

Comparing the tourism carbon footprint performance between Taiwan and Japan

Topic:

Author: Ya-yen SUN

Evaluation of the tourism carbon footprint has gained prominent attention in recent years as a means to document the environmental externality of tourism growth. Empirical applications range from the national analysis to regional scales, and from targeting a single industry to individual tourism events. The research scope of each study however varies by whether it includes all travel components into account (type of consumption), addresses direct and secondary effects of emissions (type of economic effects), and measures the impact of domestic tourism, inbound tourism or outbound tourism (type of visitor segment). Such differences make the cross-country comparison difficult, and limit our ability to identify the relative advantages in providing tourism services versus mitigating the greenhouse gas (GHG) emissions.

The balance between tourism's economic benefits and its production of natural waste is especially critical for the Asia Pacific as this region has experienced strong growth rates of international tourist arrivals of an average of 6.1% from 2005 to 2014. This is roughly double the world average, and international arrivals reached a historic high of 263 million in 2014. Among these countries, Taiwan embraces an annual growth rate of 18% while Japan reports a 29% growth rate of international visitors since 2011, rebound strongly from the Tohoku earthquake.

Therefore, purposes of this study are 1) to estimate the total tourism GHG emission in Japan and Taiwan based on a consistent evaluation framework, 2) to compare the tourism carbon efficiency (GHG emission/GDP) between Japan and Taiwan, and 3) to decompose total tourism greenhouse gas (GHG) emission in both countries to reveal the dynamics between economic growth, technology growth an environmental externality.

Methodology

To perform a tourism CF assessment or decomposition analysis, a critical step is to define a clear system boundary for components being addressed. This study will adopt a top-down approach using the consumption scope of the Tourism Satellite Account (TSA) and the calculation approach of the Environmentally Extended Input-Output Model (EEIO) to trace domestic direct, domestic indirect and foreign-sourced carbon emissions. This includes all travel activities supported by national carriers (aviation, marine and land transportation), accommodations, food and beverages, culture, sports and recreation, travel agencies, and retailing services, as defined by the TSA. In terms of decomposition analysis, this study uses structure decomposition analysis (SDA) to measure the progress of technological development gains in energy consumption against the final demand changes. The preferred formula adopted in this framework is the additive decomposition of the absolute indicator method. Four factors that cause the tourism carbon footprint to change are identified as

- 1) Intensity effect: GHG emissions per dollar of final demand (a proxy for technological improvement),
- 2) Leontief effect: domestic (foreign) production structure,
- 3) Structure effect: visitor consumption shares by items, and
- 4) Final demand effect: aggregate visitor spending.

We further use index decomposition analysis (IDA) to provide insights into the modification of tourism eco-efficiency. The additive form of logarithmic mean Divisia index method (LMDI) is

applied. Two causes are identified as:

- 1) Intensity effect: GHG emission per dollar GDP by industry.
- 2) Structure effect: relative contribution of GDP by industry.

Significance

Japan and Taiwan are island countries, sharing several commonalities in tourism development. Both destinations extensively rely on aviation services for international travel where aviation is energy intensive and critical for the tourism emissions. Also, both areas experience a fast tourism growth rate annually. These factors are critical in tourism carbon footprint measurement, and at the same time, demonstrate that tourism energy use at both regions will be expected to increase substantially. This implies the need for each nation to take responsibilities in mitigating the tourism greenhouse emissions. Based on these considerations, this research attempts to establish the baseline information, and further compare the tourism carbon efficiency between Taiwan and Japan using the same evaluation framework. This research aims to identify key factors that determine the tourism carbon footprint as well as to reveal the different comparative advantages inherited within each country. Only by understanding these components will strategies can then be developed to improve our current status quo.