

Estimating the Value of Forestry Eco-tourism Products by Contingent Valuation Method

ESTIMATION DE VALEUR DES PRODUITS ÉCO-TOURISTIQUES SYLVICOLS PAR LA MÉTHODE D'ÉVALUATION CONTINGENTE

Chen Hong¹ Ma Guoyong²

Abstract: CVM is a popular method of value evaluation in the world now, which functions on the public goods with non-use value such as environmental products etc. This paper aims to research the availability of CVM in Chinese forestry eco-tourism products value evaluation. We start from the advantages and limitation of CVM, hypothesize the survey of WTP(willing to pay) in Yi Chun forestry eco-tourism area, which is performed in Harbin., and design the survey method, content and proceeding of questionnaire and the attentive problems when applying. After exploring the limitation of estimating Chinese forestry eco-tourism products in practice by CVM, we draw the conclusion that CVM can be widely spread in Chinese forestry eco-tourism products value evaluation.

Key words: CVM, Consumer surplus, Forestry eco-tourism products value, WTP

Résumé: La MEC est une méthode populaire d'évaluation de la valeur dans le monde d'aujourd'hui, qui s'applique aux biens publiques à valeur de non-usage tels que les produits environnementaux, etc. L'article présent vise à étudier la faisabilité de la MEC dans l'évaluation de valeur des produits éco-touristiques sylvicols de Chine. Commencant par les avantages et les limites de la MEC, nous supposons l'enquête de WTP(willing to pay) dans la zone éco-touristique forestière Yi Chun accomplie au Harbin, élaborons la méthode d'enquête, les questions du questionnaire et la procédure, et prévoyons les problèmes potentiels dans l'application. Après l'étude des restrictions de l'évaluation des produits éco-touristiques sylvicols chinois par la MEC, nous arrivons à la conclusion que la MEC peut être largement appliquée dans l'évaluation de valeur des produits éco-touristiques sylvicols en Chine.

Mots-Clés: MEC, surplus de consommation, valeur des produits éco-touristiques sylvicols, WTP

1. THEORETICAL BASIS OF FORESTRY ECO-TOURISM PRODUCTS VALUE EVALUATION

1.1 Theoretical analysis of forestry eco-tourism products value evaluation

The forestry eco-tourism products value evaluation bases on the welfare economics and environmental economics, which also consider the utility theory and consumer surplus theory as direct theoretical basis. Welfare economist conveyed that WTP was a complete description of the value of some products, namely it is the amount of monetary which people are willing to pay for a product, an opportunity, or amenity.

According to the utility theory, the value of forestry eco-tourism products is decided by its marginal utility, formula as follow:

forestry eco-tourism products value = marginal utility- actual price

According to the consumer surplus theory, the economic value of forestry eco-tourism products can be expressed by the consumer surplus, formula as follow:

consumer surplus = consumer's WTP- consumer's actual payment

Therefore, the key of forestry eco-tourism products value evaluation is to decide the relation of consumers' WTP, utility function of forestry eco-tourism products and actual payment.

¹ College of Economics and Management, Northeast Forestry University, China.

² College of Economics and Management, Northeast Forestry University, China.

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1.2 Distinction analysis of forestry eco-tourism products value

Forestry eco-tourism products distinguish from the other tourism products. They differ in aim, beneficiary, management and effect. Forestry eco-tourism pays more attention to ecological protection, not to max profit. And beneficiaries include not only tourists and managers, but also local residents and economy and future residents and economy. The core of it is environmental protection, which results in satisfying tourists' demand with choices. Another, instead of destroying the environment in traditional tourism, forestry eco-tourism associates improving the ecology with developing forestry eco-tourism. As a result, it owns both use value and non-use value. Use value, called economic value, is a part which people pay to enjoy forestry eco-tourism products such as going into the nature, exploring, entertaining and so on. While non-use value, called ecological value, is the part which people can't get from forestry eco-tourism at present.

We have many BC (benefit-cost) methods like opportunity cost method, TCM(travel cost method) to estimate the value of common tourism products. But to forestry eco-tourism products with both use value and non-use value, it's necessary to draft a scientific evaluation method. To make consumers and producers realize that the success of forestry eco-tourism depends on protecting forestry resource, the consumption and sale points of forestry eco-tourism products are equal to the focus of protecting forestry ecology and environment. It is because of the ecological diversity, tourists get sights of peculiar creature and community structure in forestry ecology system, breathe fresh air, drink clean water, what's more, it's so important a factor for tourism products to enlarge the market by attracting thousands of tourists. Meanwhile, it's possible to make consumers understand the proceeding and circulation of substance, energy and information in forestry ecology system, realize various functions of the forest, for instance, on protecting creature, purifying water, cleaning air, optimizing regional environment etc. and cause them to amply their WTP for forestry eco-tourism products.

2. CVM EVALUATION

2.1 Introduction

CVM, short for contingent valuation method, is a popular method of value evaluation in the world now, which functions on the public goods with non-use value such as environmental products etc. This method is performed to directly observe economic actions from respondents in assumed market by questionnaire. Also it can break out the limitation that public goods can't be traded in common market, make researchers master the preference for public goods from people by varying

assumed conditions and estimate the value of public goods.

The feature of CVM is able to study the WTP to avoid reducing utility and WAT if utility runs down in different assumed conditions.

2.2 Proceeding

2.2.1 Designing questionnaire and establishing contingent market. It's necessary to introduce relative environment changes, so as that respondents can completely receive relative environment information.

2.2.2 Obtaining bid. This can be performed by face-to-face, telephone and mail ways. In questionnaire survey, respondents are asked to give WTP or indirect CV (compensating value), in a certain environment change. And we often get data by the three following ways:

- 1st. Bidding game approach
- 2nd. Trade-off game approach
- 3rd. Costless choice approach

2.2.3 Calculating mean WTP or mean CV. Economic and statistic methods can be used to get respondents' mean WTP.

2.2.4 Estimating the bid curve. The aim is to understand decisive factors in WTP or CV and measure the availability of result by CVM.

2.2.5 Adding all data, analyzing and getting them in order, in order to get total value of relative products or service, including use value and non-use value.

3. CVM DESIGN OF FORESTRY ECO-TOURISM PRODUCTS VALUE EVALUATION IN YI CHUN AREA

3.1 Research scope and survey method

We're supposed to choose provincial city Harbin close to Yi Chun as the research scope, whose economic development and income per person are both located at domestic average level, and investigate residents' WTP for Yi Chun forestry eco-tourism products. We choose various industrial residents as sample at random and collect data by mail and face-to-face.

3.2 Questionnaire design

3.2.1 Content design

The questionnaire of CVM usually consists of three parts:

- 1st. Explaining the information of estimated

products and its background in detail.

2nd. Asking respondents the WTP for estimated products.

3rd. Surveying respondents' social and economic characters.

And at the last part of questionnaire we ask respondents to answer how they understand questions so as to assess the effectiveness of the designed questionnaire. Accordingly, the content should be comprised of the following points:

1st. respondents' common social and economic situation, including age, sex, career, income per year, education, tourism experience etc.

2nd. Introduction of the current situation and prospect of Yi Chun forestry eco-tourism in detail, including all kinds of pictures and videos.

3rd. The WTP, which contains two parts: one is the WTA (willing to accept) for given price and the other is WTP or CV assumed freely. Finally, respondents are asked whether to understand this questionnaire and have any other question.

3.2.2 Survey way design

In accordance with the research achievements from abroad, there are four different CVM survey methods:

1st. Bidding freely. The "estimated product" is supposed to exist at first and given a certain supply level. Then the consumers are asked to give the WTP to get products and CV to give it up.

2nd. "Want or forego" experimental method. It divides respondents into several sub-samples and raises the same questions to them at different prices, then asks them to make a choice.

3rd. Trading method. Consumers are faced with two choices: one is some amount of money(or something worth some amount of money); the other is the "estimated product" in a certain assumed condition. Consumers are required to choose one between them.

4th. Delph method. Respondents should be the persons with some relative knowledge.

According to the characters of forestry eco-tourism products, our study can be implemented by three methods above.

1st. We choose those respondents with different careers, income, education and sexes. Among them there are 70% respondents having experienced eco-tourism, others do not, to assure the prevalence in sample and reduce the error.

2nd. We associate the survey result and opinions

from experts, decide admission and tax as payment way, give the price range respectively, and ask each respondent either of the two prices at random.

3rd. We finally get the WTP and CV of Yi Chun forestry eco-tourism products from respondents' free answer.

3.2.3 Questionnaire proceeding design

Look at Fig.1.

3.3 Survey implement design

Considering current development of Yi Chun forestry eco-tourism and our practical capacity, we plan to employ trained investigators to finish the survey by mail and face-to-face in turn in four seasons. we intend to train university students as professional investigators and ask them to make sure of the quality and quantity of returned questionnaire.

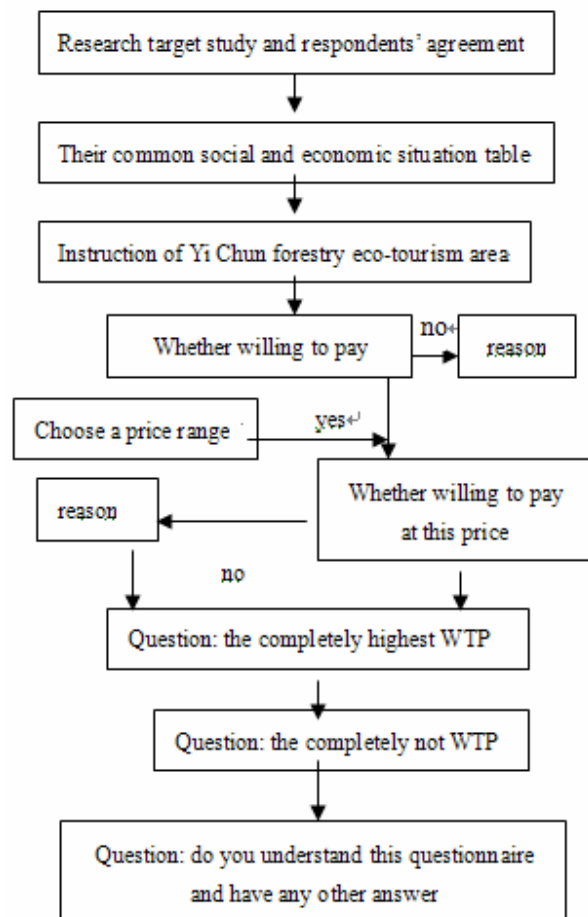


Fig.1 CVM questionnaire proceeding design of Yi Chun forestry eco-tourism value evaluation

3.4 Survey result analysis

3.4.1 survey data analysis

According to above data ,we begin to estimate use value and non-use value of forestry eco-tourism products. Firstly, we assume a indirect utility function:

$$V_i (C_i \cdot I_i \cdot B_i) \quad (i=1,2,\dots,n)$$

Here, v is the indirect utility, which is assumed to equal the utility u; I is income, B is an offer (admission fee or tax), C is other socio-economic characteristics affecting individual preference, and i is individual. Under the following condition we study consumers' utility.(Hanemann, 1984):

$$V (1 \cdot I-B ; C) +e_1 \geq V (0 \cdot Y ; C) +e_0$$

e_1 and e_0 are the identically, independently distributed random variables with zero means.

The probability (Pi) that the consumer will accept an offer (B) can be expressed as the following

probability distribution function model (Pindyck & Rubinfeld, 1981; Hanemann,1989):

$$P_i = F_g (\Delta V) = 1 / (1 + \exp(-\Delta V)) = 1 / (1 + \exp(a + bI - cB + dC))$$

where F_g is the cumulative distribution function of a standard logistic variate and some of socio-economic variables are included in this research. a is constant and b, c and d are coefficients to be estimated where $b > 0, c \leq 0, d > 0$ or $d < 0$ are expected.

Generally speaking, there are three method which are used to compute the value of WTP and change it into contingent valuation: mean WTP, overall mean WTP and truncated mean WTP. Among them , the truncated mean WTP method is the most suitable one for our model. On the basis of linear-function, we treat all variable as constant except B, use the maximum likelihood (ML) estimation method for estimating, calculate by numerical integration, and attain to work out the contingent valuation namely E (WTP) ,ranging from 0 to Maximum Bid (b) as follows:

$$\max B \quad \max B$$

$$E_i (WTP) = \int_0^B F_{\pi} (\Delta V) dB = \int_0^B (a + cB) dB$$

3.4.2 Simple geometric figure analysis

Take a consumer facing two consumption choices as an example. One choice stands for the total income (M), which can be used for all products and service traded in market. The other is to enjoy forestry eco-tourism products, shown with E. Because of their distinct characters, forestry eco-tourism products can't be traded through a market. Assuming a reasonable consumer's preference ,we show it by a non-difference curve in Fig.2:

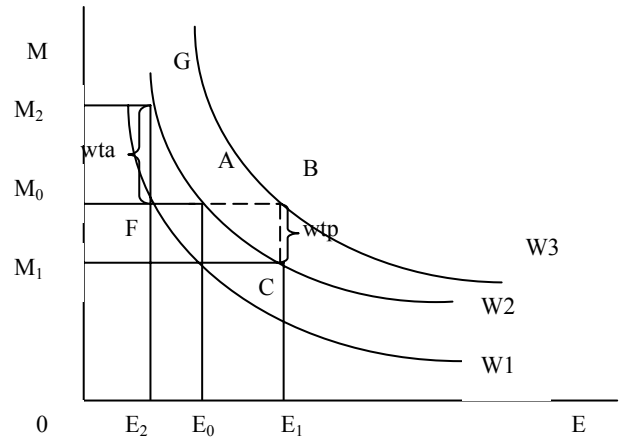


Fig.2 Monetary estimation of eco-tourism environmental quality

$W_1 \cdot W_2 \cdot W_3$ stand for three kinds of utility level. On each curve, different point is the combination of different monetary income and corresponding forestry eco-tourism environmental quality (E), but they represent the same level. Supposing someone's initial welfare is at A. It means that he can have monetary income M_0 and enjoy forestry eco-tourism environmental quality E_0 . The total utility is W_2 . Comparing with A, B located at the same monetary income level, but has better forestry eco-tourism environmental quality E_1 . Apparently, B represents higher utility level W_3 than A.

When environmental quality changes from E_0 to E_1 , how much are respondents willing to pay? From the figure we can see, as a reasonable consumer, he is willing to pay $M_0 - M_1$. At the moment, his welfare is at C, which shows that he has income of M_1 and enjoys forestry eco-tourism environmental quality of W_1 . Both A and C lie in the same non-difference curve W_2 , thus they represent similar utility level W_2 . It means that although the consumer pays $M_0 - M_1$ to improve forestry eco-tourism environmental quality $E_1 - E_0$, his welfare level is never changed. Therefore, we say that $M_0 - M_1$ is the consumer's WTP for consuming forestry eco-tourism environmental product $E_1 - E_0$, which expresses the consumer's monetary evaluation for forestry eco-tourism environmental product value practically. Similarly, we can analyze when forestry eco-tourism environmental quality degrades, how much the consumer is willing to accept is $M_2 - M_0$. Meanwhile, his welfare is at G, distinctly, G represents higher monetary income but worse forestry eco-tourism environmental quality than A. And as both points are on the same non-difference curve, it indicates the consumer's welfare is never changed. Without $M_2 - M_0$ monetary income as compensation, consumer's welfare will go down from A to F, namely from W_2 to W_1 . As a result, actually $M_2 - M_0$ is the lowest WTA that consumer is willing to accept to reduce environmental cost.

4. EVALUATION OF CHINESE FORESTRY ECO-TOURISM PRODUCTS BY CVM

CVM is still rarely taken into application in Chinese forestry eco-tourism product value evaluation. When this method is used in developing countries, we may encounter various problems, which are caused by some factors such as residents income and attitude towards environment. For instance, respondents are suspected or feel it difficult to understand the supposed method. As a result, common WTP is a little lower.

In China, most respondents regard environmental value cost of forestry eco-tourism product as public goods which can be picked up or paid by the government, not by the tourists. This may cause that the WTP respondents expressed can't reflect the real estimation of social welfare through developing forestry eco-tourism and improving ecology and environment. On the other hand, because the majority of Harbin residents haven't experienced this WTP survey before,

it is difficult for them to reveal their preference of environmental value by money. So in the assumed market, respondents have much difficulty in exactly calculating how much they are willing to pay for forestry eco-tourism products value. Though our study uses the mode of freely answering to the questions in questionnaire design and proceeding, which erases the errors from the beginning, to some degree, it is still different from the way by which the public usually make price choices and decisions in daily consumption. And it is more probable to produce errors. We also need to explore in practice which way of asking is more suitable in Chinese forestry eco-tourism value evaluation. In spite of the limitation in contingent valuation method when used in developing countries, besides CVM has its own advantages, the survey result also plays an important role in the government decision-making. Discovering the WTP for forestry eco-tourism products can be the significant basis for the government to make environmental policy and develop forestry eco-tourism.

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THE AUTHORS

Chen Hong, Vice-professor, The candidate for PH.D degree. College of Economics and Management, Northeast Forestry University, the director of economics department.

Ma GuoYong, Teaching assistant, The candidate for PH.D degree. College of Economics and Management, Northeast Forestry University, instructor.

Address: College of Economics and Management, Northeast Forestry University, Ha'erbin, Heilongjiang, 150040, P.R.China.

E-mail: Maguoyong369@yahoo.com.cn