Economic valuation of environmental amenity of Palangan Forest Park; Contingent valuation method

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Abstract: Determining the real value of natural ecosystems, due to their significant function and ecosystem services and necessity of the best management for make use of them has a great importance. According gly, in this study, using analytical – descriptive and analytical - Causal model is an attempt to recreational value of the forest park of Plangan estimating the willingness to pay for the benefits of the parkis determined with conditional valuation method using distributed 452 questionnaires area Neyriz. To measure the willingness to pay of the legit model is used.Based on the maximum likelihood method, the model parameters will be estimated and the impact of each of the considered variables in the model will be calculated and analyzed. The results show the people education is higher, indeed Increases their tendency to pay. Income Variable also has a significant positive association with willingness to pay. This means that the higher the income level exceeds their willingness to pay is too high. Household variable has significant negative relationship with willingness to pay.Number of visits Forest Park variable shows a significant negative correlation and this means that the more times a month to visit the park by people is increase, they are less willing to pay the entry fee.

Key words: entertainment value, contingent valuation method (CVM), willingness to pay, the legit, model

1. Introduction

Forest ecosystems provide many economic interests to human. Generally, these values can be divided to direct values, indirect values, option value, existence value, and heritage value (Torras, 2000). Direct values are related to direct use of the resources. In forest areas, the use of nature of these areas for recreation and leisure is considered a direct value. Indirect values mean benefits and interests that people may obtain indirectly or as a result of initial activities on available resources. Ecological services of these areas such as air carbon capture, mitigation of climate, and so on are of indirect values. Existence value is the intrinsic value of a resource. In fact, this the value that people only consider for the existence of that resource and environmental activities, even if they never use or observe it. Heritage value or value of future generations is the desirability caused by the awareness of people for maintaining the natural property for future generations. Option value involve all realizable direct and indirect values in the future or the value attributed to the ability of using goods and services in the future such as future explorations related to medical and agricultural expenditures of plants and new ecological resources. Option value is an indicator of preference degree of people for maintaining a forest park versus possible use in the future.

In other words, existence value is defined as willingness of the public to pay to protect forest park, heritage value is defined as tendency of people to pay to protect forest park for the benefit of future generations, and option value is defined as willingness of individuals to pay to protect forest park for opportunities and possible consuming activities in the future.

Hence, recreational and tourism value is classified as direct values of forest ecosystems and parks which includes the use of forests and parks for recreation, leisure, entertainment, hiking, and aesthetics. Environment is associated with economy and any change in one will affect the other. Proper management of facilities, recreational facilities, and green space of a region has a dramatic effect on the economy of that region. Valuing the natural capital is one of the effective factors in sustainable development. Creating a healthy and productive society for sustainable economic development requires keeping and developing natural resorts and tourist areas in order to meet the growing needs of humans. It is obvious that part of the cost for this should be paid by the visitors. Generally, bearing such costs is associated with the beliefs of people or, in other words, their willingness to pay.

Therefore, economic and social analysis of factors affecting people's demands and willingness to pay can considerably contribute to the anticipation of the needs and deficiencies of natural parks and tourist areas. Valuation of non-market functions and services of the environment is of great importance due to several reasons such as appreciation of environmental and ecological resources by humans, analysis of environmental issues by decision makers and planners, providing a link between economic policies and natural revenues, getting access to information about the structure and function of ecosystems, assessing the role and importance of environmental resources in support

of human well-being and sustainable development, modifying the set of national accounts such as GDP, and preventing the destruction and indiscriminate exploitation of natural resources (Ashym, 2000 and Gu *et al.*, 2001). In recent decades, economic-social development and growth as a continuous process in many communities has been accompanied with the increase in national income and positive changes per capita income. In such circumstances, tourism has attracted the attentions as a way to fill the leisure time aiming at reducing the impact of increasing stresses caused by centralized urban and industrial life. Development of economic activities, population growth, increasing busy life, raising living standards, the phenomenon of air pollution in large cities, noise pollution and other environmental pollutants have caused a dramatic increase in demand for natural environments.

This is increasing the need of urban people to nature and using its endowments, escaping from mechanical life, and taking refuge in natural recreational areas and resorts outside the cities. Many efforts have been made to determine the benefits obtained from visiting the forest recreation areas and national parks. Such actions are an important part of the benefit-cost analysis of management programs of forest parks. Review of studies in Iran shows that there are few research on estimation of recreational value of parks.. To do so, they used household production function and cost of travel. The results suggest that time, distance, and costs of travel affect the production of recreation. Marginal cost of leisure, given the competitive condition is present, is 1100000 Rials per day which is the shadow price of leisure. Lindberg *et al* (1997) applied contingent valuation method for the development of rural tourism. This method was used for the measurement of social impact of tourism on rural communities of Oregon State in the U.S.

Besides extracting the willingness to pay, this study performed a poll on such policies. The estimated annual household willingness to pay in different cases was also calculated. For example, the estimated annual household willingness to pay to reduce traffic congestion was calculated 186 dollar. Amigous *et al* (2002) estimated the conservation value of coastal habitat of Garven River in France 66, 67, 13, and 133 Frank using contingent valuation method with linear, tobit, semi-logarithmic, and Heckman two-step models, respectively. Lee and Han (2002) investigated the recreational value of five national parks in South Korea using CV method and calculated that this value, on average, is equal to 10.54 dollar per family per year. Zhangmyn *et al* (2002) used contingent valuation method in rural areas to determine the estimates of willingness to pay for reconstruction of services of Ajyna ecosystem. The results of 700 interviews show

that households are willing to pay a mean of 19.73 dollar per year, as each household would pay 20.78 dollar for the main river area and 19.41 dollar for Hay Basin Resort. Results also show that public capital in Hay Valley is willing to be paid for the reconstruction of Ajyna ecosystem, although this value is substantially less than the estimated cost of reconstruction. Whitehead and Finy (2003) valued North Carolina coast in the U.S., where there are the remnants of 5000 sunken ships, using contingent valuation method. Mean willingness to pay per visitor and annual income from the management of historic park of sunken ships were estimated about 36 dollar and 1.75 million dollar, respectively. Gorlok (2006) estimated the value of ecosystem services and natural tourism in Bursa Province of Turkey about 67.44 dollars per household per year using CVM method. Shrestha et al (2007) analyzed visitors demand in their study on environmental amenity of Apalachicola River in Florida and concluded that, on average, visitors pay 74.18 dollar per day.

The present paper aims to determine recreational value of Palangan Forest Park using contingent valuation method and measure the willingness of individual to pay for this park.

2. 2. Palangan Forest Park

Palangan Gorge is located 24 kilometers far from Neyriz in Fars Province which is one of the most important promenades of this city. Covered with trees of fig, pomegranates, willow, and old cypresses, this valley has several springs and many local residents, residents of Neyriz and Darab, and other travelers visit this site during the year.

3. Materials and Methods

Economically speaking, the value of a commodity is the sum of payments for that commodity and consumer surplus is defined as difference between the willingness of consumer to pay and the price paid for that commodity. In the case of goods which have characteristics of public goods, conventional methods used for other commodities would not have the desired efficiency, because consumption of each person has a limited impact on acquired utility of others (Asafo-Ajay, 2002).

Environmental goods are included in public goods. Supply of public goods is almost constant, so the value of such goods cannot be calculated by the conventional methods based on the analysis of demand and supply and other method should be used for this purpose. Review of studies on valuation of forest areas and national parks shows that travel cost and contingent valuation methods are commonly used to determine tourism and recreational value. Travel cost method is based on data collection through interviews and

questionnaires. In this method, demand for promenades is determined based on the number of visits paid to a park and other variable factors such as travel costs, visitors' income, and their economic-social characteristics. If a visitor has more than one decision to get use of their travel, the value of that promenade is estimated more than its real worth, making it difficult to allocate travel costs among various goals. Because of the wide variety of visitors of Palangan Forest Park and given visitors may get there either by private or public vehicles and others near the park walk to go there, the use of travel cost method in this study can distort the results. So, contingent valuation method was used in the present study in order to estimate the recreational value of Palangan Forest Park.

Contingent valuation methods involve asking individuals in scientific and research modes aiming at revealing individual preferences to make changes in the quality of non-market goods through contingent markets. These markets define benefits and losses of aforesaid goods, current situation and proposals to increase or decrease the quality, way of payment, and implementation of plan. Contingent markets cause the responder to face a hypothetical or practical situation and perform a conditional evaluation. For example, contingent markets asks, "If "it" happens, how much you are willing to pay you?" CVM method tries to determine the willingness of consumer to pay or receive which leads to their return to the initial position of utility (Cummings *et al*, 1986).

Contingent valuation method is a standard and flexible tool which is widely used in analysis of cost-benefit and measurement of non-market consumptive and non-consumptive values of environmental resources. This method was originally developed and proposed by Kryasi-Vantrap in 1947 and firstly used by Davis in 1963 for valuation of recreational interests around a river.

Research method is composed of two parts; the first part is descriptive and the second part is analytical-causal. Theoretical foundations of research were specified through the study of literature and documents. Willingness of households for recreational use of Palangan Forest Park was also assessed by handing out the questionnaires among them.

Questionnaires usually involve questions about the characteristics of the respondents (e.g. age, income, education, etc) and their preferences on the questioned product or service. Data obtained from these questions is used to estimate the regression function equation for commodity price. So, in order to measure the willingness of households to pay to visit Palangan Forest Park, Logit regression model and maximum likelihood method were used. In mathematics and statistics, Logit function is a real number (p) between zero and one as follows:

$$\text{logit}(p) = \log\left(\frac{p}{1-p}\right) = \log(p) - \log(1-p).$$

This function is considered as follows in the logistic regression model:

$$\text{logit}(p_i) = a + bx_i$$

Where, x_i is a function which represents the occurrence or non-occurrence of in the ith observation and p_i shows the probability of occurrence. The regression model used in the present study is as follows:

$$Y = a + \mathbf{B}_1 z_1 + B_2 z_2 + B_3 z_3 + B_4 z_4 + B_5 z_5 + U$$

Where, Y is the dependent variable which shows the willingness to pay for recreational use of Palangan Forest Park. If a person is willing to pay, Y will be 1 and if a person is not willing to pay, Y is considered equal to zero. z_1, z_2, z_3, z_4, and z_5 represent the proposed fee, household income, age, education, and household size, respectively. Probability (p_i) that a person accepts one of the proposals is expressed using Logit regression model as follows:

$$P_i = F_\eta(\Delta U) = 1/1 + \exp\{(-\Delta U)\} = 1/\exp\{-(\alpha - \beta_1 z_1 + \beta_2 z_2 + \theta s)\}$$

Where, $F\eta(\Delta U)$ is a cumulative distribution function with a standard logistic difference that also involves some social-economic variables of the present study, reflecting the indirect utility that a person obtain through the recreational area of Palangan Forest Park. Utility difference is resulted from willingness or unwillingness to pay for its value. S shows other social-economic variables of this model.

Parameters of Logit mode were estimated using maximum likelihood which is the most common technique used to estimate Logit model. Then, expected value of willingness to pay was calculated by numerical integration in the range of zero to the highest offer as follows:

$$E(WTP) = \int F_\eta(\Delta U)$$

0

0

Max

$$= \int (1/1 + \exp\{-(\alpha^* + \beta_1 z_1)\})\, dz_1\,, \quad \alpha^* = (\alpha + \beta_2 + \ldots + \beta_6))$$

0

0

Where, E (WPT) is the expected value of willingness to pay and α^* represents the adjusted intercept which is added to the main term of intercept (α) by social-economic term

4- Results

In terms of willingness of visitors to pay for recreational value of Palangan Forest Park, 48 questionnaires having faulty and incomplete data were excluded and analyses were done on the remaining 452 questionnaires having complete information. SPSS 16 and STATA 12 were used for data analysis. Social-economic characteristics of the respondents are presented in Table 1.

Table 1: Job frequency distribution of visitors to Palangan Forest Park

Job	Self-employed	Retired	Employee	Housekeeper	Educational job	Unemployed	Faculty member	Total
Number	269	33	84	30	15	27	3	452
Percentage	59.51	7.23	18.58	6.63	3.31	5.97	0.66	100

According to Table 1, 33 people (7.33%) were retired, 269 people (59.51%) were self-employed, 84 people (18.58%) were employees, 30 people (6.63%) were housekeeper, 15 people (3.31%) had an educational job, 27 people (5.97%) were unemployed, and 3 people (0.66%) were faculty members.

As it can be seen, the highest percentage of the population of recreational value questionnaire belongs to the group of self-employed and then the group of employees.

Table 2: Frequency distribution of education level of visitors to Palangan Forest Park

Literacy level	Master and Ph.D.	Bachelor	Associate degree	Diploma	Lower then Diploma	Total
Number	31	119	99	114	89	452
Percentage	6.85	26.32	21.90	25.22	19.69	100

According to Table 2, the highest percentage of people had a bachelor's degree and then a diploma. 31 people (6.85%) had a master or Ph.D. degree, 119 people (26.32%) had a bachelor's degree, 99 people (21.90%) had an associate degree, 114 people (25.22%) had a diploma, and 89 people (19.69%) had a degree lower than diploma.

In terms of willingness of people to pay for recreational value of Palangan Forest Park, the respondents were asked whether they are willing to pay part of their monthly income for recreational use of this park or not. The results of this question are shown in Table 3.

According to Table 3, among 135 people who are willing to pay to visit Palangan Forest Park, 46 people (30.07%) are willing to pay 3000 toman, 85 people are willing to pay less than 3000 toman, and 31 people are willing to pay more than 3000 toman.

Table 3: Estimation of willingness of people to pay to visit Palangan Forest Park

Willing to pay based the proposed price	5000	100000	15000	20000	25000	30000	40000	45000	5000	Total
Number	15	19	12	5	7	46	20	5	6	135
Percentage	11.11	14.07	8.9	3.7	5.2	30.07	14.85	3.70	4.45	100

According to Table 3, among 135 people who are willing to pay to visit Palangan Forest Park, 46 people (30.07%) are willing to pay 3000 toman, 85 people are willing to pay less than 3000 toman, and 31 people are willing to pay more than 3000 toman.

1.4. Evaluation of influencing factors on people's willingness to pay entrance fee to Palangan Forest Park:

To investigate the factors affecting the willingness to pay, Logit model can be used. In this method, answers given to the questions of contingent valuation method (Yes or No) are considered as dependent variables and other variable including the proposed price and social-economic variables are taken as independent variables. Since such a model cannot be estimated using ordinary least squares method, maximum likelihood method is used. The results of the Logit model are presented in Table 4.

Table 4: Logit model estimation results

Variables	Coefficient	Value of t-statistic	prob
Intercept	4736.85	8.90	0.00
Income	151.19	2.13	0.03
Education	197.17	2.25	0.02
Household size	-161.77	-2.93	-0.00
Job	-262.80	-1.29	0.19
Age	-6.59	-0.72	-0.46
Number of visits	-199.29	-2.56	0.01
Duration of each visit	-232.42	-2.32	0.02
R- squared: 0/50 Durbin-watson:1/87			

As it is clear from the above table, all variables, except age, are significant. Education has a significant and positive relationship with willingness to pay, as the more educated people are, the more willing they are to pay. The relationship between income and willingness to pay is direct and significant.

This means that the higher the income level of people is, the more willing they are to pay. There is a significant and negative relationship between job and willingness to pay. This variable is qualitative and only two job groups including self-employed and non self-employed are specified for it.

The results show that those who are self-employed are more willing to pay compared with those who are not self-employed. Household size has a significant and negative relationship with willingness to pay. Number of visits also shows a significant and negative with willingness to pay. This means that the greater the number of visits paid to the park by people is, the less willing they are to pay the entrance fee. Duration of visit follows the same relationship. R^2 of this model was 50% which shows that proposed explanatory variables can explain the model. Watson's camera of the model also indicates the lack of autocorrelation, implying that the model is correctly specified**.**

5. Discussion

The contingent valuation method is of the most widely used ones in which it is attempted to calculate the value of an ecological product through asking the visitors questions regarding the maximum willingness to pay them. Accordingly, it was tried in this survey to determine the recreational value of Palangan Forest Park by estimating the willingness of people to pay for the interests of this park through taking advantage of the contingent valuation method and a dichotomous questionnaire.

The Logit model was used to measure the willingness of people to pay. Finally, the parameters of the model were estimated through the method of maximum likelihood, and the effect of each variable considered in the calculation model was analyzed. According to the results of this research and based on the estimation model, the variables of education, income, age, and then household size had meaningful effects on the likelihood of acceptance and the willingness to pay for the recreational use of Palangan Forest Park.

On the other hand, as mentioned before, with rising levels of education in people, their impression of interests in the environment and nature becomes positive and their knowledge of biological advantages

and interests gets heightened, increasing their willingness to pay the suggested amount. The variable of income also had a direct and strong relationship with the likelihood of accepting the suggested amounts of money, through enhancing the ability to pay. The variable of number of visits had a meaningful impact on accepting the suggested amounts of money, but paying attention to quality of the effect of the variable of age implies the willingness of younger people to pay higher. It is obvious that this matter must be taken into account while making policies by the respective agencies through focusing more on these groups of people.

The government and the local agencies can attempt to preserve the national resources or taxes and prevent them from harms and destruction. At last, planning to attract tourists and making money through it based on the delicacy of the natural environment, especially depending on the activities of the private sector and strengthening them in the codified framework, can both make the economy prosperous and provides the financing resources of protecting the environment.

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