Journal of Economic Cooperation Among Islamic Countries **19**, 3 (1998) 67-93

WILLINGNESS TO PAY (WTP) AND WILLINGNESS TO ACCEPT (WTA) MEASURES IN TURKEY: MAY WTP AND WTA BE INDICATORS TO SHARE THE ENVIRONMENTAL DAMAGE BURDENS: A CASE STUDY

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This paper employs the contingent valuation method (CVM) to estimate the willingness to pay (WTP) of individual consumers and producers for improving environmental quality and also compares their WTP to the current environmental charges payment. According to the survey result of the Ankara case, neither consumers nor producers like to pay charges or taxes because of the inefficient usage of the revenues by the government, even though their WTP are 3-4 times more than the current charges payment. This paper presents a survey which explores the application of CVM to environmental quality improvement issues by eliciting people's WTP to support a need for legislation on the economic instruments to increase environmental quality. This finding must be considered by the environmental authorities for imposing new environmental charges or taxes.

1. INTRODUCTION

Economists generally agree that environmental issues can arise when the market system fails to create an appropriate price mechanism in relation to environmental resources. These resources can be used freely and they are called public or common goods, although their use imposes an external cost, such as water, soil, air, noise, smell pollutions and other negative environmental impacts. Bruce and Ellis (1993) stated that the environment is owned by everyone and hence by no one and a common property cannot be priced for its use and therefore, there is competitive overuse. Thus, the environmental degradation came about largely as a result of the market failure to define and enforce property rights.

The costs of producing any goods or service consist of a mixture of priced inputs, such as labour, capital, technology and unpriced inputs, such as environmental resources. So, the market price for goods and services does not

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reflect the real value of the total resources used to produce them (Pearce et al, 1990). Therefore, divergence between private and social costs of goods and services occurs from the viewpoint of an environmental economic approach. As a result, the market price of goods and services generally covers the private costs of environmental inputs but not the external costs. Because of that, producers and consumers are likely to make excessive use of these relative to others that are higher-priced. Underpricing also provides insufficient incentives for the improvement of new technologies to control environmental pollution (Jenkins and Lamech, 1993).

In the Growth Economic Model, firms seek to maximise their profit and consumers are willing to achieve their wishes at the least cost to themselves. Due to the private cost-minimising behaviour of firms, market prices of goods and factors do not reflect their costs to society, this results in economic inefficiency and reduced social welfare if markets are missing and externality is present. This process results in excessive pollution and environmental degradation. Better environmental quality can be taken into account as an economic good and the degradation of the environment caused by other economic activities can be considered as a cost item into those activities. The production and/or consumption of other commercial goods may reduce the level of environmental quality. This consequence affects the production and/or cost functions of each economic agent negatively.

A variety of measures and procedures can be used to improve or maintain environmental quality. These include legal regulations related to the products, processes, emissions and wastes and they also include various economic instruments, such as taxes, charges, state aids, tradable pollution permits, etc., and agreements with polluters. The choice of the most suitable instrument and/or instruments to use in any specific case will depend upon the legal and administrative framework, and the nature of the environmental pollution problems.

Economists have argued for taxing pollution for a long time. From the viewpoint of economists, these taxes serve to remove the market failures or missing market. Economists, however, could not find enough political support for this idea. Decision-makers and the public authorities prefer traditional command and control instruments, tradable pollution permits, and various inspections for pollutant parameters instead of charges or taxes. Oates (1988) argued that a few scientific studies have found that command and control policy instruments cost more than market-based incentives. The results of some previous scientific studies clarified that the command and control policies are not successful in creating environmental policies. The economic

implications of pollution control and prevention, particularly adopting end-of-pipe approaches, result in higher costs due to internalisation of the cost of environmental damage and may result in reduced productivity and reduced productive investment (Tolba et al, 1993). In recent years, there is a new interest in taxes both in developed and developing countries.

The main objective of environmental charges or taxes is to internalise the external costs which caused producers' and/or consumers' production and/or consumption activities. In the EU and OECD countries, some taxing mechanisms, such as emission, product, wastewater, solid waste, and noise charges, tax differentiation, and others are applied by the governments. In Turkey, the Environment Act of 1983 (No: 2873) enforces the polluter pays principle and solid waste and wastewater charges have been applied since 1994 at local level.

Environmental policy prescriptions and environmental economic assessments are generally based upon the empirical indicators that the WTP and WTA of each economic agent will yield equivalent measures of sacrifice (Knetsch, 1990). So, economic instruments of environmental conservation policies may be undertaken with the use of individual WTP and WTA measures.

The primary objective of this study is to estimate both the individual consumers' and producers' WTP for improving environmental quality and to compare these estimates to the actual amount of environmental charges payment. Also, the behaviours of economic agents relating to the relationship between charges payment and WTP and WTA measures will be examined through the CVM by analysing data from a questionnaire prepared specifically for this purpose. This research can be useful for further arrangements about environmental charges or taxes to achieve sustainable development in Turkey as well as in other developing countries.

2. METHODOLOGY

The main materials of this study were collected through questionnaires covering both households and industrial firms.

In order to determine the taxation attitudes of individual consumers, the Çankaya district of the Ankara province was selected as the research area. The reason for selecting the district is based on the assumption that its basic socio-economic characteristics are representative of the Ankara province. It is

accepted by the State Institute of Statistics and the Local Government that the district is a prototype of Ankara with respect to human settlement and life style. According to both the economic and social development levels, the Çankaya district was stratified into three strata as developed, medium-developed and less-developed urban areas. Çankaya is divided into 107 small administrative divisions by the Local Government. Three of them were selected as samples, one of them is developed (Kavaklıdere), the second is medium-developed (Cebeci), and the third is less-developed (Dikmen).

The sampling unit is the relevant household which is living in the defined areas at the stage of the sampling process. To determine the numbers of households that live in selected areas, the Government Administrators of each urban area conducted a survey. By that survey, current household numbers are defined as 8564 which constitute the population of the study. Using quota sampling the desired proportion of the sample is 2 % of current household numbers in each group. In this case this amount is 171 out of the total population. The numbers of households were decided by quota sampling, but interviewed households were determined at random.

For industrial firms, the sampling unit is the relevant firms which are registered with the Ankara Chamber of Industry. 2200 industrial firms are present in Ankara in the fiscal year of 1995 which constitute the population of the study. Two per cent of the firms in each professional group is desired as the proportion of total that is found out as 44 firms. The number of firms were decided by quota sampling, but interviewed firms were determined by purposive sampling method. For this purpose, 44 firms represent the general characteristics of the industrial structure of the Ankara province aspect of the scale of economic activities and their contribution to the environmental pollution.

The survey technique would have an increasingly wide application in all social sciences. The data were collected from both individual consumers and industrial firms between September 1995 and October 1995 through interviews. Two different types of questionnaire were prepared. One was for households and the other for industrial firms. The household questionnaire was filled by individuals aged 20 years or more in each household. The business survey was applied to the technical, production, quality assurance or environmental assessment director of the sampled firms.

Before the interview with the households and firms, 3 pre-test questionnaires were applied to different socio-economic groups and industrial firms. The results of the first interview were then reviewed. There were 18

open-ended or continuous questions in the business survey and 10 open-ended questions in the household survey. The business survey covered 23 dichotomous choices and the household survey covered 12 dichotomous choices. There were 2 double-bound questions both in the household and the business survey. The questionnaire interview was on-site or face to face with the respondents.

What researchers are commissioned to value is typically beyond their control, thus a choice of payment vehicles were used. The most often used vehicles, such as taxes, entrance fees, utility bills and higher prices are likely to be familiar to most respondents (Mitchell and Carson, 1994).

This research is dealing with an environmental change that is outside historical experience, the CVM is the more appropriate local residents' WTP for better environmental quality. CVM studies are based upon the data provided by a survey of responses to hypothetical contingencies put before the interviewees which consisted of economic agents or producers and consumers (Young and Allen, 1986). The WTP figures given by the respondents reflect the value they place on the environmental resources (Gaterell et al, 1995). An appropriate environmental tax system may be proposed according to the socio-economic characteristics of households and firms by using the direct valuation instruments such as WTP and WTA related to consumer and producer preferences about the environmental taxes or charges. To determine the suitable approach to share the environmental damages costs between economic agents in this case, sample entrepreneurs and consumers were surveyed through a questionnaire.

The amount of money that an individual is willing to pay for improving the environmental quality is obtained by the following question: How much would consumers and producers be willing to pay (WTP) as environmental taxes or charges for improving mankind's environmental quality? or what would they be willing to accept to (WTA) compensate for the environmental burden in the case of the Ankara province?

The data provided by individual producers and consumers is analysed and the relationship between individuals' satisfaction with currently applied environmental charges payment in selected case areas and their willingness to pay is learned. Descriptive statistics of all responses and chi-square ratio between two questions are determined. The statistical significance of the relationship between the two responses is tested by chi-square (x^2) distribution and the sample (observed) value of the chosen variables is tested by t statistic.

A general WTP and/or WTA function for individual consumers and producers is defined as the following: WTP_i or $WTA_i = f(Q_i, Y_i, T_i, S_i)$. Where; Q_i is quality and/or quantity of the attribute, Y_i is the income level,T_i is the index of tastes and S_i is a vector of relevant socio-economic factors (Whitehead, 1994).

In this study, WTP functions of households and firms are estimated. There is no theoretical correct form of these functions (Pearce et al, 1990; Pearce and Turner, 1990; Bateman and Turner, 1993; Kula, 1994). In these cases, economic theory does not clearly define a certain mathematical form of economic relationship. From the point of view of economic theory, it has become a usual practice for economists to experiment with various forms such as linear and non-linear (logarithm, semi-logarithm, and inverse). Then the one that must be chosen among the various results is that which is selected as the most satisfactory on the basis of certain criteria (Koutsoyiannis, 1993), such as error coefficient of independent variables, and multiple determination coefficient capital R^2. According to the results, a logarithmic function is chosen. The aim of regression analysis is to determine the factors which cause the variation of the dependent variables, namely WTP and WTA measures. The estimated logarithm WTP function of household is given below:

$$\textbf{Log WTP} = \log b_o + b_1 (\log Y) + b_2 (\log A) + b_3 (\log E) + b_4 (\log G) + b_5 (\log P) + b_6 (\log D) + b_7 (\log K).$$

Where: WTP represents the willingness-to-pay for improving the environmental quality. Y represents the net household income per month (1: under 8,000,000 TL[1], 2: 8-16,000,000 TL, 3: 16-24,000,000 TL, 4: 24-32,000,000 TL, 5: 32-40,000,000 TL, 6: 40-50,000,000 TL, 8: 50-60,000,000 TL, 9: 60-70,000,000 TL and 10: greater than 70,000,000 TL); A represents the age of respondents in each household expressed in years (1: under 20, 2: 21-30, 3: 31-40, 4: 41-50, 5: 51-60, 6: 61-70, 7: over 70); E represents the educational level of the respondents expressed as a variable in the multiple regression model with effect coding (1: uneducated, 2: graduated from primary school, 3: graduated from secondary school, 4: graduated from high school, 5: have a university/polytechnic degree, 6: have a graduate degree); G represents the gender of respondents that is expressed as a variable of multiple regression (1: male, 2: female). It is stated as a dummy variable in other words 1 and 2 coding; P states the family population assigned to the number of people in the household; D represents the development level of the residential area of

[1] TL stands for Turkish Lira. The average exchange rate of 1 US $ is equal to 48.764 TL as at September- October 1995 during the survey application of this research.

respondents with coding (1: less-developed, 2: medium-developed and 3: developed places); K states the average daily kitchen solid waste generation per surveyed household.

The general formula of the estimated logarithm WTP function for industrial firms is given below: **Log WTP= log b_0 + b_1 (log P) + b_2 (log E)+ b_3 (log W) +b_4 (log S) + b_5 (log T).** Where; P states the net return of firms for defining the economic scale (1: under 100,000,000 TL, 2: 100 - 250,000,000 TL, 3: 250 - 500,000,000 TL, 4: 500 - 750,000,000 TL, 5: 750 - 1,000,000,000 TL, 6: 1000 - 1,500,000,000 TL, 7: 1,500 -3,000,000,000 TL, 8: 3,000 - 6,000,000,000 TL, 9: 6,000 - 12,000,000,000 TL and 10: greater than 12,000,000,000 TL); E represents the level of employment of each firm. To determine the effects of solid waste (S) and wastewater generation (W) and the level of treatment technology (T) (1: not any treatment facilities, 2: pre-treatment, 3: secondary treatment and 4: advanced treatment) on WTP measures of firms, these are defined as the independent variables of this function.

The estimated model does not include environmental quality parameters because there are no measurements to determine their values. Therefore, the estimated models both for households and industrial firms do not allow us to estimate changes in mean of WTP arising from changes in environmental quality.

3. BRIEF INFORMATION ON ENVIRONMENTAL CHARGES APPLICATION IN TURKEY

Some kinds of government intervention would be required to internalise the external costs, i.e., a tax on the polluter based on the estimated damage or external cost. Economic instruments achieve both reduced materials consumption and change in consumption patterns as in the language of Agenda 21 (Pearce, 1995). Generally economic instruments are a superior mean of achieving the sustainable use of natural resources.

An appropriate environmental tax can compensate for external economic costs of excessive use of environmental resources. A well-designed taxation system has great benefits for achieving a given environmental goal. For instance, faced with an emissions tax, each firm can compare various ways of reducing emissions and choose the best available solutions.

Pollution levels are excessive because polluters do not bear the full social cost of their actions. Such a tax is known as a Pigovian tax, after the name of the British economist A.C.Pigou (1877-1959), who, in his Economics of Welfare, proposed a tax as a suitable means of equating private and social cost. The idea of a pollution tax was first put forward by Pigou who suggested that polluters should face a tax based on the estimated damage caused by their pollutive activities (Turner et al, 1994). Today, Pigovian taxes tend to be known as pollution charges and some examples of charges which approximate Pigovian taxes do exist (Pearce and Turner, 1990). It is accepted that real-world charge could not come close to the theoretically correct Pigovian tax.

Coase (1960) pointed out that such overuse is not an unavoidable outcome. In principle, the consumers who demand higher environmental quality should be willing to find some way to bribe polluters to reduce the level of pollution to the efficient level. This does not happen because environmental quality is also a public good. As a result, no individual producer and consumer has much incentive to pay polluters to reduce their pollution. Collective action is needed to prevent free-riding (Bruce and Ellis, 1993).

Sustainable development can be promoted by acceptance of the polluter pays principle that is fairly known in policy circles. The OECD Council set the principle out in 1974. In order to secure an efficient allocation of resources, product prices should reflect the marginal social cost where the marginal pollution damage or marginal economic cost competent of marginal social cost has been evaluated in monetary terms (Pearce et al, 1990). The aim of that principle is to achieve the optimal level of pollution. This principle means that each economic agent must pay taxes or charges in proportion to the generation of pollution. Environmental taxes or charges are designed to improve the policy of sustainable development.

Pollution charges or taxes are an incentive system that operates through establishing prices for environmental services by the market mechanisms. The simplest conceptual form of a market-based incentive is the pollution taxes or charges which are imposed on effluents, noise nuisance, the collection and disposal of wastewater, products and differential taxes are used in a few countries (Pearce et al, 1990). The most important result of OECD countries application is that taxes or charges should be used to provide incentives for polluters to abate pollution.

Today, solid waste and wastewater charges and a deposit refund system are applied in Turkey. Emission, product and noise charges, tax differentiation,

tradable permits and enforcement incentives are not applied as economic instruments.

With the addition of the 44 th article to the Act of Municipality Income of 2464 by the Act of 3914 published in 1993, the payment of solid waste and wastewater charges by users have been legalised since 1994. These regulations were made to derive some income for local municipalities (Anonymous, 1993).

Buildings and establishments which are within the boundaries of the local municipalities pay solid waste charges. Users pay this charge to enable local municipalities to provide solid waste collection services. Solid waste charges cover only solid waste generated from buildings such as wastes from eating, drinking, and from using park and picnic areas. It does not contain any industrial, medical and kitchen solid waste which requires special precaution, costs and transportation vehicles for carrying, collecting and making them harmless to the environment.

Municipalities have to allocate these solid waste charge revenues to collecting, carrying and treating them to make them harmless to the environment and to human health (Article 44). The solid waste and wastewater charges are paid by the users of buildings. In empty buildings, these charges are paid by the landlord or landlady. The amount of monthly charges is determined according to building groups and degrees. Building groups are determined by the Regulation of Council of Ministry No 93/5l05. In accordance with this regulation, buildings are classified into seven categories. Each category is defined by the council of local municipalities taking into consideration the social and economic properties and area of building surroundings. According to this classification, residences belong to the seventh group. As a result, in 1994 they had to pay between 25.000-100.000 TL/month.

To determine the groups of buildings in each local area which are utilised as offices or establishments, criteria such as the number of students, the number of beds, the usage areas (m^2), the number of seats, the number of officials and also, the kinds and characteristics of activity and the contribution to the environmental pollution are used. In fact, there is not enough detailed regulation in the Act. Therefore, the local municipalities have a free hand to determine the charge to be paid by each establishment. The regulations do not cover how an individual firm's contribution to environmental pollution is determined. In practice, therefore, the authorities do not take into consideration that criterion.

This regulation is made to encourage the manager to treat their wastes. In fact, the charges system is not a suitable instrument for this objective. In practice, firms generally prefer to pay charges than to establish treatment plants. This signifies the lack of a strong relationship between the choice of low pollution technology investment and the payment of charges levied on individual firms.

Under this system, the local municipality councils have a large responsibility for determining the amount of monthly charges, according to the characteristics of buildings. In practice, some of the local municipalities determine the amount of charges according to various criteria such as building usage area (m^2), locations of buildings by street and/or district. A few municipalities classify the buildings in one group, others in two or three groups. This tendency leads to inequality of practice. To solve this problem, the local municipality council must examine the details, undertake some researches and evaluations in order to determine the amount of charges. So, the basic criterion which is currently used in Turkey's socio-economic conditions can be useful.

Wastewater charges are paid by buildings, offices, and other buildings which utilise the sewerage services in the municipality boundary. In the Act, the term of wastewater contains the contamination from residences, industry, and other uses. It is paid by users and for empty buildings, it is paid by the landlord and/or landlady. The charge for 1 m^3 of wastewater must be determined by the Council of local municipalities and be less than water consumption costs of 1 m^3 (Article 44). In order to determine this charge rate, the municipality takes into account the building groups for solid waste.

The wastewater charge and water consumption cost are collected by the metropolitan municipalities and sent to the local municipalities. In practice, the council of metropolitan and local municipalities can determine various amounts of wastewater charges. In this situation, water supply and sewerage organisations have to bring into force different charge rates for wastewater from district to district in a metropolitan municipality.

In Turkey, 40 million people live within the boundaries of municipalities. Depending on the local conditions for the sewerage and treatment plant the Provincial Bank of Turkey estimates that there is a need for 10 million TL/month as investment. According to that, at 1995 prices, 400 trillion TL will be needed until 2005 to solve the sewerage and treatment problems. This means that 40 trillion TL will be invested each year by the government (Demirel and Durusu, 1995).

Each user who discharges his wastewater in the sewage canals of the municipality has to pay a certain cost. According to economic theory, there should be a certain ratio between the services and the payment. For that reason, charges can only be paid for the supplied services. For instance in North Rhine-Westphalia State of Germany, the wastewater charge system depends on this approach (Pietrzeniuk, 1995). The wastewater charge should depend on the amount of wastewater or the load in the sewage system. The charge which would be collected from the consumers must meet the needs of the treatment costs of the municipality.

The Environment Act (No: 2873, Article 3) which came into force in 1983 endorsed the polluter pays principle and handled the environmental issue on a very broad scope. In line with this Act, a fund which finances pollution prevention was established in 1985[2]. The main objectives of the Fund had been defined as preventing environmental pollution and improving the environment (Article 1) (Anonymous, 1991). All transactions and procedures relating to the Fund shall be carried by the Ministry of Environment which shall manage the Fund through a central organisation. The Fund has no provincial organisation (Article 6). This regulation has integrated the Fund into the political aims of that Ministry. In fact, the management of the Fund is self-governing. For these reasons, the defined objectives of the Fund are realised weakly.

The central organisation of the Fund will consist of the paymaster, the Fund accountant, the tax assessors, the treasurer, the accountant fiduciaries, and the inventory and warehouse officials. The paymaster of the Fund is the Minister of Environment. The minister may delegate this authority to the other officials. The paymasters will have primarily authority to sign documents, and will manage the Fund and ensure that it is used in line with its purpose (Article 7). Local authorities, NGOs and other environmental institutions' representatives are not represented on the Board of the Fund. There is a contradiction between the organisational structure and the objectives of the Fund. On the other hand, the total fund revenues and the use of fund resources, such as credits for construction of the treatment plant and prevention and improvement project had been undetermined since 1985.

According to the environmental legislation, 10 % of the environmental charges consisting of solid waste and wastewater charges which are collected by municipalities must be sent to the Environmental Pollution Prevention

[2] Formulated according to article 19 of that Act.

Fund. 20 % of them which are collected by the local municipality around metropolitan areas must be sent to the metropolitan municipality for the aims of establishing and managing solid waste incineration and recycling plants. 70 % of the environmental charges must be used by municipalities to solve their solid waste problems. Also, they have to use their wastewater charge revenues to treat wastewater and to improve the water supply. The revenues of charges must only be used for the establishment and management of those services. Since 1994, it has been found that no local municipality has used its revenues towards these aims. Now, municipalities use the collected solid waste and wastewater charge revenues as part of their official budgets. The Ministry of Environment can only ask the local municipalities not to use the collected funds for their purposes, but it is powerless to prevent them from doing so, as it has no leverage on them. This is contradictory to the purpose of establishing those charges.

4. RESULTS AND DISCUSSION

4.1. Households

50 households (29.24 %) from the sample area live in medium-developed areas, 68 (39.77 %) live in less-developed areas, and 53 (30.99 %) live in developed areas. Some 61.40 % of respondents (105) are male and 38.60 % of them (66) are female. The literacy ratio in total respondents is 97.66 %, 100 % male and 93.94 % female who live in less-developed or in squatters' shack areas, generally.

The household population varies between 1 and 7. The average population per household is 3.38. 36.26 % of households live in houses or shanties while 63.74 % of households live in apartments. Most of the houses (19.30 %) in less-developed areas are heated by stoves. An important percentage (30.99 %) of houses heated by central heating systems is in Dikmen and Cebeci. 49.13 % of houses use natural gas for heating, they are located in Kavaklýdere and Cebeci. 35.67 % of households use coal and wood in their heating systems while 15.20 % use fuel oil.

The average household income per month is 34.392.104 TL. The range of household monthly income is 143,500,000 TL. In Dikmen, the average household income per month is 24,436,000 TL, in Cebeci, it is 34,438,405.8 TL and in Kavaklýdere, it is 48,961,538.5 TL. Income distribution in Çankaya district is like that to be found in the whole of Turkey which is not in balance in proportion to economic agents.

Ninety-two households (53.80 %) were born in the Ankara region. Seventy-nine households (46.20 %) migrated to Ankara from other Turkish cities. In recent years, concern for the environment has grown considerably. The mass media reflected this growing interest.

The kitchen solid waste generation of households varies in proportion to the number of population between 0,5-13 kg/day. The average kitchen solid waste generation per household is 3.285 kg/day; per person it is 0.982 kg/day. The average generation of daily solid waste in Cebeci is 0.811 kg/person, in Dikmen this amount is 1.375 kg/person, and in Kavaklýdere it is 0.615 kg/person. While the daily solid waste generation per person in summer is 0.925 kg, it is increased to 1.825 kg in winter because most of the households in Dikmen use stoves for heating. The variation in average solid waste generation per person between the three socio-economic groups is related to

life style, collection of reusable materials in garbage and the amount and source of fuels used for heating.

52.58 % of households collect reusable materials separately. The rate of households collecting reusable materials separately increases with the increasing level of income. The rate of households which do not collect reusable materials separately while living in houses or shanties (47.42 %) is less than the rate of households which collect reusable materials separately.

46.78 % of households are satisfied with municipality services like collecting garbage, and street cleaning, but 53.22 % of households are not satisfied with these services. 40 households are pleased with municipality services such as creation of new green areas and improvement of investment in environmental quality, but 131 households are not pleased with these.

The number of households who are aware of the polluter pays and user pays principles is 44 (25.73 %). Most of them are generally with a high educational level and enjoy high living standards. 127 households (74.27 %) stated that they have not heard about these principles.

The households pay an average of 350.000 TL/month for water supply in 1995. Half of it is a wastewater charge. The number of households who do not know that half of their water payment is a charge is 48.54%. 51.46 % of households know that it is a charge.

54.97 % of households proposed as first order that the public must be educated through mass communication media to increase its sensitivity to environmental concerns. This is followed by 49.12 % of households who proposed as second order that the polluters should be fined, 46.20 % of households proposed as third order that the polluters should be exposed, 30.41 % of households proposed as fourth order to reward those who are environmentally responsible, 25.73 % of households proposed as fifth order to arrange clean-up campaigns, 21.64 % of households proposed as sixth order that pollution control inspection must be increased by the competent authority, and 5.26 % of households proposed as seventh order that polluters must be held responsible for cleaning up pollution.

Each individual's willingness to pay will differ. Since we are interested in what is socially desirable, we can aggregate the individual's WTP to secure a total WTP. While we can safely assume that people will not be willing to pay for something they do not want, we cannot be sure that WTP as measured by

market prices accurately measures the whole benefit to either individuals or society (Mitchell and Carson, 1994).

While 42.69 % (73) of households do not want to make any financial contributions for the improvement of the living environmental quality, 57.31 % (98) of the households are willing to contribute.

75.00 % of households having an income of 8 millions TL/month and less, 66.67 % of households having an income of 8-16 millions TL/month, 40.00 % of households having an income of 16-24 millions TL/month, and 43.90 % of households having an income of 24-32 millions TL/month are not willing to make a financial contribution to improve environmental quality. The willingness to pay (WTP) of households varies between 0 and 15.000.000 TL/month. It has been found that 71.43 % of the households which want to contribute financially show a tendency to pay up to 1,000,000 TL/month, 20.41 % of them show a tendency to pay 1,000,000-2,500,000 TL/month, 5 % show a tendency to pay 2,500,001-5,000,000 TL/month, 2.04 % show a tendency to pay 5,000,001-10,000,000 TL/month, and 1,02 % show a tendency to pay 10.000.001-20.000.000 TL/month.

The willingness to accept (WTA) of households varies between 0 and 30,000,000 TL/month. It has been determined that while 52.04 % of the households which are willing to contribute financially to improve the environmental quality services show a tendency to accept up to 1,000,000 TL/month, 14.29 % of them show a tendency to accept between 1,000,001-2,500,000 TL/month, 8.16 % show a tendency to accept between 2,500,001 and 5,000,000 TL/month, 5.10 % show a tendency to accept between 5,000,001 and 10,000,000 TL/month, 13.27 % of them show a tendency to accept between 10.000.001 and 20.000.000 TL/month, and 7.14 % of them show a tendency to accept between 20,000,001 and 30,000,000 TL/month.

The contingent valuation results are shown in Table 1. As seen in that table, the average WTP of households for the improvement of the environmental quality is 744,152 TL as charges or taxes. The average WTA of households for it is 2,964,912 TL. It has been determined that there are 3.98 as much difference between WTP and WTA. WTA is higher than WTP by about 2.220.760 TL.

Table 1. The Contingent Valuation Results of Households

Items	***WTP***	***WTA***	***Differences***
Mean (TL)	744,152	2,964,912	2,220,760

Standard Error of Mean	62,843	433,541	-
Range (TL)	0-15,000,000	0-30,000,000	15,000,000
Median (TL)	821,778	5,669,283	-

The large empirical divergence between individuals` WTP and WTA measures may not be indicative of some failure in the research methodology. This situation is accepted as a general perception (Hanemann, 1994). WTP and WTA are not the same; some economists found that they differ in many studies (Pearce and Turner, 1990). Previous empirical research reveals that WTP is several times lower, typically one-third to one-fifth than WTA (Whitehead, 1994).

At the significance level of 95 %, the confidence interval of WTP varies between 742,375.22 TL and 745,928.78 TL and the same confidence interval of WTA varies between 2,960,245.2 TL and 2,969,578.8 TL.

As seen in Table 2, there is an important difference between WTP and WTA measures of respondents and the development stage of residential areas. If we compare the developed area with the less and medium-developed areas, we can see that the WTP of the developed area is 2.04 times more than the less-developed area and 1.69 times more than the medium-developed area. Similarly, the WTA measures of respondents is increased in proportion to the development stage of residential areas.

Table 2. The Differences Between WTP and WTA Measures of Households and the Development Level of Residential Areas

Residential Area Characteristics	**WTP**		**WTA**	
	Mean (TL)	**Standard Error of Mean**	**Mean (TL)**	**Standard Error of Mean**
Less-Developed Area	571,428.57	105,644	1,137,755.45	366,185
Medium-Developed Area	965,714.63	229,146	4,212,142.63	988,667
Developed Area	1,166,345.73	207,130	5,171,153.73	1,143,372

The WTP gives an automatic monetary indicator of preferences. A policy of preventing the loss may not be justifiable if the measure of the benefit is based on WTP to prevent the loss, but justifiable if the benefit is measured as WTA compensation to tolerate the loss (Pearce and Turner,1990). Each household's and firm's WTP for a small improvement of environmental quality will differ in income level and individuals preferences.

WTP is generally used to consider the valuation of a potential environmental benefit. The WTP approach is still based on the notion that the

true costs of unfavourable impacts are the total amount that people would be willing to pay to avoid them (Knetsch, 1990). The willingness to pay for environmental goods or services declines as the amount of its availability rises, and WTP rises as the ability to pay for household income increases. The optimal level of pollution occurs where the marginal willingness to pay for an increase in environmental quality is just equal to the marginal cost of supplying it (Bruce and Ellis, 1993).

In monetary terms, the contribution tendency of individual consumers for improving environmental quality services is affected by various socio-economic indicators. At the significance level of $x^2_{0.01}$ they are significant factors such as residential area, total household income per month, characteristics of resident house and awareness of polluter pays and user pays principles. At the significance level of $x^2_{0.05}$, factors such as gender and occupation of respondents have important effects on consumer tendency. At the significance level of $x^2_{0.10}$, age, educational level of respondents, household population and kitchen solid waste generation variables have important effects on it.

A few socio-economic factors have a significant influence on WTP for improving the environmental quality between individuals. Regression analysis is used to assess the factors influencing expressed WTP for better environmental quality, including income level and some demographic factors. To explain the effects these factors have on WTP, Ordinary Least Squares (OLS) regressions were conducted. The type of WTP function is estimated as logarithm which is given in Table 3.

Table 3. Regression Estimates For WTP Function of Households

Explanatory Variables	***Regression Coefficient***	***Standard Error***	***t-Value***
Constant	3.384	0.5613	6.029[1]
Household Monthly Income	2.666	1.0440	2.554[1]
Age of Respondents	-0.403	0.5400	-0.746[2]
Educational Level of Respondents	0.149	0.1207	1.235[2]
Gender of Respondents	0.112	0.1226	0.914[2]
Number of Population in Households	0.541	0.6990	0.774[2]
Development Level of Residential Area	0.434	0.3380	1.284[2]
Average Daily Kitchen Solid Waste Generation of Households	2.876	1.2030	2.391[1]
R^2	0.5230	0.1452	F= 25.5314

([1]) These values are significant at 1 % level statistically.
([2]) These values are not significant at 10 % level statistically.

The results indicate that expressed WTP is positively correlated with the higher level of income of individual consumers. Consumers who have higher incomes are clearly more willing to pay a higher level of charges or taxes for defining purpose. There is a negative relationship between age of respondents and their WTP. The level of education was found to be positively correlated with WTP to improve the environmental quality. Generally, individual consumers who have a higher level of education are presumably better informed about environmental pollution. The mean WTP for male respondents is significantly greater than for female respondents. This outcome indicates

that men are more aware of environmental pollution control than women. Finally, there is a positive relationship between the number of population in surveyed households, the development level of residential area and the average daily kitchen solid waste generation of households and the expressed WTP measure.

The results indicate that WTP is positively correlated with higher level of income, education, gender, development level of residential area of respondents, average daily solid waste generation and the number of population in surveyed households and negatively correlated with the age of respondents.

Theoretically, it is expected that the parameter values of income, development level of residential area, educational level of respondents and solid waste generation of households variables of WTP function are important statistically. In this study, it has been determined that the income and average daily solid waste generation parameters only have an important value at the significance level of 1 %. The other parameter values are not significant statistically. This consequence may occur as a result of the bias in the stages of design of the questionnaire, interview process, sampling process and the analysis of the responses. The value of R^2 of WTP function has 0.523 (F= 25.5314), which is important at the significance level of 1 %. The R^2 means that the ability of regressors or explanatory variables in this function are explained in the changing of WTP functions only 52.30 %.

The correlation coefficient explains the relation between the independent variables that are affected by WTP. It has been found that the income and sex parameters of the WTP function are highly correlated with the amount of the individual WTP and that the other parameters of the function are not statistically important.

4.2. Industrial Firms

The development of industry in Ankara through government policies gives priorities to the private sector especially since 1950. Today the number of members registered with the Ankara Chamber of Industry has reached 2200. Legally, 72.77 % of the member firms have a legal identity, 26.05 % of the member firms is real entity, 1.05 % is public enterprises, and 0.13 % is co-operative enterprises. Firms have engaged in the same type of activity for more than 10 years.

13 firms have employed less than 35 workers, 17 firms have employed between 36 and 150 workers, and 14 firms have employed more than 151 workers. The net profits of firms vary between 270,000,000 and 120,000,000,000 TL/year. The average net profit of firms per year is determined as 1,558,155,200 TL.

84.09 % (37) of firms generate wastewater. The generation of wastewater by firms varies according to their size and the characteristics of their processes. 56.82 % (25) of firms' wastewater generation varies between 1 and 100 m^3/day, 9.09 % (4) varies between 101 and 500 m^3/day, 13.64 % (6) varies between 501 and 1000 m^3/day, and 20.45 % (9) is more than 1001 m^3/day. The level of kitchen wastewater generation of firms varies according to their employment capacity. 63.63 % (28) of firms' kitchen wastewater generation is between 1-20 m^3/day, 9.09 % (4) is between 21-50 m^3/day, 13.64 % (6) is between 51-100 m^3/day, and 13.64 % (6) is more than 101 m^3/day.

56.82 % of firms have their own treatment plant or share a wastewater treatment plant with another establishment. 43.18 % of firms discharge their wastewater without treatment to receiving bodies such as sewerage, lake, stream, land, and septic tank. 37.50 % of firms treat their wastewater with physical treatment processes, 25 % of them treat it biologically, 12.50 % of them use both physical and biological processes, and 25 % of them treat it with both physical and chemical processes.

Firms which employ between 1 and 35 people generate kitchen solid waste between 8 and 32 kg/day and its average is 18.50 kg/day/firm. Firms which employ between 36 and 150 people generate an average of 82.44 kg/day/firm. In the firms which employ more than 151 people, the average kitchen solid waste is 149.40 kg/day/firm. The kitchen solid waste of firms is taken to the municipalities landfill. All firms sell their industrial wastes except treatment sludge. The average treatment sludge generation is 470.72 kg/day. It is utilised as fertiliser in agriculture, reused in manufacturing processes.

Firms release some pollutants into the atmosphere, such as CO_x, NO_x, and SO_x from the units of electricity power house, steam powerhouse and the others. But the level of these gas emissions is not determined by the firms. 56.82 % (25) of firms use coal for heating and steam production, 29.54 % (13) use fuel oil and 13.64 % (6) use natural gas. It has been determined that 29.54 % (13) of firms had a licence for gaseous emission and 20.45 % (9) of firms had a licence for wastewater discharge.

Firms complained of noise originating from the machinery used in the establishment, and from the traffic. 71.43 % of firms questioned had measured noise levels. People worked 7 hours a day with an average noise level of 75-85 dBA. Firms use certain measures to decrease the noise level such as noise isolation, making use of earphones for workers.

Firm managers stated that investments to treat the wastewater, solid and other wastes so as to make them harmless to the environment would increase the unit cost of products by 2 to 3 % on average.

The managers state that while holding pollution at a minimal level, they want the improvement of industrialisation. For this objective, both old and new industrial firms have to establish treatment plants and operate them regularly. All existing industries should be required to develop programmes for the reduction of waste discharges within national guidelines and within specified and enforceable time-frames.

The percentage of firms who are aware of the polluter pays and user pays principles is 95.45 %. Also the managers accepted that these principles have to require the environmentally sound production responsibility to their firms. 44 firms said that only charges or taxes on pollution are not enough for the protection of environmental quality. Because taxes or charges on pollution are items in the total production costs for firms. They have a tendency to transfer the load of taxes to individual consumers through the price mechanism. Also, because of the current environmental and municipal regulations, tax revenues are used for political aims by the authorities.

While 9.09 % (4) of firms do not want to make financial contributions for improving the environmental quality, 90.91 % (40) of the firms are willing to contribute according to their financial possibilities. The information about willingness of individual firms is displayed in Table 4. The WTP of firms varies between 1,000,000 and 30,000,000 TL/month. The average WTP of firms is 8,121,591 TL for improving environmental quality as charges or taxes. At the significance level of 95 %, the confidence interval of WTP varies between 8,115,547.2 and 8,127,634.8 TL/month.

Table 4. The Contingent Valuation Results of Industrial Firms

Items	***WTP***	***WTA***	***Differences***
Mean (TL)	8,121,591	17,735,228	9,613,637
Standard Error of Mean	1,433,414	3,157,026	-
Range (TL)	30,000,000	80,000,000	50,000,000
Median (TL)	2,900,000	7,750,000	-

The WTP of 14 firms varies between 0 and 2,800,000 TL/month which would generate a net profit of 1 billion TL/year. The WTP of 13 firms varies between 1,000,000 and 3,000,000 TL/month which may generate a net profit between 1 and 5 billions TL/year. The WTP of 13 firms varies between 3,000,000 and 30,000,000 TL/month which would generate a net profit of more than 5 billions TL/year. The WTA of firms varies between 1,000,000 and

80,000,000 TL/month. At the significance level of 95 %, the confidence interval of WTA varies between 17,744,197.3 and 17,762,135.9 TL/ month.

Factors effecting WTP are tested using regression analysis. Firstly the relationship between WTP and solid waste and wastewater generation, net profits of firms, number of officials, and the level of treatment technology are tested. It has been determined that there is a statistically significant relationship between WTP measures and all the explanatory variables. Firms with higher net profits and employment level are totally more willing to pay a higher level of charges or taxes for the defined aim. A negative relationship exits between average daily wastewater, solid waste generation and the level of treatment technology, and their expressed WTP measure. In fact, it is expected that firms which have treatment facilities, would not be willing to pay charges, because they do not pollute the environment as much as those without treatment facilities. On the other hand, there is a negative relationship between average daily wastewater and solid waste generation and WTP. If a firm pollutes the environment, it has to pay more than the firms which have treated their wastes. This consequence may be a result of the inefficient environmental awareness of the firms' authorities.

The type of WTP function for firms is estimated as logarithm which is given in Table 5. The explanatory variables which are net profit of firms, the employment level or number of officials, the average daily wastewater and solid waste generation and the level of treatment technology explained 77.20 % in the changing of the level of WTP. The capital R^2 value is significant at the significance level of 1 %.

Table 5. Regression Estimates For WTP Function of Firms

Explanatory Variables	***Regression Coefficient***	***Standard Error***	***t-Value***
Constant	4.1516	1.0344	4.014[1]
Net Profit	1.1320	0.1009	11.219[1]
Employment Level	1.8680	0.5336	3.501[1]
Average Daily Wastewater Generation	-1.7662	0.4793	-3.685 [1]
Average Daily Solid Waste Generation	-1.6107	0.5473	-2.943 [1]
Level of Treatment Technology	-1.6673	0.6354	-2.624 [1]
R^2	0.7720	0.5220	F=25.7334

([1]) These values are significant at 1 % level statistically.

It has been determined that the value of parameters are statistically significant at the significance level of 1 %.

4.3. The Relationship Between Current Environmental Charges Payment and Individual Consumers and Producers WTP Measures

13.45 % of the households state that the local municipality and public authority allocate the revenue of environmental charges to improve and protect the environment. 86.55 % of them state that they do not allocate the revenue of environmental charges to their objectives. Individual consumers declare that the reason behind the creation of the environmental charges system in Turkey was politics and that the revenue collected through these instruments is being used for the political aims of the competent authorities.

9.36 % of the households state that charges or taxes on pollution are instrumental in the protection of environmental quality. 90.64 % of them declare that only charges on pollutant matters are not instrumental in environmental protection. They stated that an environmental policy appropriate to the local conditions of Turkey should be created. This may be achieved through a comprehensive environmental policy which consisted of taxes, standards, and other economic and technical instruments.

Because of the non-detailed nature of environmental regulations, especially industry and households with high living standards produce high levels of pollution, but consumers who generally have low living standards, pay for it.

According to the results of this survey, unless strict environmental regulations are established, taxes are not tools powerful enough to protect environmental quality. In order to protect environmental quality, comprehensive policies ought to be set up which would include various instruments such as taxes, standards, levies, incentives and so on. These must be proportionate to the socio-economic characteristics of polluters.

All households state that solid waste charges are insufficient and unfair, since they are determined without taking into account kitchen solid waste generation per household in proportion to the size of the household, the living standard of the household, and the other relevant socio-economic indicators. Each local municipality in a metropolitan city applies different charges for solid waste and wastewater and this leads to inequality. For these reasons charge rates, base and the competent authority should be reorganised.

100 % of managers accept that firms have to pay pollution participation fees according to the generation of wastes and its pollutant parameters. Private

industrial establishments could afford to finance their pollution control operations if the regulations were enforced.

According to the survey results, to bring about some changes in business community attitudes, firstly businessmen must be educated by appropriate means. During the design of plants, the selection of treatment technologies and the establishment of treatment plants have to be arranged. Also taxes, charges and other economic instruments may be useful to encourage firms to increase environmentally sound management.

The solid and wastewater charges should be increased parallel to the amount of solid waste and wastewater generated by firms. To determine solid and wastewater charges or taxes in this way, an inventory of wastes of each firm must be taken.

The municipalities should allocate industrial areas in the city's development plans. In these industrial areas, infrastructure services must be provided by the municipality. Also, in these areas, the municipality should establish wastewater, solid waste treatment and recycling plants. The operational and investment costs of these plants should be provided by the users according to their load. 100 % of firms agree on this idea. They believe this policy would be successful especially in the new industrial areas. As a result, the idea ought to be adopted as policy by the municipalities and the Ministry of Environment. It should be applied to minimise industrial wastes.

All small and medium size enterprises state that if the municipality establishes these shared treatment facilities in the industrial area, the treatment would be organised easily, and it would be cheaper than the individual treatment facilities and inspection would be easy. The treatment sludge of these plants can be used in agriculture as fertiliser and for other uses. Treated water can be used for the irrigation of green areas and reusable waste can be separated and recycled for re-use or selling. Therefore, the treatment cost of individual firms will decrease because of the economies of scale.

All WTP measures of both households and producers are efficient with respect to the opportunity cost of providing better environmental quality. On the other hand, the individuals` WTP measures are inconsistent with the symmetry of actual charges payment in this case as means to control environmental pollution.

The average solid waste and wastewater charges payment per households and industrial firms are noticeably lower than the mean values of their WTP as charges or taxes. Thus, the average WTP as charges of households is 3.8 times and that of individual firms is 4.2 times more than their average actual charges payment. The respondents implied that they did not believe the efficient usage

of charitable funds to conserve the environment by the authorities. Although households and firms' authorities did not want to pay charges or taxes, they did feel that these instruments were more likely to provide effective environmental conservation than other instruments. Thus, environmental charges are a more efficient economic instrument than charitable donations. But environmental charges or taxes regulations must be drawn up by governments as an instrument of conservation policies in Turkey as well as in other developing countries.

5. CONCLUSIONS

The results of these kinds of research have great benefits for environment policy-makers as they readjust their environmental policies. In fact, accurate information about an appropriate pollution taxes or charges level depends on accurate information regarding the social costs of pollution damages on each economic agent welfare. In this research, both individual consumers and producers are generally willing to pay for avoiding the unfavourable impacts of environmental pollution 3-4 times more than the actual charges payment level in this case. Due to the inefficient use of environmental charges revenues, both consumers and producers do not generally like to pay charges or taxes. The economic instruments of environmental conservation policies may be undertaken with the use of the individuals` WTP measures. For this aim, environmental authorities and other institutions must undertake some research projects related to this subject according to each socio-economic group in the economy at both local and national levels.

In Turkey, in local standing, solid waste and wastewater charges had been used since 1994. But there is a dichotomy between the establishing of these charges and the use of the charge revenues. They are generally used for political aims and allowances for official costs. For this reason, new legislation on the environmental charges or taxes policy must be created. Current policy must be reorganised to suit the national socio-economic characteristics of Turkey and to be concordant with the general direction of the EU application. In order to harmonise environmental legislation as a part of EU integration, the Turkish Government has to seek and regulate new environmental taxes on polluting products and/or processes.

The use of revenues from the charges must be addressed by the new regulation. The fact that the most part of revenues is being used by individual local municipalities is causing inefficient use of financial resources. Instead of this regulation, one or more suitable places in the city plan, could be selected

by municipalities so that solid waste and wastewater treatment plants can be built on them. These plants can be co-managed by all local municipalities in a city.

Local environmental taxes or charges revenue may be collected by a Local Environmental Fund which is autonomous from the central government. These financial resources must be used for waste incineration, improvement of the waste collecting system, treatment of solid waste and wastewater and other environmental investments. Also, environmental authorities and local municipalities must persuade the users that these collected charges are for establishing treatment plants and for operating them regularly.

The government and other environmentalist organisations have to persuade both the public and the firms that environmental taxes are required to improve the environmental quality by enhancement of public information and education measures. These can consist of handbooks, brochures, videos for taxpayers, conferences on health and safety in environmental pollution, preparation and publication of a journalist's guide to environmental pollution and taxes, recommendation for a harmonised approach to public information, a practical guide for public, short-term courses, information campaigns, professional training, multi-media campaigns and conferences and so on. The competent authorities should select appropriate measures to raise the public and entrepreneurs' awareness. To encourage environmental pollution prevention investments, environmental tax revenues should be used. The collection of national environmental taxes revenues must be managed through a certain fund that may be called "National Environmental Fund". The financial sources of that Fund should be used to improve the environmental quality, such as structural and environmental reform in agriculture, environmental reform and pollution abatement technology investment in energy, tourism, transportation and trade sectors, decreasing the distortion of the global economy, improving public education and increasing the awareness and so on. The central government may only exercise the financial control of that fund.

Pollutant products and/or processes are subjected to an appropriate tax which is proportional to the solid waste and wastewater generation, emission of air pollutants and so on. Products taxes which are the most practical and reasonably efficient policy instrument available are imposed on products, such as batteries, glass bottles, plastic materials, paper package and the others. The tax would be equal and/or high enough to collect and clean up these materials. It might be provided by differentiated product taxing. A deposit refund system should be applied on beverage containers and mandatory recycling must be integrated into the product and package taxes as in other countries especially

the EU experiments. Also, this system may be useful for agricultural chemical package materials.

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