

Research

Contingent Valuation in Estimating the Willingness to Pay for Environmental Conservation in Tabriz, Iran

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Abstract

The main objective of this paper was to study different social, and economic factors affecting peoples' willingness to pay (WTP) and their attitudes toward the environmental conservation in Tabriz, a metropolitan city being located on north west of the country. The research carried out, consisted of two main parts, namely, the examination of existing environmental, social, and economic conditions of the study area, and the analysis of survey and interview results. The contingent valuation method (CVM) was applied in order to estimate the amount of WTP. The results showed immense amounts of WTP averaging to 41400⁽¹⁾ Rials per month per person, and found some interesting factors determining peoples' participation in environmental conservation.

Key words:

Willingness to pay, Environment Protection, Contingent Valuation Method, Tabriz.

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(1) Amounts to \$4.5 (2005)

Introduction

The pollution trend in our country has continuously been passing its ascending patterns. Tabriz is now one of the most polluted cities of Iran and the amount of pollutants in Tabriz is more than the standard levels. Under the conditions that the developed countries have used scientific methods for planning and determination of priorities for environmental conservation and investments; in our country, the commencement of environmental research projects has been very new. Under these circumstances, the present research paper is attempting to recognize the rate of participation and the willingness to pay (WTP) of different public groups for environmental conservation in Tabriz. The result of analysis showed that in Tabriz there are many environmental problems which can range from air pollution, solid waste, and so on, along with issues such as lack of green space, noise pollution, traffic congestion, drastic changes in land uses, and the like. This research aims at finding different pollution problems in Tabriz according to the view of people. The amount of WTP of people for environmental conservation has also been estimated.

Public participation and environmental concern in Tabriz

Public participation has become a part of peoples' activities in many areas in the process of development. It can be defined as a social communication process whereby individual citizens, NGOs, the private sector and other interested parties participate with government at various levels of decision-making. Over the last

few decades, there has not been a clear statement showing public participation in Iranian cities including Tabriz.

Aims of the study

The aims of this study have been designed as the following questions:

- What are different types of environmental pollution in peoples' view?
- What are the main solutions for environmental problems in Tabriz in their view?
- How respondents' social and economic characteristics influence their participation in environmental conservation in Tabriz?
- How much the respondents are willing to pay for environmental conservation in this city?

Sampling population and study methods

The research population in this paper includes different peoples' groups in Tabriz being selected randomly. The range of age distribution in sample population was from 18 to 70. The number of questionnaires filled and completed, was 574. The author has applied the Contingent Valuation Method (CVM) for carrying out the research project. Contingent valuation is a method of estimating the value that a person places on goods. It directly asks people using a questionnaire what they are willing to pay for a benefit or willing to receive for tolerating a cost. The approach asks people to directly report their willingness to pay (WTP) to obtain a specified goods, or willingness to accept (WTA) to give up goods, rather than inferring them from observed behaviors in regular market places. Because it creates a hypothetical marketplace in which no actual transactions are made, CVM has been

successfully used for commodities that are not exchanged in regular markets, or when it is difficult to observe market transactions under the desired conditions. Many applications of the method deal with public goods such as improvements in water or air quality, amenities such as national parks, and private non-market commodities such as reductions in the risk of death, days of illness avoided or days spent hunting or fishing. It remains the only technique capable of placing a value on commodities that have a large non-use component of value, and when the environmental improvements to be valued are outside of the range of available data (FAO, 2000).

The reasons for the selection of Tabriz for research

- Tabriz has central administrative, political and economic and physical characteristics. It has been located on mountainside, and the climate and environmental conditions and green spaces existing in this city, being considered as an important city in terms of the environmental aspects.
- The rate of population growth is very quick, and the trend of population immigration is the highest in the region.
- Physical extension of the city is clearly observable.
- The growth of urban transportation vehicles is accelerated during the recent years, causing different environmental problems such as air, noise, water and visual pollution, as well as the texture disruption.

- A main point is that there is an irreversible role of public participation in solving environmental problems.

Literature review

Although it is sometimes imagined that the environmental goods and services have no economic values, and cannot be either bought or sold in the market, and are used excessively thanks to their free provision, however, the support of the environment from the peoples' side is confirmed in the literature extensively. CVM is one of the first methods used for the analysis of environmental problems by different authors and researchers. Gramlich (1977) was one of the earliest researchers who adopted the CVM for estimating public participation in an extraction of demand curve for fresh and clean water. The aim was to calculate the amount of WTP. He completed 165 questionnaires in Boston Metropolitan Area and applied statistical models for his estimation. His results showed considerable WTP amounts.

The aim of Shutz and Lindsay (1990) was to estimate WTP for the conservation of groundwater in New Hampshire. The effects of variables such as the number of settlement years in the area, gender, age, the education level, and income of the people were statistically significant.

Brookshire, et al. (1976) estimated the amount of WTP of visitors to a lake for its conservation through filling in the questionnaires. Altoff and Greig (1977) apply simpler statistical analysis for estimating public views about environmental pollution. One of the aims of this research was to estimate the amount of WTP and the public

participation pattern in environmental preservation that resulted in valuable results.

Halvorsen and Salensminde (1988) also applied CVM for estimation of WTP in Norway. Garrod and Willis (1998) used this method for estimating the loss of welfare of travelers to recreation areas due to the installation of water pipelines and find that the WTP would be higher if the number of pipelines is reduced. Breffle, et al. (1998) have estimated the WTP of people in Colorado for the protection of an intact parcel of land.

Alberini et al., (1997) examined WTP for government programs, finding that mean WTP can be lower than that implied by the responses to the initial payment question. Some respondents may treat the suggested cost of the project as a signal for the quality of the program and/ or might believe that the program to be valued was different from the initial one. In other studies where the good to be valued a private non-market good (days of illness) estimated WTP remains very stable over the rounds of follow-ups (Alberini et al., 1997, quoted in FAO, 2000).

More recently, Danso (2002) used the CVM for examining the composting acceptance among farmers in Ghana. The author tries to estimate how much the farmers are willing to pay for establishing a composting industry in three cities in African country of Ghana. The results of his study indicate that people have lower inclination toward the composting industry as their low WTPs show and the reason was technical and cultural.

Hokby, and Soderqvist (2001) estimate the demand for environmental protection amid different income groups in Sweden, and find that

environmental improvements to be relatively more beneficial to low income groups. They also concluded that the reduced eutrophication effects are an ordinary and price elastic good in applying the willingness to pay procedure.

Finally, Singleton (2001) evaluated the willingness to pay for ecotourism certification in Audubon and made the following suggestions: There is an increasing demand for products being certified as environmentally friendly for ecotourism; and consumers are WTP price premiums ranging from 10 to 170%, but these premiums are limited by the initial price of the conventional good provides for the activity.

Except that of Ghana, all other studies have used the CVM in developed countries. The author has also observed researches in Iran using CVM, but most of them have oriented toward the valuation of other economics or social aspects. Apart from a thesis being compiled in 1994 by the author (Khorshiddoust, 1994), there seems to be a deficiency in the relevant studies in this regard. Although the literature review shows a large number of studies of this concern, none of them have really taken into account the same techniques for understanding whether there exists a gap between the ideas and desires of these different societies.

Sampling and calculation methods

The techniques of measuring the attitudes and trends of people and the way they become related to overt behavior are quite extensive. The present research is both descriptive and analytical, and different statistical and analytical methods have been used. The research was aimed at considering the evaluation of social class as well as other parameters

on environmental concern; hence the class dimensions were constructed. A functional model was then developed to relate different variables together and estimate the possible correlations between them. Any relationship or correlation between variable was estimated. Accordingly, the willingness to pay variable (WTP) was considered as a dependent variable, other variables being independent, namely, education, income, age, and gender for the estimation of the multiple regression coefficients. The equation adopted was as follows:

$$WTP=f(\text{education, income, age, and gender}) \quad (1)$$

The general equation was drawn based on the following linear function:

$$Y=a+bx \quad (2)$$

As:

$$Y= b_0+b_1(X_1)+b_2(X_2)+ \dots b_p(X_p)$$

Where the X parameters are independent variables, b_1 , b_2 , ..., and b_p are representing regression coefficients, and finally, b_0 stands for fixed regression coefficient.

This sample function was then adopted in the above equation:

$$WTP= f(\text{INC+EDUC+AGE+GENDER+EQ}) \quad (3)$$

As:

$$WTP=b_0+b_1 (\text{income})+b_2 (\text{education})+b_3(\text{age})+b_4 (\text{job})+b_5$$

In which the variables are specified according to (1), and EQ is an indicator of environmental quality in respondents' view. A random stratified sampling method was used for the survey in different parts of the city that already were

classified on the basis of different borders, urban mater plan and suburban areas. A standard coding was specified using an SPSS⁽¹⁾ package version 10.

Results

The results on social and economic determinants of people's attitudes toward the environment in terms of descriptive statistics have been interesting and show that people are keen to participate in environmental conservation programs. An almost complete research in the area of peoples' concern on environmental issues is that of Van Liere and Dunlap (1980) whose work indicated a strong correlation between education and WTP. The above variable has shown to be effective in our research too, and the higher-educated people, are more willingness to pay and/ or take steps toward environmental conservation. However, Samadahl and Robertson (1989) find that education had negative effect on WTP. Lowe, et al. (1980) find out that the variable age is the most influential factor in peoples' concern, while Tognacci, et al. (1972) estimated that younger participants are more concerned about environment. Table 1 to 5 show the general social and economic information characteristics of our respondents. 63.4% of respondents were male and the remainders were female. 37.3% were university educated with B. A., or B. Sc. Degrees. 50.7% of the respondents were around 30 years of age. 56% of them were working in one of the governmental organizations.

Table 1: Respondents' gender composition

| Genre | Frequency | Percent |
|--------|-----------|---------|
| Male | 364 | 63.4 |
| Female | 210 | 36.6 |
| Total | 574 | 100.0 |

Table 2: Respondents' education.

| Education (years) | Frequency | Percent |
|-------------------|-----------|---------|
| 5,00 | 12 | 2.1 |
| 9,00 | 67 | 11.7 |
| 12,00 | 149 | 26.0 |
| 14,00 | 79 | 13.8 |
| 16,00 | 214 | 37.3 |
| 19,00 | 53 | 9.2 |
| Total | 574 | 100.0 |

Table 3: Respondents' age

| Age | Frequency | Percent |
|-------|-----------|---------|
| 20,00 | 52 | 9.1 |
| 30,00 | 291 | 50.7 |
| 40,00 | 133 | 23.2 |
| 50,00 | 84 | 14.6 |
| 60,00 | 14 | 2.4 |
| Total | 574 | 100.0 |

Table 4: Respondents' job

| Job | Frequency | Percent |
|--------------|-----------|---------|
| Student | 53 | 9.2 |
| Business | 124 | 21.6 |
| Private firm | 35 | 6.1 |
| Govt. staff | 321 | 56.0 |
| No job | 27 | 4.7 |
| Other | 14 | 2.4 |
| Total | 574 | 100.0 |

Table 5: Respondents' income distribution (Rials)

| Income | Frequency | Percent |
|------------|-----------|---------|
| 100000,00 | 109 | 19.0 |
| 250000,00 | 106 | 18.5 |
| 400000,00 | 131 | 22.8 |
| 700000,00 | 144 | 25.1 |
| 1000000,00 | 84 | 14.6 |
| Total | 574 | 100.0 |

In peoples' view the most significant pollution problem in Tabriz was air pollution by cars (27.6%), followed by waste pollution in public

areas and domestic water pollution (Table 6). No doubt people are the best deciding elements as always are highly subjected to different pollution types and can judge about them. It appears that they do not take into account various visual pollution types as important issues for highlighting.

The respondents later indicate their prioritized solutions for environmental pollution in Tabriz that are followed:

1. The creation and reinforcement of green space.
2. More control over the public motor vehicles and private cars
3. More control over the manufacturers and industries
4. Environmental education both in schools and universities
5. Improvement of solid and liquid waste management practices

Table 6: Respondents' view on environmental pollution by type in living neighborhood (respectively)

| Rank | Cases selected | Percent |
|------|---|---------|
| 1 | Air pollution by cars | 27.6 |
| 2 | Waste pollution in public areas | 24.8 |
| 3 | Domestic water pollution | 13.5 |
| 4 | Air pollution by industries | 10.9 |
| 5 | Air pollution by residential sections | 5.4 |
| 6 | Noise pollution by industries | 4.0 |
| 7 | Noise pollution by airport | 3.8 |
| 8 | Noise pollution by cars | 3.5 |
| 9 | Urban drain water pollution | 1.09 |
| 10 | Groundwater pollution | 1.7 |
| 11 | Soil pollution | 1.0 |
| 12 | Visual pollution due to buildings | 1.0 |
| 13 | Visual pollution due to garbage in public areas | 5.0 |
| 14 | Visual pollution due to lack of green space | 2.0 |
| | Total | 100.0 |

The next category was to determine peoples' willingness to pay for environmental conservation. As table 8 shows, over 38% of the respondents prefer to join the environmental conservation action programs by allocating an amount of 5000 Iranian Rials, and 29% were interested in paying 1000 Rials.

Table 7: Monthly WTP (Iranian Rials for 2005 discount rates)

| WTP (Rials*) | Frequency | Percent |
|--------------|--------------------------------------|---------|
| 5000,00 | 220 | 38.3 |
| 10000,00 | 167 | 29.1 |
| 20000,00 | 1,4 | 18.1 |
| 40000,00 | 41 | 7.1 |
| 50000,00 | 42 | 7.3 |
| Total | 574 | 100.0 |
| Average | 41140 (Rials, per person, per month) | |

* The exchange rate for Iranian Rials in 2005 was 9000 RLS=\$US 1

The results of correlation and regression analyses

The person correlation estimation and stepwise regression analysis were carried out choosing dependent and independent variables on the above mentioned basis. Analysis showed the following results:

1. The amount of F (ratio) is significant in all estimations, as it is the case with (β) Betas.
2. The WTP correlation with variable such as education (+0.405), age (+0.175), and income (+0.314) was significant. The strongest correlation of WTP is apparently with education and income respectively (table 8 and 9)².

Table 8: Correlations between variables

| | WTP | Gender | Educ | Age | Job | Income |
|-----------------------------------|-------|--------|-------|-------|-------|--------|
| Person correlation with WTP | 1.000 | ,094 | ,405 | ,175 | -,070 | ,314 |
| Sig. (2-tailed) | , | ,254 | ,000 | ,000 | ,095 | ,000 |
| Person correlation with Gender | ,049 | 1.000 | ,029 | ,021 | ,068 | ,042 |
| Sig. (2-tailed) | ,245 | , | ,489 | ,608 | ,104 | ,316 |
| Person correlation with education | ,405 | ,029 | 1.000 | ,155 | ,036 | ,296 |
| Sig. (2-tailed) | ,000 | ,489 | , | ,000 | ,388 | ,000 |
| Person correlation with Age | ,175 | ,021 | ,155 | 1.000 | ,134 | ,437 |
| Sig. (2-tailed) | ,000 | ,608 | ,000 | , | ,001 | ,000 |
| Person correlation with Job | -,070 | ,068 | ,036 | ,134 | 1.000 | ,162 |
| Sig. (2-tailed) | ,095 | ,104 | ,388 | ,001 | , | ,000 |
| Person correlation with Income | ,314 | ,042 | ,269 | ,437 | ,162 | 1.000 |
| Sig. (2-tailed) | ,000 | ,316 | ,000 | ,000 | ,000 | , |
| N | 574 | | | | | |

Table 9- Regression model summary

| Model | R | R square | Adjusted R square |
|-------|-------------------|----------|-------------------|
| 1 | ,405 ^a | ,164 | ,163 |
| 2 | ,454 ^b | ,206 | ,203 |
| 3 | ,496 ^c | ,220 | ,216 |

a Predictors: (constant), Educ

b Predictors: (constant), Educ, Income

c Predictors: (constant), Educ, Income, Job

d Dependent variable: WTP

Conclusion

This research was conducted under specific and new conditions and its results are hopeful. The results fall in line with the findings of other international studies. Although the CVM and other relevant evaluation methods on environmental issues have been frequently applied in developed countries, this research is a significant work for showing public

participation in this matter. The research indicates that people in Tabriz are greatly concerned about their living environment and are ready and prepared for contributing in solving its problems.

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Notes

1. Statistical Package for Social Sciences
2. ut the results of the regression analysis and NOVA see the appendix for more information

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Appendix

Table on ANOVA

| Model | Sum of squares | Df | Mean square | F | Sig. |
|--------------|------------------|-----|-----------------|---------|-------|
| 1 Regression | 17389643121,591 | 1 | 17389643121,591 | 112,445 | ,000* |
| Residual | 88459660014,297 | 572 | 154649755,270 | | |
| Total | 105849303135,888 | 573 | | | |
| 2 Regression | 2177393810,414 | 2 | 1088966905,207 | 73,939 | ,000* |
| Residual | 84075369352,474 | 571 | 147242328,066 | | |
| Total | 10584933135,888 | 573 | | | |
| 3 Regression | 23252730846,778 | 3 | 7750970282,259 | 53,489 | ,000* |
| Residual | 82596572289,111 | 570 | 144906267,174 | | |
| Total | 105849303135,888 | 573 | | | |

a- Predictors: (Constant), EDUC;

b- Predictors: (Constant), EDUC, INCOME;

c- Predictors: (Constant), EDUC, INCOME, JOB;

d- Dependent variable: WTP

Table on regression coefficients

| Model | Unstandardized coefficients | | Standardized coefficients Beta | t | Sig |
|------------|-----------------------------|------------|-----------------------------------|--------|------|
| | B | Std. Error | | | |
| (Constant) | -9961,981 | 2407,349 | | -4,138 | ,000 |
| 1 EDUC | 179,209 | 168,918 | ,405 | 10,604 | ,000 |
| INCOME | | | | | |
| JOB | | | | | |
| (Constant) | -10688,743 | 2352,761 | | -4,453 | ,000 |
| 2 EDUC | 1512,553 | 172,552 | ,342 | 8,766 | ,000 |
| INCOME | 9,625E-03 | ,002 | ,213 | 5,457 | ,000 |
| JOB | | | | | |
| (Constant) | -6523,838 | 2673,467 | | -2,440 | ,015 |
| 3 EDUC | 1505,678 | 171,192 | ,341 | 8,795 | ,000 |
| INCOME | 1,052E-02 | ,002 | ,233 | 5,938 | ,000 |
| JOB | -1352,736 | 423,450 | -,120 | -3195 | ,001 |

Dependent variable: WTP