A Socio-economic Assessment on Sustainable Eco-tourism Development at Hsiao-Liu-Chiu Island in Taiwan

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Abstract

A balanced development between economic activities and environmental concern are profound in public and emphasized by the government policy. It is especially so with the change in working policy, thus the increase in leisure time for Eco-tourism. All along, fishing industry and marine based tourism have been major industries in Hsiao-Liu-Chiu Island and this study analyses the potential and value of developing a sustainable eco-tourism in Hsiao-Liu-Chiu Island. Questionnaires and on-site surveys are carried out to analyze the different challenges and issues facing the development of sustainable eco-tourism; suggestions are then forwarded in this with survey results that provide a guide for planners and managers. Fundamentally, this study based on Travel Cost Method (TCM) and Contingent Valuation Method (CVM) to evaluate the benefits of developing leisure and recreation at Hsiao-Liu-Chiu by questionnaires and on-site survey.

According to the survey and empirical results, it indicates that, majority of tourist are from southern, aged between 20 to 35, and main occupation is military, academic and student. Most tourist time is one-day, and natural landscape appreciate, touring with family, and visiting friends are the main motivation. The average traffic expense is NT$ 602 dollars, while on-site spending is NT$ 634 dollars. In general, majority of tourist have high expectation for Hsiao-Liu-Chiu recreational development, they are satisfied with the natural landscape and the artificial scenery, and more them half wish come back again. The empirical results indicate that, each tourist's recreation benefits are NT$1,900.63 measured by TCM, and NT$1,700.79 the recreation benefits are measured by CVM. The overall benefits is NT$3.1 hundred million (TCM) and NT$2.78 hundred million (CVM) in 2001. Finally, this study provides suggestion for development, planner and management of leisure and recreational activities at Hsiao-Liu-Chiu Island.

Keywords: Hsiao-Liu-Chiu Island, Leisure and Recreational, TCM, CVM

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I. Introduction

In recent years, the fad of travelling in leisure time is increasing due to the emphasis of balancing mental and physical, and higher life quality in Taiwan, in particular, the access of marine leisure and recreational activities. Existing tourist spots in Taiwan are no longer satisfying the demands of travellers, and people started to turn to off-shore islands and maritime activities for recreation and leisure. This paper studies the ocean-going tourism activities in the Liu-Chiu island. Ecological, cultural, and historic tourism as well as the scenic routes that the travel industry has laid out for the travellers are examined. Through the case study on operation and management of eco-tourism area, key success factors that attribute to the tourism development of the Liu-Chiu are analysed. Questionnaires and on-site surveys are conducted to understand the economic impacts, tourist behaviour and recreational value of Liu-Chiu island. Travel cost method and contingent value method, are applied to evaluate the visitors' willingness-to-pay, economic and recreational benefits to the local economy and visitors are estimated. Policy implication and decision support that balance resource conservation and sustainable development are suggested to determine a well-designed island eco-tourism.

The United Nations, with the popular idea of global environmental conservation, has set the year 2002 as an ecotourism year. There is a vision that ecotourism will become the trend in developing the tourism industry. Among the offshore islands in Taiwan, the island of Liuchiu (or Hsiao Liu Chiu, as it is known sometimes) is located in the Ping-Tong County, which is formed by coral reefs. The water around the island is extremely clear with a profusion of coral reefs, tropical fish, and all different kinds of organisms. There is also an abundance of nature, leisure, and recreational resources, which leaves the environment free of industrial pollution. In addition, the mild temperature of four seasons and the short distances from

Taiwan are both recognized as the best developing ecotourism in Taiwan. In order to attract more travelers to come to visit Hsiao Liuchiu, the government has formally announced it as one of the National Parks. In order to get a well balance between the development of Leisure and Recreation and the maintenance of recreational resources is to keep the recreational activities of great quality. Therefore, the development, arrangement for leisure and recreation resources, and as well as the sustainable uses will be the research issues to face in the current stage for Hsiao Liu Chiu.

With a view of the insufficient research in Taiwan for the leisure and recreation profit analysis for Hsiao Liu Chiu, we can allocate effectively with the finance, manpower, and the leisure and recreational resources to get a balance between the leisure plan and the construction with the environment. This research is to analyze the recreational potential and the problem about the development of Hsiao Liu Chou. When evaluating the recreational economical profit, we are able to offer the best results for developing a sustainable recreational strategy reference. The research is based on tourists about Hsiao Liu Chiu; exploring how to develop leisure and recreational activities and the recreational economical profit related to the consumption for travelers. We use questionnaires and an on-site survey, which collected 382 copies, with the statistics from Fisheries Association of Liu Chiu in accordance with the year. In addition, we also referred to the related periodicals and thesis for our survey, and conducted an assessment on the potential and benefits of developing leisure and recreational activities at Hsiao-Liu-Chiu Island

Ii. Current Status Of Ecotourism Development In Hsiao Liu Chiu

Hsiao-Liu-Chiu Island is the only coral island among Taiwan's fourteen offshore islands. It is also getting popular as an important leisure spot for the public. For these reason, this study examines the potential and benefits of developing leisure and recreational activities at Hsiao-Liu-Chiu by assessing recreational value and extended economic benefits. The Hsiao-Liu-Chiu Islands is an archipelago paradise in the Taiwan Strait. In the olden days, Hsiao-Liu-Chiu was also known by such beautiful and mysterious name as: Pearl on the Ocean. During the 16th and 17th century, foreigners referred to it as "Hsiao-Liu-Chiu." The term was Portuguese, which meant "island of fishermen." Today, it is simply called "Hsiao-Liu-Chiu." The Hsiao-Liu-Chiu is made up of 64 islands of various sizes, and has a total land area of 126.86 square meters. Penghu country is composed of Makong city and five rural townships, namely Hunei, Paisha, Hsiyu, Wangan, and Chimei, and 97 villages and neighborhoods. Penghu county has a population of more than 10,000, one-fourth of which live in Makong city, the seat of the county government. Travel in Penghu is convenient. There are four airlines servicing routes between Taiwan and the offshore islands of Makong, Wangan, and Chimei. On the sea, regular ferries shuttle among islands.

The Hsiao-Liu-Chiu is currently actively developing its tourism industry as it undergoes modernization. The archipelago's marine areas are the most beautiful in Taiwan, comparable to those in Miami and Hawaii, and are suitable for sailing, fishing, and swimming. Penghu island also contains many historical and cultural sites. The peaceful fishing villages, majestic basalt reefs, fresh seafood, inexpensive curios, and hospitable residents are just some of the many tourist attractions on the island. The Hsiao-Liu-Chiu is an emerging ecotourism attraction worthy of further development.

Table1. Population Statistics of Fishermen Household

| Year | total population | Population of fishermen household(person) | | | | | Population (%) |
		Far sea	Offshore	Coastal	Marine culture	Total	
1994	13,161	175	8,506	1,688	--	10,369	18.79
1995	12,886	930	7,416	--	12	8,358	64.86
1996	12,619	1,070	8,440	32	13	9,555	75.72
1997	13,800	1,060	8,371	75	11	9,517	68.96
1998	12,562	1,140	6,995	1,260	15	9,410	74.91
1999	12,472	1,180	6,508	1,280	68	9,036	72.45
2000	12,514	1,017	4,767	3,339	25	9,148	73.10

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Although the population of the first industry is becoming lower than in the past, the third industry's population is slowly increasing. Currently, the leisure and recreation activities offered locally are mainly dependent on the ocean and beach. The activities are mainly; boat tours of the island, submarine tours, snorkeling, or just relaxing on the sandy beaches. According to "the whole recreational plan for Liuchiu Scenic Spot" , the marine activities will be set up as follows:

(1) Recreational ocean activities, eg. fishing in the ocean, etc.
(2) Marine leisure and recreation activities, eg. swimming, playing in the ocean, sand sculpturing, diving, surfing, rowing, snorkeling, etc.

Iii. Analysis Of Survey Results

In order to realize the characteristics of tourist, we conducted on site survey during Feb. 7-17, 2002. A total of 382 tourists are interviewed and the basic results are described as follows:

(1) Basic characters of tourist

Among tourist, male (57.6%) is more than female, their occupations are students, public servants, business and service industry (24.1%, 21.2%, 16.5%, and 12.3%respectively); 56.8% of tourists have college degree and 51.3% aged between 20-29 ; Most tourists come from southern part of Taiwan(67.8%)and average salary 1,000-1.500 US$ monthly (32.2%)_78.3%visit here for leisure only, and their yearly trip is 1.33 with standard 0.73; male consumption(NT$930.82)is higher than female; average traffic time is 2.29 hrs and cost 602.01NT dollars; 76.3%is first trip and 69.4%is one day trip, while 27%is two days trip; average local expense is NT$ 633.66. In addition, 59.2%will come again which show a great potential tourist market(see Table 2)_

Total 2. Characters of Tourist

character result	Mean	Standard deviation
Traffic time(hour)	2.29	1.29
Traffic cost(dollar)	602.01	535.80
Local expenditure(dollar)	633.66	555.72
Will tour again_Yes No	226 52.9%	155 40.8%

WTP(dollar)
          500
          1000
          1500
          2000
          2500
          3000
          3500
          4000
          4500
          5000
	2,260.47	613.35

Source_Survey conducted by this study

About WTP, the average willing to pay is NT$2,260.47 for 2 days in Hsiao-Liu-Chiu Island. In addition, if the recreational conditions are completed, the tourist willing to pay NT $2,262.53.

The main transportation vehicle is motorcycle about 42.4 percent for the tourists. Appreciating nature landscape is main traveling goals for 36.4 percent and family traveling is 28.3 percent. In cause of traveling information_there are 49.5 percent from the introduction of relatives and friends. Among 67.5

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percent tourists think to set up the casino can attract more tourists.(see Table 3)

Table 3. Travel character of tourist

Result Character	Person-time	percent
Traveling goals		
appreciate nature landscape	139	36.4%
join religion activities	1	0.3%
pressure relief	32	8.4%
family union	108	28.3%
business	29	7.6%
academic activities	12	3.1%
visit friend	43	11.3%
marine activities	12	3.1%
else	6	1.6%
Cause of traveling information		
Journalism	51	13.4%
friends' introduction	189	49.5%
video	42	11.0%
network	27	7.1%
travel agent	15	3.9%
else	58	15.2%
Will casino attract more tourists		
No	115	32.5%
Yes	264	69.5%

Source: this study

(2)Analysis of satisfaction

In this study, we use the Likert-type to analyze the recreational satisfaction for tourists. The statistics result presents the most satisfying factors accordingly are uniqueness of natural landscape(53.9%), uniqueness of cultural landscape(11.3%), and crowded conditions of scenic(8.1%)_On the hand, the most unsatisfying factors which are available scenic and quality(27.5%), facilities quality and number of leisure activities(23.3%) and Restaurant conditions(11%)(see Table 4).

Total 4. Rank of environmental stratification

satisfactory			type	unsatisfactory		
Rank.	number	percent		percent	number	rank
	11	2.9%	Hotel facilities and conditions	4.7%	18	
	25	6.5%	road facilities and traffic conditions	7.6%	29	
	8	2.1%	Restaurant conditions	11%	42	3
	20	5.2%	Conditions of environment sanitary	2.1%	8	
	0	0%	sanitary facilities	2.1%	8	
	1	0.3%	Facilities quality and number of leisure activities	23.3%	89	2
	5	1.3%	Protection of local animals and plants and natural landscape	3.4%	13	
1	206	53.9%	Uniqueness of natural landscape	0%	0	
2	43	11.3%	Uniqueness of cultural landscape	4.5%	176	

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3	31	8.1%	Crowded conditions of scenic	0.5%	2	
	7	1.8%	Comfortable level of commute Ferry	5.0%	19	
	0	0%	guide providing	6.3%	24	
	5	1.3%	Available scenic and quality	27.5%	105	1
	20	5.2%	Resident's hospitality to tourist	2.1%	8	

Source: Survey conducted by this study

IV. Model Specification

Recreational resources are non-market assets, and their demand is determined by their ability to satisfy the strongest desire of the consumers. It is generally difficult to assess the economic value of non-market assets through market prices. Since recreation is a form of psychological experience, it cannot be measured through market prices. Nonetheless, the demand function for non-market value can be calculated theoretically through TCM and CVM methods. Questionnaires containing hypothetical questions are used to directly ask the respondents the price they are willing to pay. (Brown and Mendelssohn, 1984; Hanemann, 1984; Cameron, 1992; Hanley and Spash, 1989; Chang, 1986; Lu,1990;Liu, 1990;Chen, 1997; Huang, 1993;Chang, 1995, 1997; Chuang, 1999).

(1). construction of empirical model
a. Travel cost model

To maximize the consumer's utility, we have the consumer's behavior as:

$$Max \quad U(R,E)$$

$$st \quad I = cR + p_E E \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

where I represents tourist's income; R is trip; E is goods consumption; C represents travel cost; P_E is the price of E. Assume the individual preference is normal, through first order condition we have the demand function of tourist as:

$$R = R(c, p_E, I) \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

consumer surplus are then used to measure the leisure benefits

$$CS = \int_{C'}^{C''} R(c, p_E, I)\,dc \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3)$$

here $R(c, p_E, I)$ is individual demand function, C' is the lowest travel cost among tourist while C'' is the highest

b. Contingent valuation model

This model uses the Willingness To Pay (WTP) to reflect the tourist's benefit when change the tour quality (Mitchell_Carson, 1989). We obtain the individual WTP function as follow:

$$WTP = f(X, G) \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4)$$

here, X and G represent trips and social-economic variables respectively. In CVM model, compensated variation is used to measure the leisure benefits. Maximum Likelihood Method (MLE) is applied and results are showed on Table 5 and 6.

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(2) regression results

a. Demand Function for TCM

Table 5 shows, under 1% significant level, traffic cost (TR), monthly income(I), age(AGE), and trips yearly(Q) is negatively related; while SEX and STAY have positive sign. According to results of Table 5, we obtain leisure demand function as:

$$Q = 1.831 + 0.386SEX - 0.252AGE - 0.000008373I + 0.275STAY - 0.0001021TR \quad\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(5)$$

Total 5. Estimated Demand Function for TCM

Parameters	Coefficients	t -Value	P-Value
Constant	1.831	12.701	0.000***
SEX	0.386	4.938	0.000***
AGE	-0.252	-2.771	0.006***
I	-0.000008373	-3.988	0.000***
STAY	0.275	3.401	0.001***
TR	-0.0001021	-1.479	0.140
R^2=0.095	Adj. R^2=0.083	F-Value =7.911	P-Value=0.000***

Note_*** means 1% of significance level.

b. Demand Function for CVM

In table 6, empirical results show under 1% significant level, SEX has positive sign which indicate male are willingness to spend more than female; while education has negative sign which imply they have higher expectation since they are willing to pay more when the facility are expected to improve, see the sign of variables SPEND and WILLQ.

Total 6. Estimated Demand Function for CVM

Parameters	Coefficients	t -Value	P-Value
Constant	2000.327	10.491	0.000***
SEX	197.333	3.045	0.002***
AGE	-189.780	-2.442	0.015**
I	0.002722	1.576	0.116
EDU	-17.646	-1.702	0.09*
STAY	54.816	0.725	0.469
SPEND	0.197	3.101	0.002***
WILLQ	181.602	3.427	0.001***
R^2=0.17	Adj. R^2=0.154	F-Value=10.910	P-Value=0.000***

Note_same as Table 5.

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The estimated function as:

$$WTP = 2000.327 + 197.333SEX - 189.78AGE$$
$$- 0.002722I - 17.646EDU + 54.816STAY$$
$$+ 0.197SPEND + 181.602WILLQ \quad ……..………................(6)$$

(3)Estimated Recreational Benefit

This study estimated the Recreational benefit with demand function of TCM and CVM.

a. TCM

$$Q = 1.39 - 0.0001043TR \quad …………….…………………………………..……………….(7)$$

$$CS = \int_{210}^{2210}(1.39 - 0.0001021TR)dTR \quad …………………………………….………..(8)$$

The recreational benefits is NT_2,527.84 annually, the value divide three to get the annual average visiting frequency is 1.33, the recreational benefits are NT_1,900.63 per tourist.

b. VCM

This study puts the average value of variables in the sampling to WTP regression model. The annual Recreational benefits of the tourist are NT_2,262.05,_the value divide three to get the annual average visiting frequency is 1.33, the recreational benefits are NT_1,700.79 per tourist.

Table 7. Estimated Recreational Benefit   Unit: NT$/person

Estimated Method	TCM	WTP
Recreational benefits	1,900.63	1,700.79

c. Economic benefits of recreational developing

According to the construction of implementation at islet of Peington county, 2002, the second data are the practice tickets of recreational site in Hsiao-Liu-Chiu island. With the number of 163,239 for tourists in 2000 , the economic benefits are about NT$31,025.69 ten thousand for TCM model(see Table8.). In addition, the economic benefits are about NT$27,763.52 ten thousand for CVM model. Making a comprehensive survey, developing recreation not only can provide a recreational place, but also create the tourism for Hsiao-Liu-Chiu.

Table 8 Estimated Leisure Benefits   Unit_NT$10,000/Year

Estimated method	TCM	CVM
Recreational economic benefits	31,025.69	27,763.52

This study is to apply the SWOT method to analyze the Niche for Hsiao-Liu-Chiu in developing the eco-tourism. Internal condition, Strength and Weakness and external condition (Opportunity and Threat) are discussed in Table 9.

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Table9. SWOT analysis of develop recreation for Hsiao-Liu-Chiu

Inter condition	Outer condition
1.Consistent season, unpolluted seawater and clear air 2.Abundance of ocean and nature eco-tourism sites can attract tourists 3.Unique and excellent geographic and scenic coastline 4.The coastal villages have their own unique culture.	1.Off-shore island tourism offers more diversity and has a huge potential market. 2.Government encourages investments in eco-tourism industry to stimulate local economy and increase employment opportunities. 3.Tourist bureau's double foreign tourist program. 4.The authority promotes for the prosperity of the fishing villages and the multi-function use of the fishing harbors.
1.Traffic network and recreational activities are not well designed. 2.Absence of comprehensive laws and regulations for land utilization 3.Insufficient complementary industries in the fishing villages. 4.Aged population and shortage of managerial manpower. 5.Too many administrative agencies involve in recreational development and investments.	1.Diversity of the leisure industry and fierce competition with its substitute industries. 2.Leisure industry to be easily affected by the economic downturn. 3.An influx of tourists may adversely affect the local culture and society, and harm the ecology.

Source: Survey conducted by this study

VI. Conclusion

People in Taiwan have attached increasingly more important to leisure and recreation in recent years. The tourists and travellers in Taiwan have increased in recent years with the increasing leisure time. Although researches on domestic tourism are many, discussions on selecting eco-tourism leisure activities are few. Thus, this paper focuses on the selection and values of the tourists to the multi-function Pisha Harbor. In addition, a balanced development between economic activities and environmental concern are profound in public and emphasized by the government policy. It is especially so with the change in working policy, thus the increase in leisure time for Eco-tourism. All along, fishing industry and marine based tourism have been major industries in Hsiao-Liu-Chiu Island and this study analyzes the potential and value of developing a sustainable eco-tourism in Hsiao-Liu-Chiu Island. Questionnaires and on-site surveys are carried out to analyze the different challenges and issues facing the development of sustainable eco-tourism; suggestions are then forwarded in this with survey results that provide a guide for planners and managers. Results of the non-market price valuation experiments used in the research indicated that although eco-tourists have great expectations on the development of eco-tourism enterprise, they suggest that transportation and lodging issues should first be resolved during development. In addition, most local entrepreneurs and community organizations interested in the tourism market do not have the necessary skill sets and the know-how to operate successful eco-tourism establishments. Other issues to be addressed include environmental and cultural concern, landscape maintenance, garbage disposal, and the quality of the leisure and recreation. Finally, to summarize this study, there is a great potential and recreation value for Hsiao-Liu-Chiu Island to build an eco-tourism enterprise, we recommend a

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community-based entrepreneur to ensure a sustainable and profitable eco-tourism for local residents.

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