Balancing Growth: Tourism, Economic Development, and Sustainable Environment in Indonesia

A Panel Data Analysis

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Abstract

Tourism development has been a strategic priority for the Indonesian government, aimed at fostering economic growth with potential implications for poverty alleviation, employment creation, and environmental sustainability. This study investigates the causal impact of tourism on economic development and environmental outcomes by analysing panel data across Indonesia's 34 provinces from 2012 to 2019. The results indicate a positive relationship between tourism and employment outcomes, demonstrating that tourism growth can stimulate job creation both directly within the tourism sector and indirectly through supporting industries. However, the extent of this effect is influenced not by the size of the tourism industry but by capacity in tourism activity, including the total number of local tourist and the average hotel occupancy. On the other hand, the study reveals that tourism's influence on poverty reduction and environmental sustainability across Indonesia's provinces is limited. Expected benefits in poverty reduction through tourism was not significant. Additionally, while tourism activities can strain environmental resources, this research does not find substantial direct effects on environmental sustainability index. Hence it might be moderated by other factors or may require a longer observation period to be fully visible.

Keywords: tourism, poverty, employment, environmental sustainability.

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CHAPTER 1: INTRODUCTION

Tourism is considered one of the largest industries in the world as it is a significant contributory factor in developing national and regional economies (Vaishno Devi Katra & S. Shrief, 2018). In fact, according to the World Bank, tourism was the world's largest service sector providing one in ten jobs worldwide, accounting for almost seven percent of all international trade, and 25 percent of the world's service exports, making it a critical foreign exchange generator (World Bank, 2022). In 2019, the global tourism sector was valued at over US$9 trillion, contributing 10.4 percent to the global GDP. This indicates the tourism sector has a substantial role not only in increasing economic growth but also in terms of demand for a wide range of goods and services(Ferguson, 2007). The industry's influence extends beyond economic output, as it creates an interconnected global network. Research by the World Travel and Tourism Council (WTTC) and the United Nations World Tourism Organization (UNWTO) also revealed that travel and tourism, directly and indirectly, supported nearly 334 million jobs worldwide in 2019. This highlights its considerable role in improving global employment and economic well-being (WTTC & UNWTO, 2019).

The tourism industry is widely recognized as a promising tool for job creation and regional economic growth in both developed and developing nations through the movement of people and the influx of foreign (Nakernis et al. 2009). Jobs generated by travel and tourism are spread across the economy; in retail, construction, manufacturing, and telecommunications, as well as directly in travel and tourism companies. This explains that tourism can be a powerful means for both developed and emerging countries to reduce poverty with different types of tourism, such as heritage tourism and eco-tourism, helping to increase the income of local communities living in and around tourism sites (A. Ganesh & C. Madhavi, 2013).

Some studies, such as Eslami et al. (2019), Yabuuchi (2015), and Daitoh and Omote (2011) have explored the causal relationship between tourism, employment, and poverty reduction. These studies indicate that tourism has a significant impact on economic development, especially in developing countries. In addition, Kim et al. (2016) mention that tourism significantly contributes to poverty reduction by generating employment prospects across diverse demographics, including women, youth, migrant labourers, and rural inhabitants,

particularly in emerging economies. In many developing countries, tourism promotes economic diversification and infrastructure development, leading to an expansion of job opportunities and increases in household incomes. By creating employment and generating revenue, tourism helps to improve living standards in regions that often lack other economic prospects (Fafurida et al., n.d, 2020). Thus, the growth of the tourism sector is recognized as a major driver of not only employment but also broader economic progress, positioning it as an essential factor for achieving poverty reduction and sustainable development.

Although the growth in the tourism sector contributes to poverty reduction, brings better income, and the economic benefits of the tourism industry are profitable, it can also have negative impacts on the environment, such as environmental damage, deforestation, and water pollution (Zhao and Min Li, 2018). The development of tourism activities and infrastructure around the area can often come at the expense of environmental sustainability if not managed properly. Cheaper and more efficient transportation, and a growing hotel business, enabled the expansion of mass tourism (Lanier, 2014). It is often criticized for disrupting the natural and cultural environment (Rajaonson & Tanguay, 2022). Additionally, the increased demand for water and energy to cater to the needs of tourists can strain local resources and contribute to water pollution and other environmental problems.

Indonesia is a country with rich nature and cultural heritage, which makes it a popular destination for tourists. Based on Indonesian geography, tourism comprises over 17,000 islands that stretch across the equator (Aji & Sukmasetya, 2022). This unique geography has significantly shaped the development and spread of tourism throughout the Indonesian archipelago. The four largest islands - Sumatra, Java, Sulawesi, and Kalimantan - each offer distinct natural landscapes, cultural traditions, and tourism experiences for visitors (“Wild Indonesia: The Wildlife and Scenery of the Indonesian Archipelago,” 1993). For example, Java, being the most populous and economically central island, has long been a hub for domestic tourism, with destinations like Yogyakarta, Borobudur, and Prambanan drawing visitors to the island's rich cultural heritage. Meanwhile, the island of Bali has emerged as Indonesia's premier international tourism destination, renowned for its Hindu temples, beaches, and vibrant arts scene. Beyond these well-known hubs, tourism has gradually spread to other parts of the archipelago as well. Thus, the geographic dispersal of tourism across Indonesia's diverse islands has presented both opportunities and challenges. While it has allowed for the

economic benefits of tourism to reach a wider range of communities, it has also required significant investment in infrastructure, transportation, and destination development to facilitate access and services for visitors.

According to the Bureau of Central Statistics of Indonesia, in 2019 the tourism sector reached 15.8 million international arrivals, doubling in size since 2012, while domestic tourism tripled at the same time. This sector made a direct contribution of 5.0% to the country's Gross Domestic Product (GDP) from domestic and international tourism, amounting to IDR 15,833.9 trillion or €950 billion EUR (BPS, 2019). The average expenditure for local tourists in the same year amounted to IDR 704.680 (EUR 46) per trip per day while international tourism reached IDR 16.027.538 (EUR 1,068) per trip per day. The considerable differences in spending patterns between domestic and foreign travel highlight their distinct features. Even though domestic travel has grown significantly, and the number of local tourists far outweighs that of foreign visitors, it is difficult to draw direct comparisons between the two groups because of the differences in the types of trips they take and the amount of money they spend each day. For example, local tourists often prefer shorter trips that focus on cultural and heritage sites, family-oriented destinations, and recreational activities within the country. They tend to spend less on accommodation and dining, often opting for budget-friendly options. On the other hand, international tourists usually prefer longer stays and are more likely to visit iconic landmarks, luxury resorts, and high-end dining establishments (Oppermann, 1994). Their expenditures typically include higher costs for accommodation, travel, and premium services, reflecting a different economic impact on the tourism sector.

Source: BPS Indonesia

Figure 1. Number of tourists visiting Indonesia both local and international.

Figure 1 shows the number of tourists both domestic and international visiting Indonesia over the last 10 years. Although the domestic tourist counted based on the trip per individual, the international tourist was counted based on the number of people who visited Indonesia. There was a noticeable increase in 2015 in domestic trips which was caused by several factors such as promotion by the Indonesian government, through the Ministry of Creative Economy (Kemenkraf), which actively promoted tourism by organizing 430 events in 2015. These included 119 promotional activities, 137 events, and 174 supporting events aimed at boosting tourism (Purwata, et al., 2020). Concurrently, the Indonesian government intensified its efforts to bolster the tourism sector by spearheading promotional initiatives. Hence, the effect of these initiatives was evident across various sectors of the tourism industry, leading to increased demand for hotel services, heightened tourism expenditure, improved transportation infrastructure.

Furthermore, the Indonesian government has declared tourism development as one of the main strategies for developing the country. As an example, Presidential Regulation Number 96 of 2019 mandates the Ministry of Tourism and Creative Economy to boost tourism promotion efforts (Maulana et al., 2022). The Ministry of Tourism and Creative Economy has a vision to make Indonesia a world-class tourism destination. In addition, they also focus on developing the environment and capacity of the tourism industry in Indonesia which is highly competitive. One of their initiatives is the "10 New Balis" strategy, which aims to duplicate Bali's success

in ten additional places throughout the archipelago. This strategy plan sought to provide a more balanced distribution of economic gains by diversifying tourism in addition to increasing visitor numbers.

Government investments in infrastructure contribute as an important factor in this transformative tourism agenda, especially domestic investment which is one of the main ways to boost economic growth and increase demand in the tourism sector (Geni, 2022). These investments can increase the efficiency of people's mobility, making it easier for more people to travel, while also facilitating the transfer of technology and management skills. The Tourism Infrastructure Acceleration Program (PMDA – Program Percepatan Pembangunan Infrastruktur Pariwisata) became a main tool directing funds toward developing essential facilities. These investments are aimed at expanding airports, improving transportation networks, and making remote destinations more accessible to foster sustainable tourism beyond traditional routes (Maulana et al., 2022).

The aim of this study is to assess the impact of tourism on economic development and environmental sustainability. Therefore, there are three objectives in this study; first, to analyse the impact of tourism on poverty reduction; second, to examine its effect on employment; and third, to evaluate the impact of tourism on environmental sustainability. Panel data from 34 Indonesian provinces over the period 2012 to 2019 will be used to conduct the analysis. The methodology will rely on regression analysis with a fixed effect model to account for unobserved heterogeneity across provinces.

This thesis is structured in the following way: The next chapter provides general information, theory, and background of the variables of interest and the hypotheses of this study. Chapter 3 provides methodological aspects of the research including the econometric model, data collection, limitations, and variable selection. Chapter 4 analyses the data result from the fixed effect regression in order to clarify the impact of tourism on economic development and environmental sustainability. The final chapter summarizes and discusses the most important findings of this study and concludes with recommendations for future research.

CHAPTER 2: TOURISM, ECONOMIC DEVELOPMENT, AND ENVIRONMENTAL SUSTAINABILITY

This chapter introduces the concepts used in this thesis and explains how they relate to the impact of tourism on economic development and environmental sustainability.

2.1 Tourism and Economic Development

The World Tourism Organization defines tourism as ‘people traveling to and staying in places outside their usual environment for not more than one consecutive year’ (Takuli et al. 2022 p.1). This definition sums up the essence of tourism as a broad phenomenon that includes a wide range of activities, impacts, and motivations. Tourism has evolved into a complex global industry with significant economic, cultural, and environmental implications. Menante et al. (2012) classify tourism into sectors such as leisure, business travel, cultural tourism, and ecotourism, each serving as an important role of economic growth in numerous countries. These sectors generate income through job creation, foreign exchange earnings, and stimulating investment in infrastructure, such as roads, airports, and hotels, to accommodate and cater to tourists (Gasparino et al., 2008).

Several studies emphasize the substantial economic contributions tourism makes, particularly in emerging economies. The sector's impact not only attracts foreign currency but also stimulates local businesses, such as restaurants, hotels, retail stores, and transportation services, which experience increased demand for goods and services (Telfer, 2015). This, in turn, creates additional income streams and economic opportunities for the local population, helping to diversify the economy and reduce dependency on traditional industries. Stobart & Ball (1998) highlights the "multiplier effect," where tourist spending circulates within the local economy, driving indirect benefits by boosting consumption in related sectors. This process generates further economic activity beyond the immediate spending of tourists, such as through increased demand for locally sourced goods, construction, and the expansion of services like transport and entertainment. In particular, industries such as agriculture, retail, and banking benefit from this secondary spending. The multiplier effect amplifies tourism’s overall contribution to economic development, increasing growth and diversification in local economies (Lasso & Dahles, 2018). This broader economic stimulation not only sustains businesses catering directly to tourists but also creates additional income opportunities for non-tourism sectors that support local production and service industries (Stobart & Ball, 1998).

Tourism has the potential to significantly contribute to poverty reduction by creating employment opportunities for local communities, particularly in developing countries where alternative employment options may be limited. Jobs in the tourism sector, ranging from hospitality and transportation to tour guiding and retail, provide a significant source of income for individuals in many regions (Telfer, 2015). These jobs can be particularly beneficial for low-skilled workers, including women, youth, and marginalized groups, helping to reduce unemployment and poverty levels. According to the World Bank (2019), the tourism sector employs millions of people worldwide and can offer a pathway out of poverty for communities in rural or remote areas where traditional industries may not be as prominent. In regions like Southeast Asia, tourism has helped lift many out of poverty by providing direct employment opportunities and increasing income levels. However, the benefits of tourism in terms of employment and poverty reduction are not always equitable or sustainable. While tourism can generate jobs, the quality of these jobs is often a concern. Many of the positions created in tourism are low-wage, seasonal, or informal, which can limit their long-term impact on poverty reduction. Additionally, the growth of tourism in certain regions has led to the rise of income inequality, where the wealth generated from tourism tends to benefit a small proportion of the population, such as those who own businesses or have access to higher-skilled jobs in the sector, while the majority of workers remain in low-paying, precarious employment.

Kang et al. (2014) argue that the economic advantages of tourism can bypass the local population, particularly in cases where multinational corporations dominate the tourism sector. In these instances, much of the revenue generated flows out of the host country, creating limited opportunities for local communities. Paramati et al. (2018) further elaborate on the dependency that can emerge from this structure, where host countries rely on foreign investment and tourists, often leading to economic vulnerabilities. Boluk (2011b) referred to tourism as "the victim of its own success," emphasizing the potential negative consequences of uncontrolled tourism development across economic, social, and environmental dimensions. For instance, in popular tourist destinations like Venice, the overwhelming increase of visitors has led to significant environmental degradation, overcrowding, and the displacement of local residents. Moreover, unregulated growth in tourism can lead to various social-cultural problems, such as the rise of sex tourism, and environmental degradation through the depletion of natural resources. Economically, unchecked tourism can result in several drawbacks, including the leakage of revenue out of the local economy and overdependence on tourism as a single

industry which can limit the economic benefits for host communities. As tourism is highly sensitive to external factors, such as global economic downturns, political instability, natural disasters, or pandemics as seen with COVID-19. When a destination is overly reliant on tourism, these shocks can lead to severe economic disruptions. For example, during the COVID-19 pandemic, many countries that were heavily dependent on tourism faced massive declines in income and employment as travel restrictions and lockdowns were enforced. In such cases, without a diversified economy, there are fewer alternative sources of income to fall back on, leading to widespread financial instability (Manente et al., 2012).

The distribution of the economic impact of tourism must be carefully managed to ensure that benefits are widespread and inclusive, reaching local communities and vulnerable populations. In this sense, it is the duty of both the tourists and the government to find a more responsible way of enjoying their holiday and maintaining tourism sites. This approach acknowledges the importance of tourism for economic development but calls for strategic measures to mitigate its adverse impacts. Font & Epler Wood (2007) note that tourists are increasingly seeking "green, sustainable, and ethical" holiday options, reflecting broader societal trends toward environmental consciousness. Governments and industry stakeholders are responding by promoting sustainable tourism practices, including responsible resource use, community engagement, and the protection of cultural and natural heritage.

2.2 Environment

While tourism can have a positive implications for economic growth, tourism intensity and capitalisation can also lead to environment degradation (Ștefănică et al., 2021). Several tourism activities have been identified as potential threats to the environment, both direct and indirect adverse effects (Lewis, 2018). Direct impact may arise from activities occurring within unregulated tourism areas which may contribute significantly to environmental degradation. This degradation can occur through habitat fragmentation, destruction, or damage, whether due to the expansion of tourism infrastructure or tourist activities like anchoring, diving, fishing, and waste disposal, which can directly harm species and habitats (Ștefănică et al., 2021). Indirect impact is caused by various aspects of tourism development and activity, such pollution and greenhouse gas emissions from large-scale construction and ongoing operations of hotels and resorts. This extensive development of the tourism sector can contribute to air

and water pollution on a larger scale, affecting not only local ecosystems but also human health over time (Koondhar et al., 2021).

In addition, forests and coastal regions are heavily utilized for constructing tourism facilities. Forests, while essential as natural assets and resources for tourism, also bear the brunt of environmental impacts from both individual activities and facility development associated with tourism industry (Liu et al., 2022). Moreover, tourism activities as simple as hiking can lead to environmental damage through unregulated conservation tourism and soil degradation, while tourist presence and noise may stress local wildlife. Intensified tourism activity also leads to various forms of pollution, including water, noise, air, and visual pollution. The increase in visitor numbers and hotelier efforts to enhance service quality often result in water pollution issues. Increased traffic from tourism generates noise that can disturb both local communities and wildlife.

Tourism largely depends on the attractiveness of the resources of the destinations, hence an increase in investment for tourism development often comes with an increased carbon footprint and the potential to harm the environment, particularly in infrastructure sectors like accommodation and public facilities (Lee & Syah, 2018). Studies indicate that this expansion of tourism infrastructure can trigger various environmental issues such as habitat degradation, deforestation, biodiversity loss, and increased carbon emissions (Aniza Abdul Aziz & Abdul Manab, 2020; Purnama et al., 2020). Additionally, Dinda (2004) mentioned that in the early stages of tourism development, environmental pressures tend to escalate more rapidly than economic growth. Thus, it becomes important to adopt regulatory frameworks and astute management strategies toward prioritizing environmental preservation while promoting tourism activities, especially the government and tourism agencies, is currently labelled as being responsible according to Nicolau (2008, p. 992). Therefore, balancing sustainable tourism development and managing the environmental impact can be greatly aided by considering tourism that is carefully managed and mindful of its influence on the environment.

Together with maintaining the tourism sites, environmental sustainability must be prioritized to prevent the degradation of natural resources and maintain the attractiveness of tourist destinations. Effective policies should balance economic growth with environmental preservation, promoting practices that reduce carbon footprints, protect biodiversity, and

manage waste. One country that has successfully implemented sustainable tourism practices is Costa Rica. (Molina Murillo, 2019) explains that Costa Rica has developed a certification system for sustainable tourism, which encourages businesses to adopt eco-friendly practices. This has not only contributed to environmental preservation but also stimulated local economic development by creating green jobs and promoting investment in sustainable infrastructure. Such policies demonstrate the potential for tourism to contribute to both economic growth and environmental conservation when managed responsibly.

Sustainable tourism also requires investment in both physical infrastructure and human capital Butler (2006). He emphasizes the need for well-planned infrastructure development, such as energy-efficient hotels, eco-friendly transportation systems, and effective waste management facilities, to reduce tourism's environmental footprint. For example, the Maldives, heavily dependent on tourism, has invested in solar energy projects and waste-to-energy plants to manage its environmental impact while supporting the tourism industry (V. Ali et al., 2015). These investments ensure that tourist destinations remain attractive and viable in the long term. Therefore, tourism undoubtedly has a crucial role in global economic development by generating income, creating jobs, and stimulating investment. However, its benefits are not always equitably distributed, and its environmental impacts can be severe if left unchecked.

The Environmental Kuznets Curve (EKC) hypothesis posits that as economies develop this initially leads to deterioration in the environment, but after a certain level of economic growth, a society begins to improve its relationship with the environment and levels of environmental degradation reduce.

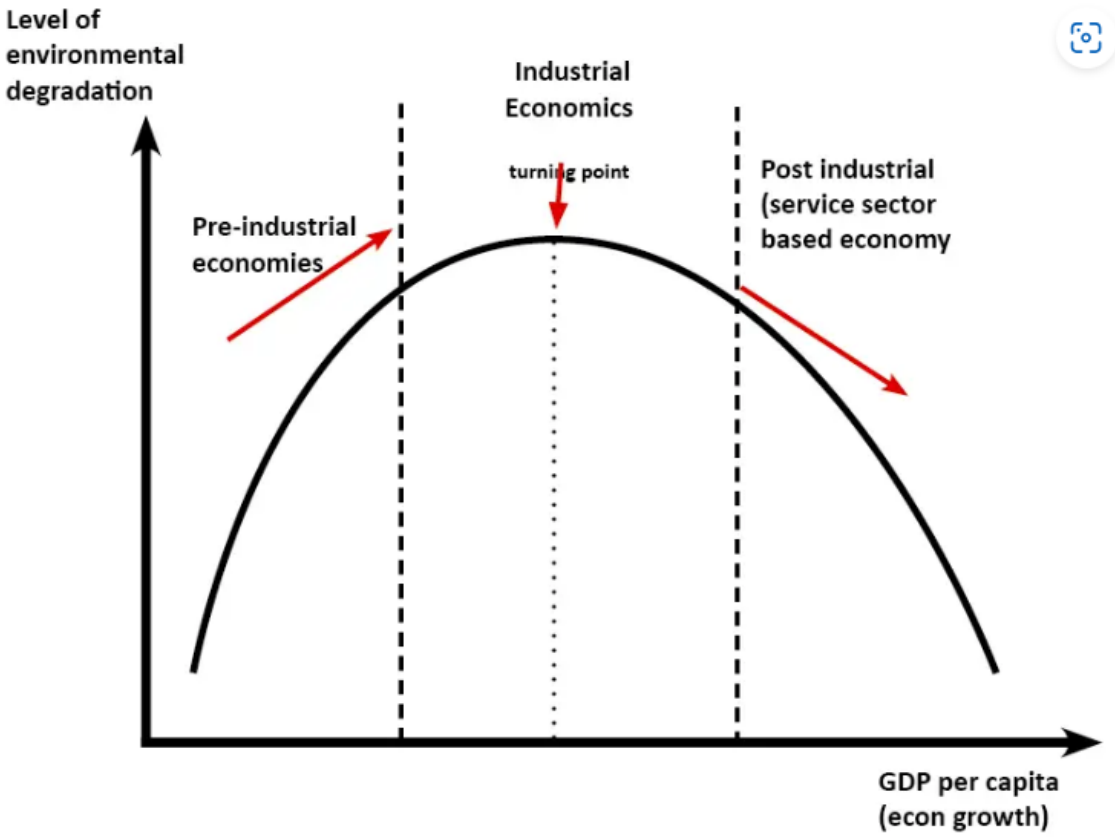

Figure 2 Diagram of Kuznets Curve

Although the EKC does not directly address the relationship between tourism and the environment, it is plausible that tourism can be part of economic development within the framework of the EKC. As tourism contributes to economic growth in many regions, it can indirectly influence environmental factors through its impact on various sectors of the economy by increasing resource consumption, generating waste, and contributing to pollution through the expansion of various sectors of the economy. Moreover, historically, unregulated tourism development hurt the environment, as people have not been concerned about environmental sustainability (Sudartianto et al. 2021; Jushan et al. 2009). During the early stage of tourism growth, the priority was often on economic development, with little regard for the environmental consequences. This aligns with the initial upward-sloping portion of EKC, where environmental degradation increases as economic activities expand. However, in more recent years, there has been a growing awareness and emphasis on sustainable tourism practices. As societies have become more affluent and environmentally conscious, there has been a shift towards adopting modern technologies, innovation, and regulations to mitigate the environmental impact of tourism. This reflects the interpretation of the downward-sloping part of the EKC.

Therefore, while the EKC primarily describes the broader relationship between economic development and environmental quality, the concept can also be insightful for understanding how the development of the tourism sector can potentially affect environmental outcomes.

2.3 Hypothesis

Drawing from concepts and existing evidence, this study sets out three main hypotheses related to the impact of tourism on economic growth, and environmental sustainability. The first hypothesis states that more jobs will be created as tourism grows. As tourism grows, there is a need for workers in several industries, including retail, transportation, and hospitality. It is anticipated that this higher demand for workers would lead to additional job openings and overall economic growth. Adding to the first hypothesis, the second predicts that poverty will decline as a result of increased employment brought on by tourism. More people working and making money will raise living standards and enhance the local economy, which will lower the rate of poverty in the community. The third hypothesis is that an increase in tourism will harm the environment, as the growing tourism activities, such as the development of infrastructure and people's mobility often exert pressure on fragile ecosystems and natural resources. However, the EKC offers an alternative and contrasting hypothesis, as there is a possibility that sustainable tourism can eventually have a positive impact on the environment.

CHAPTER 3: METHODOLOGY

In order to empirically test the hypotheses outlined in chapter 2, the methodology employed for this study is designed to provide a causal analysis of the relationships between key variables.

3.1 Methodology

This thesis employs province level panel data with a fixed effect model to investigate the relationship between tourism, poverty, employment, and economic sustainability. This approach helps mitigate omitted variable bias and unobserved endogeneity, such as the presence of local policies or cultural characteristics associated with an increased number of local tourists, which could introduce bias if not accounted for in the analysis. Provinces with rich cultural heritage may exhibit higher tourism and greater environmental consciousness, necessitating control for these inherent differences.

This model analyses the impact of tourism by accounting for variations among provinces in Indonesia and changes within provinces over time. By addressing unobservable differences specific to each province, the fixed effects model captures consistent province-specific factors that may be correlated with the independent variables. This approach aligns with the research focus at the provincial level, allowing for a detailed examination of province-specific trends while controlling for time-invariant characteristics. It assumes that changes over time are random, providing the reliability of the analysis by ensuring that the findings are consistent and less likely to be influenced by unobserved factors, such as cultural differences and historical economic conditions of Indonesia.

The fixed effect model in this study:

$$Ln(Y_{it}) = \beta_0 + \beta_1 Ln(Tourism_{it}) + \beta_2 T_t + \beta_4 P_{it} + \alpha_i + e_{it} \dots\dots (1)$$

Y_{it} captures the natural logarithm of four outcome variables: poverty, employment (total employment in tourism and employment rate), and an environmental index. $Ln(Tourism_{it})$ denotes the natural logarithm of the tourism variables, including the number of tourists, the total number of rooms available, and the hotel occupancy rate. By using the logarithmic transformation, the coefficients in the model can be interpreted as elasticities,

meaning that a 1% increase in tourism leads to a percentage change in the outcome variables, depending on the estimated coefficients.

The individual fixed effects α_i account for unobserved heterogeneity across provinces, while time variable T_t captures the time-specific effects from 2012-2019. e_{it} captures unobserved factors that affect dependent variables in this model but are not explicitly included in the model. The time-variant control variables include government investment and the number of populations P_{it}, capturing various aspects of a province's economy, such as labour supply, market demand, and resource availability. The fixed effects model relies on the assumption of parallel trends, meaning that in the absence of tourism's influence, the outcome variables would evolve similarly across provinces.

3.2 Data

The data for this thesis was primarily sourced from the National Bureau of Statistics of Indonesia (BPS), the Ministry of Environment and Forestry website, and existing literature. The selected timeframe, from 2012 to 2019, reflects changes in a decade of economic evolution, policy shifts, and global influences. It allows for comprehensive longitudinal analysis, capturing the changes in the tourism sector. However, this study will not take into consideration the coronavirus pandemic years due to its unprecedented and disruptive nature, which introduces exceptional and unpredictable dynamics of the tourism landscape.

3.3 Variable Selection

This research considers four dependent variables that reflect poverty, employment in tourism, employment rate, and the environment in 34 provinces. The first variable is poverty per province, which measures the percentage of the population living below the poverty line. The poverty line is determined by Indonesia's Central Bureau of Statistics (BPS) and represents the minimum expenditure required to meet basic food and non-food needs. This threshold is updated regularly based on price fluctuations and consumption patterns in each province. The poverty rate is then calculated as the proportion of individuals whose income falls below this threshold within a given province. The employment variables include total employment in the tourism sector and the overall employment rate. These metrics provide insights into the labor market over the years, highlighting the sector's role in job opportunities and its impact on overall employment levels.

The fourth variable is the Environmental Quality Index (IKLH - Indeks Kualitas Lingkungan Hidup), with values ranging from 0 to 100, where a higher value signifies better environmental quality. The IKLH is a key performance indicator used by the Indonesian government to measure environmental sustainability. It integrates various environmental dimensions, such as water quality, air quality, and forest cover. Among these, water quality and air quality are particularly relevant to tourism, as tourism activities can influence pollution levels and resource degradation in popular tourist destinations. This index combines the Environmental Quality Index (EQI) and the Environmental Performance Index (EPI), providing a comprehensive assessment of environmental quality based on diverse indicators across the domains water, air, land, and oceans. The EQI and EPI, while both integral to the IKLH, serve different purposes. The EQI measures the current state of environmental conditions, focusing on water quality, air quality, and land cover. It reflects the direct impact of human activities, including tourism, on environmental health. In contrast, the EPI assesses a country's overall environmental policy performance, focusing on long-term sustainability goals and management practices. The EPI looks at broader issues like policy implementation, legal frameworks, and international environmental agreements, which may indirectly influence how tourism is managed from an environmental standpoint (PPID Menlhk).

Table 1. IKLH Indicator and Parameter

No	Indicator	Parameter	Weight
1.	Water Quality	Total Suspended Solids	34%
		Potential of Hydrogen	
		Dissolved Oxygen	
		Biochemical oxygen demand	
		chemical oxygen demand	
		Total Fosfat	
		Fecal Coliform	
		Total Phosphate and Nitrate-Nitrogen (NO_3-N)	
2.	Air Quality	Sulfur dioxide (SO_2)	42,8%
		Nitrogen dioxide (NO_2)	

3.	Land Quality	Forest Cover Area, shrubs, and swamp shrubs located in forest areas and protected function areas (river borders, lakes, and beaches, slopes >25%), Green Open Spaces such as Botanical Gardens, Biodiversity Parks, Urban Forests, and City Parks, as well as forest and land fire incidents and the presence of canals in peat ecosystems.	13,3%
4.	Ocean Quality	Total Suspended Solids	9,9%
		Dissolved Oxygen	
		Oil and Fat	
		Total Ammonia	
		Orto-Fosfat	

Source: Ministry of Environment and Forestry Indonesia

The environmental metrics outlined in Table 1 describe the key components of the IKLH that are essential for evaluating how tourism impacts different ecosystems. An increase in tourist numbers can result in significant environmental impacts, particularly in key domains measured by the IKLH (Environmental Quality Index). The four primary domains are Water Quality, Air Quality, Land Quality, and Ocean Quality. Each of these domains includes specific environmental indicators that assess the health of ecosystems and human living conditions. The domain weights are determined based on the relative importance of each environmental factor in contributing to overall ecosystem health and human well-being. Air quality is weighted the most (42.8%), given its direct implications for public health, while water quality (34%) also carries significant weight due to its importance for both human consumption and ecosystem services. Land and ocean quality are weighted less but remain integral for sustainable environmental management (Luhung & Yuniasih, 2023).

Water Quality (34% Weight): Water quality is the second most heavily weighted domain in the IKLH, indicating the important impact of freshwater resources for both ecosystems and human activities. This parameters measures:

- Total Suspended Solids (TSS), which indicate water turbidity.
- Potential of Hydrogen (pH), reflecting the acidity of water.
- Dissolved Oxygen (DO), a key indicator of aquatic health.
- Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), which measure organic pollution.

- Nutrient levels, including Total Phosphate and Nitrate-Nitrogen (NO3-N), which are often linked to runoff from fertilizers and tourism infrastructure.

Tourism activities, especially those involving hotels and resorts, can contribute to water pollution through increased waste discharge. The changes of degrade freshwater sources, impacting not just aquatic life but also local communities that rely on these water bodies for drinking and recreation. Data on water quality is gathered through sampling and testing and is critical for assessing the overall environmental impact of tourism in freshwater ecosystems by the Indonesian government.

Air Quality (42.8% Weight): Air quality carries the highest weight in the IKLH because it directly affects public health and regional climate conditions. This parameters measures:

- Sulfur Dioxide (SO2)
- Nitrogen Dioxide (NO2)

These gases are mostly by products of transportation systems, energy consumption, and industrial activities, all of which see significant increases with growing tourism. For example, as tourist numbers rise, so does air travel and local transportation, contributing to higher emissions of these pollutants. Monitoring stations collect air quality data, which is essential for identifying trends and implementing regulations to mitigate the environmental footprint of tourism.

Land Quality (13.3% Weight): Land quality measures the extent of forest cover, protected areas, and green spaces, which are vital for biodiversity and ecological balance. It also tracks forest and land fires and peat ecosystem canals. These indicators are important for assessing the impact of tourism-related urbanization and infrastructure development on natural landscapes. Tourism can exacerbate land degradation by increasing the demand for land conversion to resorts, hotels, and other facilities. Such activities may lead to deforestation, soil erosion, and biodiversity loss. Data is typically collected through satellite imagery and field surveys, allowing policymakers to monitor changes in land use patterns over time.

Ocean Quality (9.9% Weight): The ocean quality parameters measures:

- Total Suspended Solids (TSS)
- Dissolved Oxygen (DO)
- Oil and Fat
- Total Ammonia
- Ortho-Phosphate

Though ocean quality has the smallest weight in the IKHL, it is a crucial indicator for assessing the health of coastal ecosystems, especially in regions dependent on marine tourism. Coastal tourism can contribute to ocean pollution through runoff containing oils, fats, and other contaminants, disrupting marine habitats. Data on ocean quality is obtained from coastal and marine water sampling and is particularly relevant to tourist destinations near beaches and coral reefs.

The independent variable in this study is tourism, which will be measured by the total number of local tourists, and the number of available hotel rooms over a particular area or destination, and the hotel occupancy rates per province per year. These indicators collectively offer a well-rounded view of tourism activity and its impact. The total number of tourists reflects the direct demand for tourism services, indicating how popular a tourism area in the region and its ability to attract visitors. However, this study will focus on domestic tourists due to the unavailability of data on international tourists at the provincial level. Additionally, the number of domestic tourists significantly exceeds that of international tourists. Domestic tourism also has a unique impact on the local economy, as local tourists generally exhibit different spending patterns, preferences, and travel motivations compared to international tourists.

The number of available hotel rooms indicates the capacity and infrastructure available to accommodate tourists, which ties into how well the region can support tourism growth. Lastly, hotel occupancy rates, which include the percentage of occupied rooms and the average length of stay, measure the efficiency and intensity of tourism infrastructure usage. Together, these variables provide a comprehensive picture of the tourism scale and economic impact of tourism, making it possible to assess how tourism development contributes to poverty, employment, and environment.

Table 2 shows the variables that are included in the dataset, their means, standard deviation, and sources.

Table 2. Descriptive Statistics: Tourism, Economic, and Environment Variables

Variable	Observations	Mean	Standard Deviation	Source	Unit
Poverty	337	11.24	5.90	BPS Indonesia	Percentage
Tourism employment	306	274733.4	690099.9	Ministry of Tourism and Creative Economy	Number of people
Employment rate	337	94.65	1.96	BPS Indonesia	Percentage
Environment	337	67.73	9.89	Ministry of Environment and Forestry	IKLH
Number of rooms	340	19844.29	29829.09	BPS Indonesia	Number of total accommodations
Number of Local Tourist	336	1.10	2.12	BPS Indonesia	Number of people
Hotel occupancy	337	1.85	0.37	BPS Indonesia	Average of Hotel Occupancy
Number of Population	334	7779.76	10851.96	BPS Indonesia	Number of people
Investment	336	7768.47	11764.05	BPS Indonesia	Millions of Rupiah

3.4 Limitations

This methodology has several limitations. First, the reliability of the results depends heavily on the completeness and accuracy of the data. Variability in data quality and consistency across different provinces and years may affect the robustness of the findings. Additionally, since the study focuses on Indonesia's 34 provinces, the results may not be directly applicable to other

countries or regions. Extending these findings without considering specific local characteristics could lead to inaccuracies or misinterpretations.

Second, while the fixed-effects model aids in addressing endogeneity, it cannot fully account for potential indirect causality or time-varying unobserved variables. For example, although tourism may influence employment rates, the availability of jobs can also affect tourist demand, creating a feedback loop that complicates the analysis. Furthermore, the fixed-effects approach limits the ability to capture unique provincial differences, as it assumes individual characteristics remain constant over time. This is particularly relevant for the environmental index, which shows minimal change over time, with most variation occurring between regions. In a fixed-effects setting, much of this variation is lost, reducing the model's statistical power. If a random-effects model were used instead, results could suffer from bias, as it assumes that individual effects are uncorrelated with the independent variables, an assumption that may not hold in this context.

Finally, the analysis is further limited by the absence of recent data on employment in the tourism sector beyond 2017, due to the reorganization and merging of two Indonesian ministries. This data gap prevents the study from capturing more recent trends in tourism-related employment, diminishing insights into current employment dynamics within the sector.

CHAPTER 4: RESEARCH FINDINGS

In chapter three the model and the dependent and independent variables are explained. This chapter reports the trends in the outcome variables and the regression results on the impact of tourism on economic development and environmental sustainability.

4.1 Tourism Indicator

To understand the role of tourism across various regions of Indonesia, this section examines specific tourism indicators including the total number of rooms available and average hotel occupancy per island. Indonesia's unique geography, with islands showing varying levels of tourism development, provides an ideal setting to explore how concentrated tourism affects economic and environmental outcomes differently. On islands with established tourism infrastructure, such as Bali, indicators like high hotel occupancy rates and a large number of rooms indicate the intense demand for tourism services. In contrast, less-touristed islands exhibit lower occupancy rates and fewer accommodation options, highlighting an uneven distribution of tourism impact across the archipelago.

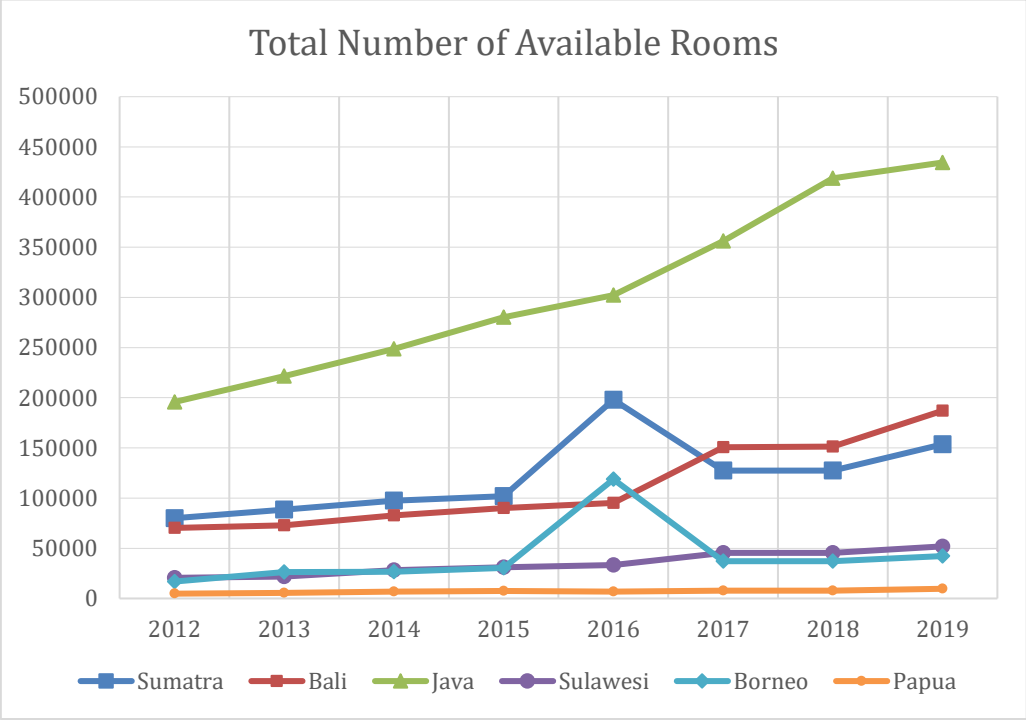

Figure 3 Total Number of Rooms Available

Java, Bali, and Sumatra have consistently shown the highest numbers of available hotel rooms in Indonesia from 2012 to 2019. By 2019, Java led with 434,400 rooms, followed by Bali with 187,027 rooms, and Sumatra with 153,564 rooms. These islands collectively attract over two-thirds of Indonesia's domestic tourism, partly due to their population density, established

infrastructure, and accessibility (Gunawan, 1996). Java and Bali, despite covering only 7% of Indonesia's land area, serve as primary destinations for domestic travellers. Sumatra, although less densely populated, is the second-largest island in the archipelago and attracts visitors with its natural attractions, such as Lake Toba, Mount Leuser National Park, and other ecotourism spots. Additionally, these islands benefit from extensive land transportation networks, which are the preferred travel mode for most Indonesians. This accessibility makes Java, Bali, and Sumatra ideal for year-round domestic tourism, ensuring a consistent demand for hotels and other accommodations on these islands (Pratomo, 2017).

Furthermore, the average hotel occupancy rates from 2012 to 2019 provide additional context to the distribution and demand for accommodations across Indonesia's islands or the fluctuations of tourist mobility. Sumatra reports the longest stays, with tourists averaging 16 to 20 nights per year, likely due to its appeal as a destination for eco-tourism and cultural experiences that encourage extended visits. Java, with a moderate stay length of 9 to 11 nights per year, attracts both business and leisure travellers, making it a popular but often transitional destination, as tourists may use it as a central hub before exploring other islands. In contrast, Bali sees shorter stays of 6 to 8 nights per year, likely due to its high visitor turnover and popularity for brief vacations, particularly among international tourists. Similarly, Sulawesi and Borneo show moderate stays, with tourists averaging 14 to 16 nights per year in Sulawesi and 7 to 8 nights in Borneo (BPS, 2020).

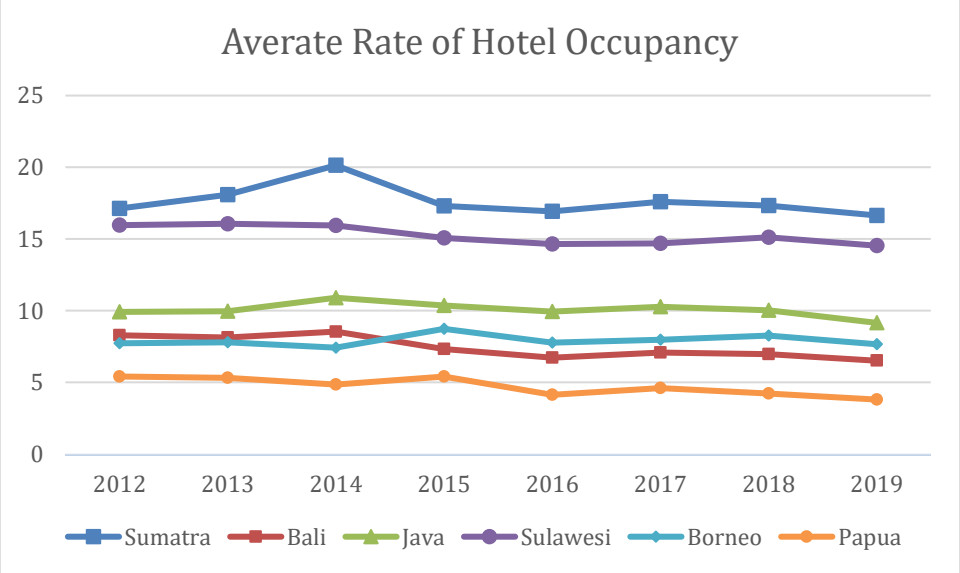

Figure 4 Average Rate of Hotel Occupancy

Domestic travel in Indonesia revolves around three peak seasons. Summer (June-July) and Winter (December) school vacations bring large numbers of families to popular destinations, while Idul Fitri, the holiest day in the Muslim calendar, prompts a surge in travel as people journey to celebrate with loved ones. Visiting friends and relatives remains the primary purpose for domestic travel, with vacations or recreational trips as the second most common reason. Although many Indonesians stay with friends and family during these trips, around a third choose to stay in hotels, which adds significantly to the demand for accommodations on these islands. The extensive land transportation networks on Java and Bali further support this high volume of domestic tourism, making them accessible and popular year-round for local travellers (Pratomo, 2017).

4.2 Poverty

In Indonesia, poverty measurement is assessed through the national poverty line, which reflects the minimum income level required to meet basic food and non-food needs. The Central Bureau of Statistics (BPS) uses various criteria, including household consumption, to estimate poverty rates. As of 2021, the national poverty rate stood at approximately 9.71%, with variations across different regions of the archipelago.

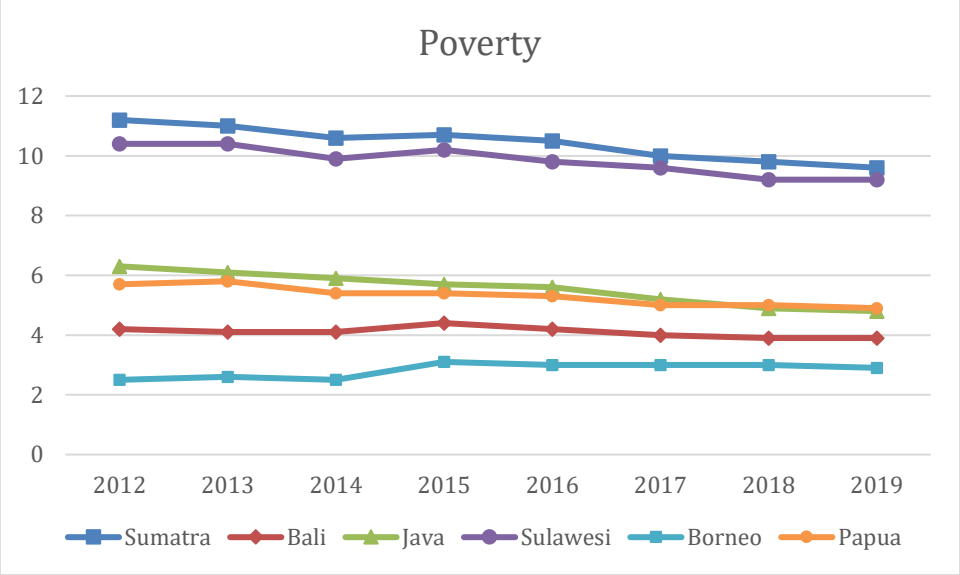

Figure 5 Poverty Rate

As showed in the graph above Sumatra exhibited a gradual decline from 11.2% in 2012 to 9.6% in 2019, with a notable peak at 10.7% in 2015. This fluctuation suggests some economic instability during that year. While in Bali, the poverty rate consistently remained low, decreasing from 4.2% in 2012 to 3.9% in 2019, indicating the effectiveness of the tourism

industry in maintaining economic stability. Java experienced a similar downward trend, with rates dropping from 6.3% in 2012 to 4.8% in 2019, reflecting ongoing development efforts. These data points highlight the diverse economic conditions and the varying success of poverty alleviation strategies across Indonesia's regions, warranting targeted interventions for continued progress (Pratama & Zubaidah, 2023).

4.3 Employment Rate

Tingkat Kesempatan Kerja (TKK), Indonesia's employment rate, is a crucial gauge of the country's economic activity and employment trends (Nastiti & Nailufar, 2024). TKK gives information about job availability and utilization in the labour market by reflecting the proportion of the economically active population that is currently employed. Given its strong correlation with worker engagement, productivity, and income levels across industries, this measure is crucial for assessing the nation's economic health.

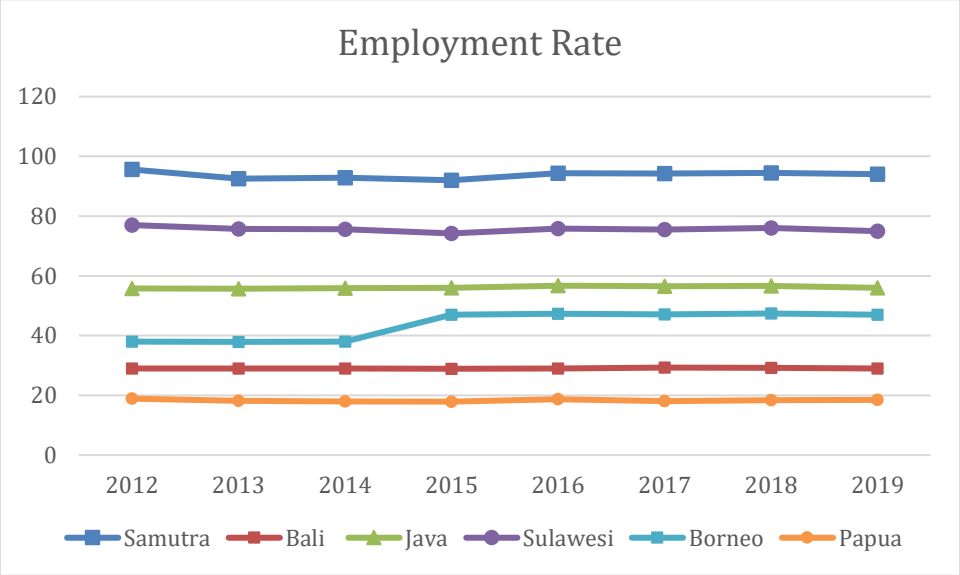

Figure 6 TKK Indonesia

As the region with the highest and most stable workforce participation, Sumatra consistently holds the highest values, averaging around 94%, indicating strong stability in that region. In contrast, Papua shows the lowest values, remaining near 18% throughout the years, with minimal change. Java and Sulawesi maintain mid-range values, with Java around 56% and Sulawesi slightly higher at 75%, both relatively stable. Borneo stands out with a noticeable increase from 38% in 2012 to 47% in 2015, after which it levels off. Bali shows steady, low values around 29% with almost no fluctuation.

4.4 Environmental Index

As a thorough indicator of the sustainability and well-being of ecosystems, the Environmental Quality Index (IKLH) is a crucial framework utilized by Indonesia's Ministry of Environment and Forestry to evaluate environmental health across provinces. It was created to inform environmental policy and track the effects of human activity. The score of each province is determined by certain indicators found in the categories (land, water, air, and ocean), which are weighted to represent their influence on environmental stability and public health.

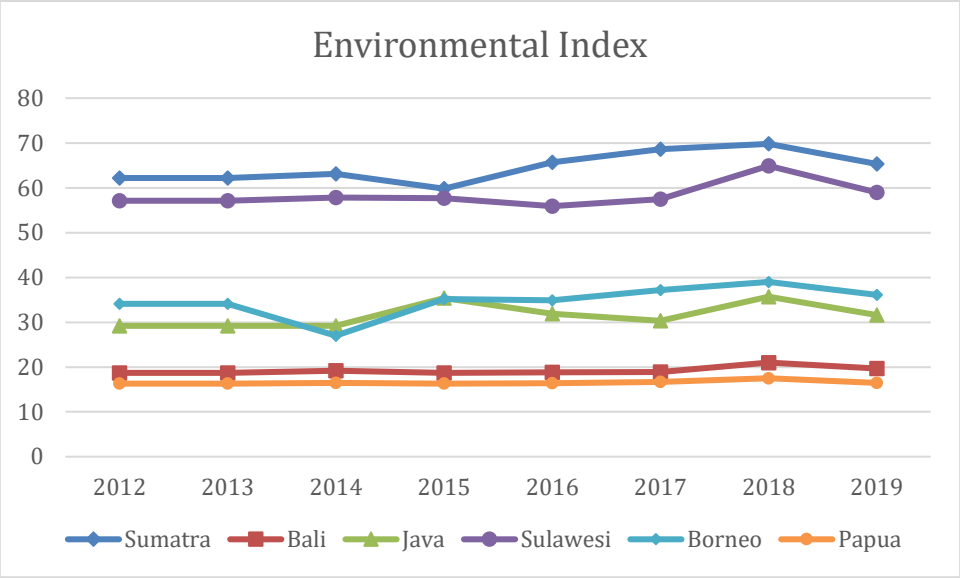

Figure 7 Environmental Index (IKLH) Indonesia

In comparison to other regions, Sumatra shows sustained high performance, reaching index of 69.8 in 2018, indicating efficient environmental management. Sulawesi and Java exhibit notable fluctuations, with Sulawesi hitting 64.9 and Java at 35.7 in 2018. These variations might be a reflection of the effects of industrialization and urbanization, particularly in Java. On the other hand, Papua and Bali typically have lower IKLH index, with Papua staying in the 16.3 to 17.5 range and Bali ranging between 18.7 and 21. While Papua's index might be the result of inadequate environmental infrastructure, Bali's lower score probably reflects the environmental strain caused by tourists. Borneo had the biggest progress over time, rising from 34.1 in 2012 to 39 in 2018, presumably as a result of conservation initiatives despite resource extraction constraints (Gunawan, 1996).

4.5 Empirical Result

The analysis in this study used econometric techniques to examine the relationships between the key variables of interest. To determine the appropriate model specification, I conducted a

diagnostic Hausman test to evaluate the suitability of the fixed effects and random effects models for the panel data estimation. The tests reveal that a fixed effect model was recommended for the panel data estimation. The test results (chi2 = 35.56, p-value < 0.0001) suggest clear evidence of coefficient differences between the fixed and random effect models (shown in the appendix). The results of the causal analysis, as described in equation (1), are reported in Table 3.

Table 3. The Impact of Tourism on Economic Development and the Environment

VARIABLES	(1) Log Poverty	(2) Log Employment in Tourism	(3) Log Employment Rate	(4) Log Environmental Index
Log Number of Local Tourist	0.017	0.369*	0.008**	-0.001
	(0.015)	(0.199)	(0.004)	(0.026)
Log Number of Rooms	-0.001	0.056	0.002	-0.000
	(0.009)	(0.117)	(0.002)	(0.015)
Log Hotel Occupancy	0.013	0.894**	0.010	0.055
	(0.034)	(0.436)	(0.008)	(0.058)
Log Investment	0.006*	0.037	-0.001	-0.002
	(0.003)	(0.039)	(0.001)	(0.005)
Log Population	-0.125	2.263	-0.093**	0.187
	(0.187)	(2.372)	(0.047)	(0.318)
Year = 2013	-0.004	-0.026	-0.015***	-0.003
	(0.012)	(0.151)	(0.003)	(0.021)
Year = 2014	-0.034**	-0.013	-0.014***	0.002
	(0.013)	(0.170)	(0.003)	(0.023)
Year = 2015	-0.030*	-0.212	-0.020***	0.053**
	(0.015)	(0.194)	(0.004)	(0.027)
Year = 2016	-0.066***	-0.021	-0.005	0.032
	(0.018)	(0.226)	(0.004)	(0.031)
Year = 2017	-0.095***		-0.002	0.044
	(0.020)		(0.005)	(0.034)
Year = 2018	-0.135***	3.836***	0.002	0.126***
	(0.022)	(0.275)	(0.005)	(0.037)
Year = 2019	-0.167***	3.532***	-0.003	0.044
	(0.029)	(0.372)	(0.007)	(0.050)
Constant	3.108**	-17.33	5.212***	2.581
	(1.517)	(19.22)	(0.385)	(2.586)
Observations	263	230	260	262
R-squared	0.604	0.932	0.353	0.250
Number of ProvinceID	34	34	34	34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The Table 3 presents the estimated impact of tourism indicators on poverty, employment, and environmental sustainability in Indonesia. The results indicate that the number of local tourists raises tourism-related employment by 0.369% percentage points and an increase in general employment level by 0.008% points. Additionally, the result also shows that hotel occupancy rates have a positive effect on employment in the tourism sector. With a significant coefficient of 0.894, which mean that an increase in hotel occupancy in 1% reflects higher demand for employment in tourism of 0.894%.

On the other hand, the other tourism indicators above which include the total number of local tourists, the number of available rooms and hotel occupancy rate do not show a statistically significant impact on poverty levels or environmental sustainability, measured through the environmental index. This finding implies that while tourism increase employment specifically within the sector, it does not significantly impact poverty or contribute directly to environmental quality improvements.

The impact of tourism on employment in this study could be explained by several factors. This correlation suggests that while tourism positively impacts general employment, the effect is relatively small, showing a weak multiplier effect on broader employment levels. This means that although increased tourism activity generates some additional jobs, the impact does not extend significantly beyond the tourism sector itself. One reason for this weak multiplier effect could be the seasonality of tourism employment; the sector often relies on part-time or seasonal workers, which may reduce its overall impact on full-time employment rates (Q. Ali et al., 2021). In addition to that, the elasticity of employment in tourism shows that an increase in hotel occupancy positively impacts employment within the tourism sector. As hotel capacity expands, more hotel jobs are created, which not only provides direct employment in the hospitality sector but also stimulates job growth in related industries such as transportation, retail, and food services. This creates a multiplier effect as increased demand for goods and services results in further job creation, leading to a broader boost in overall employment levels across the economy (Zhao, 2021).

The result indicates that an increase in tourism does not significantly impact poverty reduction in Indonesia. Despite tourism's potential to generate employment, its benefits may not be

reaching those most in need. The economic advantages of tourism can often bypass impoverished communities, particularly when jobs created within the sector are low-wage, seasonal, and lack stability (Goodwin, 2014). In such cases, tourism employment fails to provide a reliable route out of poverty for vulnerable populations. Additionally, when a local economy lacks diversity, tourism revenues tend to flow to established businesses and wealthier segments, leaving marginalized groups with limited improvements in living standards (Torres & Momsen, 2004). These findings suggest that while tourism can stimulate economic growth, its role in poverty alleviation is complex and may require targeted policies to ensure equitable benefits.

Moreover, the results reveal no statistically significant relationship between increased tourism activity and improvements in Indonesia's environmental index (IKLH). This finding contrasts with the third hypothesis that tourism growth will harm the environment. This lack of a clear negative effect on environmental quality suggests several possible interpretations. First, the aggregated nature of Indonesia's environmental index (IKLH) may mask specific negative or positive impacts on the environment, as it combines multiple indicators of environmental quality. Studies have noted that composite indices can sometimes obscure rather than clarify, especially in cases where sub-indicators move in different directions (Greco et al., 2019). In this context, the IKLH may not fully capture localized environmental challenges linked to tourism, such as increased waste or water usage in certain destinations. Secondly, it might also be due to the difference in geographical and tourism areas across different regions of Indonesia. For example, in some areas like Bali, tourism may promote environmental conservation efforts and funding, while in others, the increase of visitors could place strain on local ecosystems and infrastructure. These mixed effects, as noted by studies on regional environmental impacts, suggest that tourism's environmental consequences may be more complex and context-dependent than previously assumed (A. Ganesh & C. Madhavi, 2013). Therefore, the need for integrated strategies that address the environmental pressures brought about by tourism, ensuring that growth in the sector does not come at the expense of ecosystem health.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

A summary and conclusion of our major findings are given in the following sub-section, followed by some recommendations for future research.

5.1 Summary and Conclusion

In this thesis, the impact of tourism on economic development and environmental sustainability is examined using panel data analysis. To examine the causal relationship between tourism and explanatory variables, the estimations employed a fixed effects model, using the number of rooms available, the hotel occupancy rate, and the number of local tourists as an indicator of tourism.

The descriptive trends reveal significant regional variations in tourism impact across Indonesia. Java, Bali, and Sumatra have the highest levels of tourism infrastructure, with abundant hotel rooms and high occupancy rates, especially during peak travel seasons, resulting in stable, year-round demand for tourism services. In contrast, remote islands experience lower occupancy rates and limited accommodations, reflecting an uneven distribution of tourism activity. Environmentally, regions with intensive tourism, such as Java and Bali, face greater strain, while areas like Sumatra and Borneo show stable or improving environmental scores, likely due to conservation efforts. These trends highlight both the economic benefits and environmental challenges of tourism, indicating the need for region-specific approaches to sustainable development.

The empirical results reveal a positive relationship between tourism activity and employment, both within the tourism sector and in overall employment rates. The findings suggest that fluctuations in tourism, indicated by the number of local tourists and hotel occupancy rates, contribute to the local economy by creating job opportunities. This impact highlights tourism's role as a driver of employment growth. However, the study shows no significant relationship between tourism indicators (local tourists, room availability, and hotel occupancy) and poverty reduction or environmental sustainability in Indonesia. This suggests that while tourism growth can stimulate economic activity in a region, its broader benefits may not automatically extend to all segments of the population, particularly those who are economically disadvantaged. In the case of Indonesia, the growth of the tourism sector may increase jobs opportunities, and enhance infrastructure, but these positive effects may not be equally distributed. Moreover, in terms of environmental impact, the growth in tourism may not automatically result in

widespread environmental degradation, but it could still put pressure on certain ecosystems or local resources.

5.2 Recommendations

Based on the result, two recommendations are given: one for governments concerning policy change and one for further study.

As mentioned in this thesis, tourism impacts employment in the tourism sector, and employment rate. Thus, to maximize the socio-economic benefits of tourism, policymakers should focus on improving the quality and stability of tourism-related jobs. Efforts should be made to transition such as developing infrastructure and tourism programs in less-travelled areas outside the main tourism hubs of Bali and Java. This approach would help distribute economic benefits more evenly across provinces, as well as opening more job opportunities particularly to remote and economically marginalized regions. that offer better wages and career development opportunities.

Secondly, the aggregated nature of the environmental index (IKLH) may not adequately reflect localized environmental challenges tied to tourism. Therefore, it is essential for the government to commission more detailed, province-specific studies on the environmental impact of tourism. These studies should focus on key indicators such as waste generation, water usage, land degradation, and biodiversity loss. This localized research will provide a clearer understanding of how tourism affects specific ecosystems and help to identify targeted solutions for each region.

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Appendices

Linear Regression Fixed Effect

VARIABLES	(1) Poverty	(2) Number of Employment in Tourism	(3) Employment Rate	(4) Environment
local	-4.32e-09	0.00218	5.74e-08	-0.000
	(8.29e-09)	(0.00608)	(1.14e-07)	(0.0000)
number of room available	1.33e-06	5.774**	-9.69e-06	-0.000
	(3.87e-06)	(2.779)	(5.34e-05)	(0.0000)
Hotel occupancy	0.429*	-9,782	-6.905**	0.942
	(0.229)	(164,098)	(3.159)	(1.8109)
Invest	2.27e-05**	3.004	8.27e-05	0.000
	(9.71e-06)	(7.296)	(0.000134)	(0.0001)
pop	-0.000493***	446.6***	-0.00253	-0.001
	(0.000169)	(122.6)	(0.00233)	(0.0013)
Year = 2013	-0.0884	-60,239	-1.340	-0.052
	(0.152)	(104,834)	(2.101)	(1.2044)
Year = 2014	-0.602***	-117,325	-0.421	0.591
	(0.156)	(107,845)	(2.154)	(1.2345)
Year = 2015	-0.340**	-176,018	0.701	3.487***
	(0.160)	(110,614)	(2.203)	(1.2735)
Year = 2016	-0.620***	-256,180**	1.760	2.257*
	(0.171)	(118,884)	(2.358)	(1.3514)
Year = 2017	-1.052***		2.081	3.329**
	(0.173)		(2.385)	(1.3669)
Year = 2018	-1.402***	227,227*	2.358	8.861***
	(0.179)	(125,423)	(2.466)	(1.4135)
Year = 2019	-1.454***	176,870	0.984	3.676**
	(0.199)	(137,457)	(2.741)	(1.5715)
Constant	14.99***	-3.395e+06***	124.3***	67.476***
	(1.260)	(916,178)	(17.36)	(9.9784)
Observations	263	230	263	262
R-squared	0.553	0.424	0.068	0.279
Number of ProvinceID	34	34	34	34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Log Regression

Regression Log-variable Random effect

VARIABLES	(1) Log Poverty	(2) Log Employment in Tourism	(3) Log Employment Rate	(4) Log Environmental Index
Log Local Tourist	0.00750	0.470***	0.00717**	-0.001
	(0.0167)	(0.171)	(0.00353)	(0.0263)
Log Room Available	-0.00713	0.120	-0.000289	-0.000
	(0.00978)	(0.0919)	(0.00197)	(0.0154)
Log Hotel Occupancy	0.0162	0.911**	0.0107	0.055
	(0.0378)	(0.393)	(0.00827)	(0.0588)
Log Investment	0.00492	0.0413	-0.000803	-0.002
	(0.00345)	(0.0377)	(0.000766)	(0.0054)
Log Population	-0.0607	0.0599	-0.00859	0.187
	(0.0624)	(0.249)	(0.00596)	(0.3183)
Year = 2013	-0.00373	-0.00331	-0.0170***	-0.003
	(0.0132)	(0.143)	(0.00298)	(0.0211)
Year = 2014	-0.0348**	0.0385	-0.0169***	0.002
	(0.0135)	(0.145)	(0.00303)	(0.0235)
Year = 2015	-0.0292**	-0.143	-0.0242***	0.053**
	(0.0142)	(0.149)	(0.00309)	(0.0270)
Year = 2016	-0.0636***	0.0648	-0.00583*	0.032
	(0.0151)	(0.156)	(0.00324)	(0.0311)
Year = 2017	-0.0930***		-0.00886***	0.044
	(0.0155)		(0.00327)	(0.0346)
Year = 2018	-0.132***	3.959***	-0.00450	0.126***
	(0.0165)	(0.165)	(0.00345)	(0.0375)
Year = 2019	-0.153***	3.571***	-0.0113**	0.044
	(0.0267)	(0.263)	(0.00550)	(0.0502)
Constant	2.769***	-1.074	4.522***	2.581
	(0.491)	(1.642)	(0.0407)	(2.5862)
Observations	263	230	260	262
R-squared				0.250
Number of ProvinceID	34	34	34	34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1