African Journal of Agricultural Research Vol. 6(27), pp. 5953-5958, 19 November, 2011
Available online at http://www.academicjournals.org/AJAR
DOI: 10.5897/AJAR11.1576
ISSN 1991-637X ©2011 Academic Journals

Full Length Research Paper

Evaluation of the recreation value of tourist strawberry gardens with organic farming in Dahu: An appreciation of CB combined with TCM

Yawen Chiueh[1] and Wei-Teng Huang[2]

[1]Department of Environmental and Cultural Resources, National HsinChu University of Education,Taiwan.
[2]Miaoli County Fun-Ling Elementary School, Taiwan.

Accepted 2 November, 2011

This study uses the travel cost method and contingent behavior to evaluate the recreation value of tourist strawberry gardens with conventional farming or organic farming in Dahu. The evaluation results show that the recreation value of tourist strawberry gardens in Dahu is 2,457 NT, and the annual recreation value is 2.702 billion NT. Under the assumption of "all the tourist strawberry gardens use organic farming in Dahu", the recreation value of tourist strawberry gardens in Dahu is 3,184 NT, and the annual recreation value is 4.308 billion NT. However, the recreation value of organic farming adds 1.606 billion NT to its value than that of conventional farming.

Key words: Organic farming, tourist strawberry gardens, travel cost method, contingent behavior, recreation value.

INTRODUCTION

Among the leisure farming industries, fruit-picking tourism is among the earliest activities developed and has long been a favorite. Organic farming is good for the environment and has become an increasing consumer concern for health and safety under the environment friendly trend. Strawberry cultivation in Taiwan is highest in Dahu Township of Miaoli Province, which is dubbed from "Strawberry Town". Strawberry season is from every December to the following March, which always attracts an endless stream of visitors. Visiting strawberry farms allows visitors to experience farm life and better understand strawberry ecology; it also increases efficiency of production on fresh strawberry among other benefits. Strawberries have long been viewed as a fruit with relatively large amounts of pesticide residue. If management on strawberry farms can be altered by combining "Organic" and "Fruit Picking Tourism" into "Organic Fruit Picking Tourism", then it would benefit the environment, improve the ecology of strawberry farms, and ensure the health and safety of farmers and consumers. It would overall improve life and production. The relation between consumer awareness and the pro-environment trend can create a niche product. Thus, it is important to estimate the benefits of "Organic Fruit Picking Tourism".

The methods for estimating the beneficial leisure resources earlier on revealed that the preference method or stated preference method have developed into a combined method. However, to evaluate the benefits of environmental improvement, we surveyed the present and future environmental quality variations and tourist frequency to a destination. This type of research has improved the efficiency of value evaluation, and expanded its empirical use. This study combines Travel Cost Method and Contingent Behavior Method to evaluate strawberry farm tourism in "conventional farming" and "organic farming". The changes of tourism benefits are important reference for those involved in tourism farm planning and business strategy. It helps the government plan leisure farming development strategies and promotes related policy on cost benefit analysis. The meaning of Agricultural Resources is human using natural environment to create an artificial ecological system. It is a compound system of natural environment, animals, and society. Strawberry farming is one example,

*Corresponding author. E-mail: yawen@mail.nhcue.edu.tw.

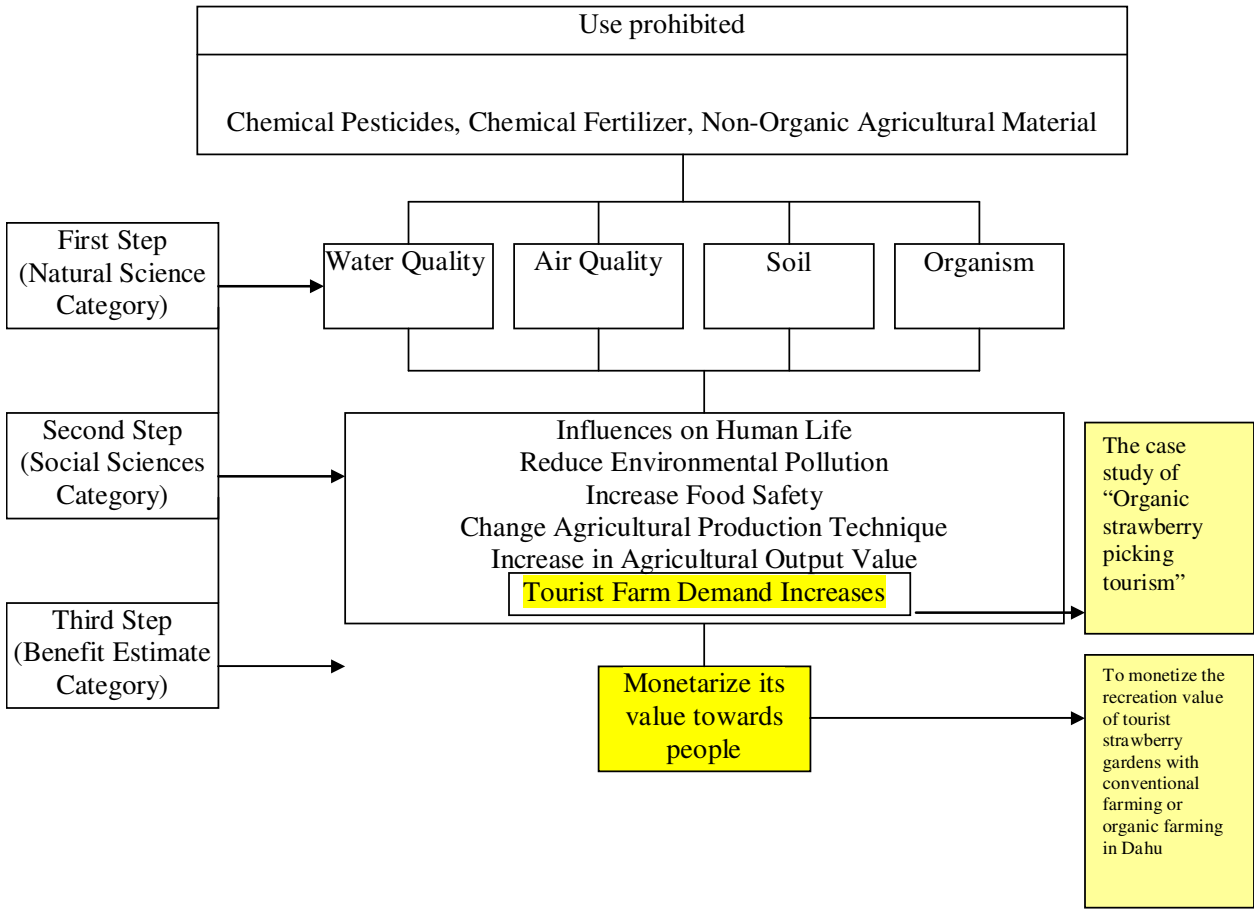

Figure 1. A graph of the benefits brought on by organic leisure farming industry.

it uses a "natural environment" (garden) to cultivate a "product" (strawberry), and provides travelers consumption (tasting and picking strawberries and other leisure activities). Thus, upgrading strawberry tourism farms from conventional farming to organic farming will be beneficial to the society. There are three steps to the process of raising efficiency through Organic Leisure Farming (Figure 1). The first step is to carry out organic farming and reduce pollution, including water, air, soil and biological, physical or chemical change. This is a natural science of research strategy. The second step which involves the effect of environmental improvement on people and society is categorized in Social Science research.

The third step is to monetize the previous two steps by estimating its values to people. This study focuses on the economic benefit of "Organic leisure farming increases travel demands", and its choice case of "Organic strawberry picking tourism". To evaluate the third step, this study uses the travel cost method and contingent behavior to monetize the recreation value of tourist strawberry gardens with conventional farming or organic farming in Dahu, and to evaluate the economic benefit of "Organic strawberry picking tourism". Changing the tourist farms of the Dahu Township in Miaoli from conventional farming to organic farming is a hypothetical question about leisure quality. Freeman (1993) mentions that the "hypothetical question" can influence the demand of travel to a single environmental quality change. Bhat (2003) researched the benefits of the Florida Ocean Protection Department's Coral Reef Improvement Plan, through observing interviewees in present and future implementations of different environment qualities, the same tourist location will experience different amounts of visitors based on the type of change, and combine the two sets of results to the benefits that improved environment quality can bring. Alberini et al. (2005) researched leisure-fishing activities at the Venetian Lagoon. He combined travel cost method and contingent behavior to draw from the changes tourist expenditure and the changes of the rate of catching fish, reflect the changes of real and hypothetical tourist visit rates. Ellingon et al. (2011) combine travel cost method and contingent behavior to evaluate the benefits for tourism of the improvement of Bolivian Ecology in protected areas. Alberini et al. (2005) combines travel cost method and contingent behavior to evaluate the benefits of leisure

fishing in Venice. Anna and Albert (2000) and Alberini (2006) combined TCM and CB to evaluate the benefits of Armenian Culture Relics. Strawberry tourist farms in Dahu Township mostly used conventional farming. This study uses the travel cost method and contingent behavior to evaluate the recreation value of tourist strawberry gardens with conventional farming or organic farming in Dahu.

THEORETICAL MODEL

The model set up by this study is a function for traveler demand for Dahu strawberry farms. It considers the traveler's travel expenses to the leisure destination and other expenses. Seeking utility maximization, consumer behavior can be expressed as:

$$\underset{q}{MAX} \quad U(Y - Mq; q) \quad \text{s.t.} \quad Y = z + Mq \tag{1}$$

If the regular demand function is q_i then $g(x_i, \beta)$ represents, η_i as normal allocation of $N(0, v^2)$; $g(x_i, \beta)$ represents the number of times the traveler decides to travel; and $g(x_i, \beta)$ as the solution for maximization. Through the first order conditions you can obtain demand function for travelers to travel area as

$$q_i = g(x_i, \beta) + \eta_i = g(Y, Tc, ...) \tag{2}$$

According to function (2), suppose traveler demand function for Dahu Strawberry farm as:

$$R_i = f(TCi, Mi, Zi, SEi) \tag{3}$$

Wherein, R_i represents the number of times traveler *i* goes to Dahu; TC *i* represents the amount it costs traveler *i* to get to Dahu Strawberry farms; M *i* represents the total after tax income of traveler *i*; Z *i* represents cognitive attitude of traveler *i* towards organic strawberry farming; and SE *i* represents socio-economic background of traveler *i*.

Empirical model

When choosing the dependent variable for travel costs, most researches around the world choose the number of trips, number of days of travel, and the amount of time of travel. On the contrary, most researches in Taiwan use the number of trips, but do not use the number of days of travel. It is probably because Taiwan's land area is small, and because the travel demand is within Taiwan. According to Taiwan Tourism Bureau, the "2004 Tourism Investigation Report" shows the following Taiwanese travel habits in 2004; the average number of travel for each person is 5.7 times, 62% went and returned in the same day, and the average stay time was only 1.7 days. Average number of travel locations was 1.46, thus number of travels is the best choice for the dependent variable. In calculating the cost of travel, time cost was restricted to travel time; although, the study did not include "time at the location". And 33% wage rate was the standard of calculation. However, this study defines the calculation of travel costs as follows:

Travel cost to the strawberry farm = Gas expense + Opportunity cost of travel time (4)

The calculation of the gas expense and opportunity cost of travel time is obtained from many different Taiwanese research surveys. Most travelers use their personal car as the mode of transportation, so the gas price consumed by personal car is the cost of travel[1]. Heyse (1999) believes that "the travel distance is an important piece of information about the cost of travel", and proposes to adopt GIS to calculate the distance to avoid any errors caused by interviewees' "narrative data". This study used Maction Technologies "electronic navigation software" and used the center of each interviewee's administrative area (Township, City, and District Office) as the starting point for the software, the location of the Strawberry Farm where the interviewee took the questionnaire as the destination point. The "optimal path planning model" is set up to calculate the total distance of the trip. The formula for gas price is the following:

Gas price = [(the distance from starting point to Dahu) × 2] × 2.53 (cost per km) / (the number of travelers) (5)

In regards to the calculation of travel time, this study adopts "a blank in the questionnaire where the interviewee fills out the time that was spent on traveling" to respect the individual differences of interviewees. To reduce the number of errors on the interviewee's part, the questionnaire asks them to fill out "the time of departure from their place of residence and the time of arrival at Dahu", and not in the regular model of _ hours _ minutes. The calculation formula for opportunity cost of travel time is as follows:

"Personal information" about travel time expense = travel time (h) × individual hourly wage × wage ratio (33%) (6)

This study uses on-site samples, the unique characteristics regarding these types of samples are "Truncation" and "Endogenous Stratification Problem"; when in accordance with variable as discontinuous and non negative whole number, the frequently used continuous distribution model no longer applies. Thus, Shrestha et al. (2002) proposes using Poisson allocation model to solve count data. Poisson allocation model is the following:

$$\text{Prob}(Yij \mid X) = \frac{e^{-\lambda} \lambda_{ij}^{y_{ij}}}{Y_{IJ}!} \tag{7}$$

Suppose the dependent variable *Yij* shows Poisson allocation,

Wherein; *Yij* : 0,1,2…∞ ; X: Independent Variable Vector

The expectation value and mean variance of Poisson allocation are equal to its parameter λ, so assessment is travel demand function; whereas, β is the return coefficient vector of the independent variable. According to Bockstael et al. (1987), interviewee *i* travel

[1]According to the Ministry of Transportation Census and Statistics Department 2004 "Survey Report on the Use of Small Passenger Cars" : personal cars on the average road average about 8.9 kilometers for every liter of gas. On the highway or expressway they average 10.9 kilometers per liter. For the convenience of calculation, and to conform with reality: from the starting point to Dahu, most people drove on the highway or expressway, so "10.5 kilometers per liter" is used for standard calculation, as well as the average price of gas at the time of the questionnaire (2006 January to April). According to Chinese Petroleum Company gas price information, the price for a liter of unleaded 95 was 26.6NT$ from 2006 January to April, therefore the calculated average cost of one kilometer as 2.53NT$.

benefit can be displayed as:

$$CS_i = \int e^{\beta_0+\beta_1 C} dc = \left[\frac{e^{\beta_0+\beta_1 C}}{\beta_1} \right]_{c=c_0}^{c\to\infty} = -\frac{X_i}{\beta_i} \quad (8)$$

where CS_i is the travel benefit of interviewee *i*, C is the travel expense, Travel number X obeys index of demand function $X = e^{\beta 0+\beta 1C}$; β_0 is constant term; β_1 as travel cost estimated coefficient, and C_0 is the current travel expense. According to Formula (8), the "current situation" of Dahu Strawberry tour farms and the "hypothetical benefit" of organic farming in Dahu strawberry farms formula is as follows in Formulas (9) to (12):

The "current situation" of Dahu tourist strawberry farms benefits calculation formula:

Per person CS value = - (The number of trips this recent year / travel expense coefficient) (9)

Entire year CS value = per person CS Value × 1.1 million visitors (10)

Benefit of hypothetical renovation to organic strawberry farming:

Per person CS value= - (Number of trips under the hypothetical plan /travel expense coefficient) (11)

Entire year CS value = per person CS value × (Number of trips under hypothetical plan / predicted number of trips in the next year) × 1.1 million tourists × (Number of trips under the hypothetical plan / number of trips in the recent year) (12)

This study combines TCM and CB empirical models to set up the current situation and hypothetical plans.

The current situation model of Dahu strawberry tour farm is given as follows:

$$R_i = f(TC, INC, STB, FRE, CHO, TEG, SEX, EDU) \quad (13)$$

where R_i is the number of times the interviewee has traveled in the last year; TC is the interviewee's travel expense; INC is the interviewee's monthly income; STB is the strawberry farm which the interviewees attended; FRE is the amount of organic products the interviewee consumed; CHO is the reason why the interviewee decided to visit strawberry farm; TEG is the number of people traveling with the interviewee; SEX is the interviewee's sex; and EDU is the number of years the interviewee has received education.

Research area and survey sampling

Dahu Township is located at the southeastern tip of Miaoli County, Taiwan. The surface area is about 90 km^2. The Dahu Township Administrative District is divided into 12 townships, with a total of 5050 households of which 46% are agricultural (2315 households), and the total population is 16431 people (Dahu household registration office, 12/2006). 56% of the population (9432 people) is involved in agriculture (Dahu Township Agriculture Division). Fuxing, Dongxing, Daliao and Yihe are the four villages that have the largest strawberry growing area, and they are the biggest strawberry farm tourism areas in Dahu Township. According to Dahu's Farmers Association Statistics, they received about 3,000 visitors on weekdays and about 25,000 visitors on the weekends. According to this calculation, about 1.1 million people visit Dahu during the strawberry season, which takes up to 120 days in total.

We performed surveys in Dahu's strawberry tourist farms and combined travel cost method and contingent behavior to evaluate the benefits of conventional farming or organic farming for Dahu's strawberry tourism.

The questionnaire of this study includes "travel behavior", "hypothetical scenario" and "individual background" sections. Survey targets are those who were physically present at the strawberry farms and are 18 years or older, and we collected information from on spot interviewees. According to Scheaffer et al. (1996) sampling formula was according to Formula (14):

$$n \geq N/(N-1)\delta^2 + 1 \quad (14)$$

n as the number of specimens, N as the matrix size, and δ for sampling inaccuracy. For 1.1 million people visits per year calculation and to have a < 5.5% sampling error, we need to extract at least 332 samples. The questionnaires were conducted from 2006/05/01 to 2007/04/20 and 2007/01/01 to 2007/03/10 during Dahu strawberry season. A total of 450 questionnaires were handed out, received 72 from interviewees at organic farms, and 345 from normal farms, for a total of 417, with a retrieval rate of 92.7%. 81 invalid questionnaires were removed, so altogether there are a total of 336 questionnaires used. The reason that the return questionnaires received from organic farms were lesser than the conventional farms is that there were few organic farms in Dahu. We hope the study could evaluate the different value between the hypothetical scenario that the Dahu Township becomes an organic farming township or the current situation that most of the farms were conventional farms. We used contingent behavior for the hypothetical scenario that all the tourist strawberry gardens use organic farming in Dahu to evaluate the recreation value of organic tourist strawberry gardens in Dahu. We hope that by using this method, we could evaluate the added recreation value of organic farming Township and conventional farming Township.

EMPIRICAL RESULTS

This study combines travel cost method and contingent behavior to set up Dahu strawberry tourist farm demand function. Table 1 shown the variable definition and the expected value. Empirical model uses Count Data Poisson Regression Model, and MLE to carry out estimation. However, the estimated results are shown in Table 2. The reasons that interviewees went to Dahu Strawberry farms were the following: travel expense (TC), individual income (INCOME), years of education (EDU), choice reason (CHO) and frequency of consuming organic (FRE) and other variables. Variable coefficient symbols generally conform to expectation. The relation between every regression coefficient symbol and the positive and negative sign is about the same. TC coefficient value is negative and t value is the most significant. This shows that the higher the expense to travel to Dahu, the less times the interviewee will go. INCOME coefficient value is positive and t value is most significant, it means the higher your income, the higher your ability to participate in travel activities, so the travel amount to Dahu is higher. Gender (SEX) coefficient value is positive. The number of males traveling to Dahu was more than females. It is possible that males enjoy outdoor activities more.

Table 1. Variable definition and expected value.

Variable name	Variable code	Definition	Expected value	Explanation
Number of Trips	TRIP	Number of times visited in the last year	N/A	Dependent Variable
Travel Expense	TC	Includes opportunity cost of travel, gas expense	-	The more expensive the cost of travel to Dahu, the fewer times the interviewee visits
Income	INC	Individual Monthly Income	+	Higher income, more times to Dahu
Type of strawberry farm	STB	Dummy Variable Normal=1, Organic=0	+	Those going to Normal Strawberry farms, go to Dahu more times
Diet Frequency	FRE	1-4; the higher the number, more times they eat	-	The more organic food they consume, the less they go to Dahu
Reason for Going	CHO	Motive for going to Dahu	+	More motive for going to Dahu means more trips they make to Dahu
Number of Companions	TEG	The number of people accompanying the interviewee	-	More companions means less trips to Dahu
Gender	SEX	Dummy Variable Male=1Female=0	+	Male interest in outdoor activities is higher, so they go more times to Dahu
Years of Education	EDU	Years of education the interviewee has received	-	More years of education means less trips to Dahu

Source: This study.

Table 2. Empirical results.

Model coeff. variable name	Current situation	Hypothetical renovation to organic strawberry farming
intercept	0.6010 (1.336)*	0.9087(2.483)**
STB	0.2530(1.495)*	0.2233(1.664)
FRE	0.1222(1.851)	0.5305E-01(0.995)
CHO	0.3484E-02(0.067)	0.6539E-01(1.561)
TEG	-0.2547E-01(-0.881)	-0.8244E-01(-3.544)***
SEX	0.6607E-01(0.761)	0.2625E-01(0.376)
EDU	-0.2874E-01(-1.468)*	-0.8235E-02(-0.0590
INCOME	0.6070E-05(2.265)**	0.1004E-04(4.807)***
TC	-0.6999E-03(-3.517)***	-0.8418E-03(-5.253)***
Log likelihood function	-480.3233	-650.9211
Restricted log likelihood	-491.0217	-675.3244
Chi-squared	21.39684***	48.80647***

Table 2. Contd.

Degrees of freedom	8	8
Significance level	0.6165E-02	0.0000
Samples people	336	336

Source: Questionnaire survey of this study.

Years of education (EDU) coefficient value was negative. The higher their education, the less number of trips they made.

Perhaps, it is because the higher their education level, the more hours of work they have, and the fewer the opportunities they have to travel. This study aimed at estimating the benefits of Dahu Tourist Strawberry Farms. The empirical results showed that the amount spent per person by the Dahu strawberry farm interviewees was about NT$2457; with 1.1 million travelers per year, Dahu strawberry farms earn approximately NT$2.702 billion annually. Under the hypothetical reform to organic farming plan, per person CS adds NT$3184, and the annual earnings increased to NT$4.308 billion, thus carrying out organic farming will increase profits by NT$1.606 billion, which is NT$500 million more than the production value of strawberries.

Conclusions

Dahu strawberry tourist farms have already become economically important to the leisure agricultural sector, and the organic strawberry techniques and benefits are empirically better than those of conventional farming. The reason why the questionnaires received from organic farms were five times smaller than those of the conventional farms was that there were few organic farms in Dahu. As such, the Agricultural Department should promote organic farming, and plan a development project including organic techniques, ecology, environment, culture and leisure. Thus, we recommend to the government's ministry to develop further agricultural plans in the future with organic requirements, so as to improve Taiwan's agriculture. By estimating the benefits of the tourism sector, we find that combined travel expense and contingent behavior, estimated benefits to leisure farming, and location characteristics and benefits to changing leisure all conform to this research.

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