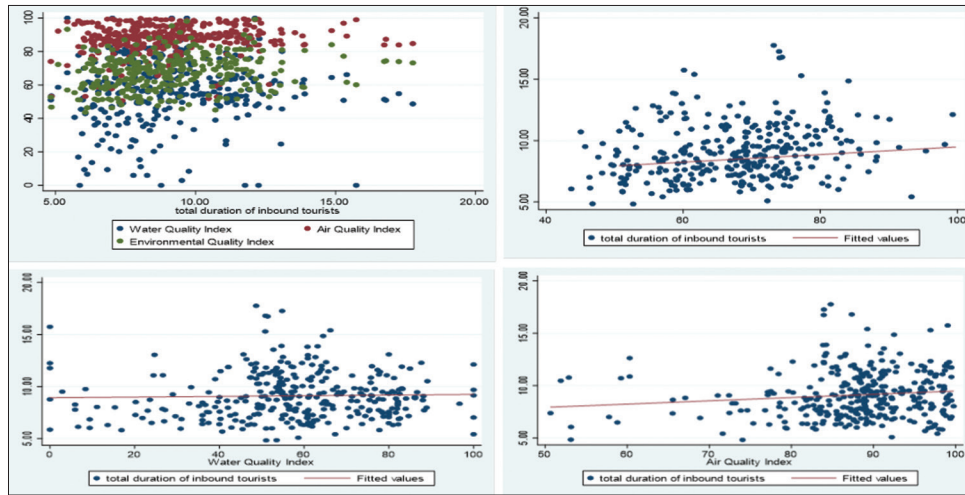
The regression results are listed in Table 3, which shows various determinants of inbound tourism measured in terms of incidence (from equation 1 to 3) and duration (from equation 4 to 6). In the former (i.e. incidence), it is important to note that both water quality index (WQI) and environmental quality index (EQI) were significantly and positively correlated with number of inbound tourists. The estimated coefficient implies that a one additional point increases in WQI and EQI, the demand for inbound tourism will increase by 1 % and 3 %, ceteris paribus respectively. In terms of control variables, as expected, the number of rainy days were significantly and negatively correlated with number of

Figure 3: Relationship between environmental quality and inbound tourism



Source: Authors' calculation

Figure 4: Relationship between environmental quality and duration of stay



Source: Authors' calculation

Table 3: Instrumental variable (IV) on tourism equation

Ind. variables	Dep. variable: lintou			Dep. variable: tdots		
	(1)	(2)	(3)	(4)	(5)	(6)
ipa	0.01** (0.007)			-0.12 (0.03)		
ipu		-0.33 (0.71)			0.73** (0.22)	
iklh			0.03* (0.01)			-0.13 (0.15)
lacom	-0.16 (0.14)	0.57 (1.62)	-0.28 (0.24)	0.20 (0.48)	-1.44 (2.71)	0.46 (0.77)
lcrime	-0.08 (0.08)	-0.56 (1.24)	-0.06 (0.10)	0.45 (0.34)	1.53 (1.59)	0.40 (0.35)
lrain	-0.46*** (0.18)	-1.12 (1.77)	-0.72** (0.38)	-1.07 (0.97)	-0.41** (0.12)	-0.49 (1.45)
san	0.009** (0.005)	0.02 (0.03)	0.005* (0.009)	0.02 (0.01)	0.05* (0.09)	0.008 (0.02)
lroad	-0.28 (0.31)	-0.72 (2.07)	-0.48 (0.57)	-0.70 (2.07)	-0.29 (5.56)	-0.24 (0.71)
lgrdppc	0.096** (0.42)	0.36 (1.52)	1.50** (0.69)	1.93 (1.97)	3.27* (4.15)	0.73 (2.69)
lpop	4.46*** (1.84)	5.94 (5.91)	2.08* (1.25)	4.77 (5.56)	1.46* (1.21)	10.10 (8.35)
Provincial FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	318	318	318	318	318	318
Group	32	32	32	32	32	32
Within	0.55	0.51	0.53	0.20	0.23	0.18
R-squared						

Number of parentheses are robust standard error. Asterisks denote: *** = significant at 1%; ** = significant at 5% level; * = significant at 10% level

inbound tourists. Meanwhile, there was a significant and positive association between quality of sanitation, GRDP per capita, number of population, and the demand for inbound tourism.

In the latter (i.e. duration), we found that air quality index (AQI) was significantly and positively correlated with length of stay of inbound travelers in Indonesia. Precisely, it indicates that a one additional point increases in AQI will rise the duration of stay of visitors by 0.73 day, holding other variables fixed. On other control variables, similar to the previous estimations, there was a significant

and negative association between number of rainy days and length of stay. In contrast, quality of sanitation, GRDP per capita, and number of population were all significant and positive to duration of stay of travelers. All in all, our results are somewhat consistent with the logic of other studies which use air quality index (AQI) as a proxy of environmental quality (Wang et al., 2018; Yan et al., 2019). By implementing their analogy, when local air pollution became worse, it could stimulate the demand for outbound tourism.

5. CONCLUSION

In this study, we investigated the effect of environmental quality on inbound tourists in 32 provinces of Indonesia over the period 2009-2018 through the use of instrumental variable (IV) technique. Our estimation showed that quality of environment, measured by WQI and EQI, was positively and significantly correlated with the demand for inbound travelers. Furthermore, we found that there was a positive and significant relationship between AQI and length of stay of inbound visitors.

Our study is bound by certain limitations. First, our study does not capture the certain components of pollutant that form AQI such as concentration of PM_{2.5} and PM₁₀. The relative importance of difference pollutants will assist policymakers to identify and facilitate the design of efficient policies. Thus, the work will improve significantly if those data become available in the nearer future. Last, this study focusses on several metrics of environmental quality, but these indicators do not sufficient enough to capture other dimensions of pollution, such as noise pollution, which may affect tourism. Therefore, a comprehensive measure of environmental quality can evaluate precisely the impact of pollution and or quality of environment on tourism.

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