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## 主 論 文 の 要 旨

論文題目

(Title)

An Empirical Study of Island Tourism on Carbon Dioxide Emissions and Economy: The Case of Xiao-Liu-Qiu, Taiwan

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## 論 文 内 容 の 要 旨

In modern society, the concept of sustainability has become an important idea for rapid development. In particular, it has been taken by the governments in the world as the principle while making policy-making on offshore islands. The offshore island development policy of Taiwan is influenced by the international island development consensus and the ethos of sustainability. Under the framework of the offshore island development policy, tourism is taken as a strategy to improve the regional development on offshore islands of Taiwan. This development statement is a starting point and the core of this study.

This study aims to provide insights into the tourism expansion on the environment (carbon dioxide emissions) and the economy of an island tourism destination, Xiao-Liu-Qiu, Taiwan. For this purpose, four main research questions are raised as follows:

- I. What are the global agreement trends and the national policy of island tourism development of Taiwan?
- II. What is the current situation of island tourism development on Xiao-Liu-Qiu?
- III. What is the environmental impact of the tourism expansion of an island tourism destination in terms of energy use and carbon dioxide emissions on Xiao-Liu-Qiu?
- IV. What is the economic impact of tourism on Xiao-Liu-Qiu?

This dissertation is composed of five chapters. Chapter 1 introduced the background, conceptual framework, research objectives and questions. Chapter 5 summarized the findings of this study, gave policy implications, and academic contributions and limitations based on the findings. Chapter 2 through 4 were analytical chapters.

Chapter 2 reviewed the agreement trend of global island development and the policy of island tourism development in Taiwan since the international consensus, and the national policies laid the foundations of the developmental policies and strategies of the offshore islands of Taiwan. Besides, the current developmental outcome of Xiao-Liu-Liu was examined, and the tourists' characteristics and the tourist spending patterns of Xiao-Liu-Qiu were explored as well. This chapter served as the basis for capturing a

tendency of the island development and for obtaining the essential information regarding Xiao-Liu-Qiu for further analyses in Chapter 3 and Chapter 4.

Chapter 3 quantified the energy use and the corresponding carbon dioxide emissions due to tourism expansion, especially focus on the aspects of transportation and accommodation. Both the primary data (i.e. tourists' characteristics) and the secondary data related to environmental factors for tourism on Xiao-Liu-Qiu were employed to respond the research questions. Besides, tourist numbers of Xiao-Liu-Qiu were forecasted. Meanwhile, the mitigation effects of carbon dioxide emissions from land transportation were also explored based on the scenario analysis.

Chapter 4 explored the economic structure of Xiao-Liu-Qiu and its economic relationship with the rest of Taiwan within the context of tourism as a development strategy. A two-region input-output analysis was employed to answer the research questions. The industry linkages of Xiao-Liu-Qiu were analyzed. In addition, the economic effects regarding the creation of production value, employment, and wage were studied. Besides, the leakage of economic effects to the mainland of Taiwan, in particular from tourism, was studied as well by utilizing the data of tourist spending and the length of stay.

Overall speaking, Xiao-Liu-Qiu has become a popular island tourism destination that received more and more tourists in the past years. It not only resulted in high pressure on its socio-culture system due to the larger and larger tourist-resident ratios year by year and a big gap in seasonal variation of tourist arrivals, it also raised the awareness of environmental issue in terms of the tourism carbon dioxide emissions. It is unavoidable that more and more carbon dioxide emissions would be generated year by year on Xiao-Liu-Qiu because the increase of tourist arrivals and most tourism activities require energy use. However, if the mitigation policies and strategies of carbon dioxide emissions can be implemented, the negative environmental effects from tourism would be reduced, but the local economic benefits would increase while the tourist arrivals are growing. In other words, the development of tourism on Xiao-Liu-Qiu would be more sustainable in the long term in terms of the local environment and economy.

The future development of this island depends on the direction of the tourism since tourism has been flourishing on Xiao-Liu-Qiu. As Martín-Cejas and Sánchez (2010) suggested, it is necessary to consider a trade-off between the economic gains and environmental impacts. For example, constructing a new tourism facility may promote the destination business, but the environment may be changed. In particular, when tourist growth and tourism facilities are not well managed.

In terms of the environmental aspect, three possible directions are proposed: One is to implement the eco-friendly alternatives for tourism. At the beginning, the environmental conservation funds for replacing the conventional tourism facilities and services with the green alternatives are suggested. For example, to replace the gasoline vehicles with the electricity powered ones. The other example is to increase the amount of energy generated by renewable energy (e.g. solar power, combined heat and power). This may also enhance the communities' and tourists' environmental awareness and responsibilities. Meanwhile, the

policy for mandatory carbon dioxide emissions reduction should be implemented gradually in order to minimize the environmental impact.

Another direction is to control the tourist numbers. Based on the result of seasonality of the tourist visitation of Liouciou Scenic Area, the gap of tourist numbers between high season and low season on Xiao-Liu-Qiu were big. In other words, the tourist visits are concentrated in certain months. To reduce the seasonal fluctuations in tourist numbers, price control of tourism is suggested to implement. For example, to set up the tourism tax or to increase the price of using tourism facilities and services in the busy time.

The other direction is to extend the length of tourists' stay. The typical tourism type on Xiao-Liu-Qiu is of a short-stay. As Croes (2007) stated, the short length of stay contributes in particular to the increasing number of traffic movements. This causes the higher energy use and carbon dioxide emissions. Based on the finding of the study, it can reduce the carbon dioxide emissions per day per capita from tourism. Therefore, the strategic plans to extend the length of stay by increasing tourism attractions are recommended. For example, holding the green events and festivals. The green events are expected to attract the tourists who have a deeper environmental awareness to Xiao-Liu-Qiu. The benefit of organizing the green events and festivals may enhance the environmental awareness of the other tourists and the locals.

Tourism business is boosting on Xiao-Liu-Qiu. However, as Polo and Valle (2008) suggested, the local economy should find a way to increase local production and be aware of tourism crisis. One example is a traditional cookie called Mahua or fried dough twist (麻花捲) has become a popular local snack food for souvenir in recent years. More and more shops were opened by the locals and each shop has their own recipes. The owners try to create different flavors of Mahua in order to give more options to their customers. Making Mahua has become a unique business on Xiao-Liu-Qiu and it brings the extra economic benefits to the locals due to the tourism expansion. The economic benefits not only include the generation of sales revenue but also the creation of job opportunities, especially for the females who could not find any job on Xiao-Liu-Qiu in previous year. Taking this experience, it is recommended to develop the higher value added products locally. The government can play the role of supporting the creation and innovation in local products. Based on the finding of the economic effects in this study, the government can implement the industry-promotion strategies in the Wholesale & Retail Trade (S8) and Entertainment & Recreation (S14) because these two tourism characteristic industries show the higher intra-regional effects in multiplier. In other words, the more economic profits can be created and remained on Xiao-Liu-Qiu.

Although tourism expansion has enhanced the economy of the island, it is important to note a high economic leakage to the mainland of Taiwan. The local industries on the island should be aware of the high risk that may result from large supply dependence on the rest of

country. When the tourism demand on Xiao-Liu-Qiu increases, the extra imports will be generated to support it. As Reis and Rua (2006) stated, the higher the import dependence is, the lower the industry linkages in a given area will be. In other words, when a region relies on more importation of goods and services than using local production, the more profit leaks to the supplier regions and ends up having a smaller impact on the local economy. A similar idea is described in the study by Gravino (2012). The strategic alliance between industries with a higher output multiplier could be considered in order to generate larger profits from tourism income. Besides, the strategy of local production for local consumption should be implemented, especially the products regarding the industries of the Transportation & Storage (S9) and Accommodation (S10) because they are the industries with the higher effects in economic leakage.

This study contributes a procedure to evaluate both environmental (e.g. carbon dioxide emissions) and economic impacts from tourism. Regarding the environmental aspect, this study took the advantages of the bottom-up approach from the viewpoint of tourist and the top-down approach from the perspective of industry chain. It provides a more comprehensive picture while studying tourism impacts on the island. In terms of the economic aspect, this is the first study to discuss the economic structure within Xiao-Liu-Qiu and between Xiao-Liu-Qiu and the rest of Taiwan, especially focusing on the economic contribution of tourism on Xiao-Liu-Qiu based on a two-region input-output analysis. This study not only focus on the intra-regional effects on Xiao-Liu-Qiu, but also concerning the inter-regional effects between Xiao-Liu-Qiu and the rest of Taiwan.

The limitation of this research is that the results only concern Xiao-Liu-Qiu. It will be interesting to replicate the analyses on other islands. In addition, the research period of this study did not allow to investigate the tourists' characteristics and their choice behaviors for each month. It will represent a more comprehensive insight on this matter if the tourists' characteristics and their choices in terms of the seasonality are investigated. Besides, this study only focused on the major land transportation choice, therefore, another issue requires further comprehensive research exploring the effectiveness of another green tourism facility alternatives. Additionally, due to very limited data accessibility, this study was only able to analyze data for 2006 and 2011. Tourism has become a primary strategy for enriching local development. Therefore, a long-term analysis observing the economy of the island is suggested for further policy making.