

## COMPLETION REPORT

Estimating and comparing the tourism carbon footprint between Japan and Taiwan

Dr. Ya-Yen Sun

Assistant Professor

Department of Transportation & Communication Management Science

National Cheng Kung University

### **The tourism carbon-efficiency comparison of Taiwan and Japan**

With the emerging of the global value chains (GVCs), imported products and services play a critical role in the quality and quantity of tourism services. What to import and how much to import thus concerns the trade-offs of maintaining economic prosperity, reducing domestic carbon emissions and improving tourism carbon efficiency at destinations. This study presents an environmentally extended input-output model to assess the distribution of tourism economic and environmental effects in the global segments. We propose that a country's carbon competitiveness rests on two perspectives, including 1) the share of GDP and carbon emissions that are obtained in GVCs, and 2) the carbon efficiency performance per dollar GDP at the destination economy. The first indicator, share of GDP and emissions in GVCs, measures the relative economic welfare a destination can secure and the percentage of the global carbon responsibility. The second indicator, on the hand, reflects the opportunity cost in delivering one dollar of tourism GDP, benchmarking the destination against others. Both measurements document collectively a comprehensive environmental responsibility as well as a country's efficiency in its tourism carbon emissions. These two measurements highlight three essential factors of competitiveness - the ability to convert sales to GDP, the ability to produce tourism services based on minimum energy consumption, and the ability to rely on international trade and services to improve the agglomerated domestic tourism carbon efficiency.

In the example of bilateral travel flow between Taiwan and Japan, there was around 1.3 million visitors travelling from Japan to Taiwan, generating a total of US\$ 2,286 million foreign receipts, of which, 29% was for local lodging expense, 22% for international airfare, 17% for shopping expenses, and 11% for dining in 2011. The 2,286 million spending has a total (direct + indirect) economic impact of 4,463 million in sales, and 2,238 million in value added. The tourism carbon footprint is estimated to be 1597 kilotons of CO<sub>2</sub> globally.

In contrast, around 1 million of Taiwan residents have made the visits to Japan, and their trip expenses were around 1,316 million. The largest share of Taiwanese trip expenses goes to international air fare (30%), followed by shopping (26%), lodging (19%) and dining (14%). This market incurred a direct spending of 1,316 million, generating a total effect of 2,851 million in sales and 1,300 million in value added across the global segments. Their tourism carbon footprint is estimated to be 866 kilotons globally.

In the context of bilateral travel flow between Taiwan and Japan, both regions secure 70% of the tourism GDP from the foreign receipts in the global value chains but Japan outsourced 70% of their carbon footprint to foreign production while Taiwan only outsourced about 40%. In addition, the tourism carbon intensity of Japan is

55% more efficient than the performance of Taiwan (0.27 kg CO<sub>2</sub>/GDP vs. 0.60 kg CO<sub>2</sub>/GDP). From these perspectives, Japan demonstrates the comparative advantages over Taiwan in terms of its ability to produce a clean and carbon efficient services in domestic tourism production lines as well as to collaborate with foreign suppliers for energy-intensive products and services.

Note: (1) Print or type the result of your Research **in English with 400~500 words**. As the content of this "COMPLETION REPORT" will be opened to the public on the web-site of Foundation, you are requested to provide Foundation, with the same content in the form of electronic file by e-mail.

(2) If necessary, use an extra sheet.

(3) "COMPLETION REPORT" (and "FINANCIAL REPORT" as well) shall be submitted to Foundation within 3 months after expiration of the duration of your research project.

(4) If you plan to make or made the results of the Research available to the public by any media (such as published academic papers or issues, etc.), please fill in the following format, wherever applicable.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

Journal: Tourism Management

Title: Global Value Chains and the National Tourism Carbon Competitiveness

Date: Plan to submit the manuscript on August 2016

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)