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The Influence of Factors Affecting the Willingness to Pay for Reduction of Air Pollution in Zimmerman

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Abstract

Purpose: The purpose of this study was to identify the factors that determine the willingness to pay for reduction in air pollution in Zimmerman.

Methodology: System random sampling was used to select the sample of the study. The sample size was limited to 150 households. Ordinary least squares technique was applied in the data analysis to investigate the influence of the identified explanatory variables on the willingness to pay.

Results: The study results showed that the size of household, age, marital status of respondent and incidence of a polluted illness in a respondent's household are related to the willingness to pay for reduction in air pollution although they are insignificant at the 95 percent level of significance.

Unique contribution to theory, practice and policy: The study recommended that increasing the income of the individuals may lead to an increase in the charges for air pollution abatement. Educating the people about the virtues of a pollution free environment may increase their willingness to pay for air pollution reduction via payment vehicle such as taxes and service charges or higher prices. The government can help reduce the housing problem by solving the air pollution problem which will further encourage investments in residential housing units in the undeveloped parts of Zimmerman given that it is an important residential estate for the lower middle class to the upper middle class groups as evidenced from the income data gathered.

Keywords: *air pollution, willingness to pay, factors*

1.0 INTRODUCTION

Zimmerman is a relatively recent residential estate that was developed along Thika Road. It is approximately six kilometers from the city and is in the wider Kasarani Administration Zone of Nairobi which occupies about 15 kilometers and has about 26.692 people according to the 1989 population census and subsequent projection.

In spite of its being largely a residential area, a tannery is located within Zimmerman. The tannery is called Abdul Wadood Tanning Ltd. (formally Kamiti Tanners Ltd). Effluence from the tanning operations emits an unpleasant gas that spreads to the surroundings. The emissions are irritating to those who inhale them. A pre-study visit in the area established that many residents who rent houses especially within the neighborhood of the tannery seek alternative housing because of air pollution resulting from gas emissions. Some claim that the gas emissions have been responsible for the rapid deterioration of their roofing materials, (mainly corrugated iron sheets).The claim has however not been supported by any empirical study. The World Bank Technical Paper Number 55 (1988) recognizes tanneries as Industries utilizing hazardous materials mainly organic solvents, sulphide and inorganic chrome compounds.

1.2 Statement of the problem

The World Bank Environment Guidelines (1988) has recognized that consideration for disposal of wastes from tanneries should include among other factors a safe distance from existing or planned residential area, commercial and recreational areas because of potential environmental pollution problems that may result from the wastes. Although data on water and soil pollution is not readily available for purposes of this study, there is however evidence of air pollution in Zimmerman Estate. Where nasty smells are emitted from the tannery to the immediate residential neighborhood (There is virtually no separating distance between residential houses and the tannery.

Smells are undesirable and as much a nuisance as noise, dirt or corrosion of building materials. Smell affect peoples' frame of mind. They are subjective partly because a person's attitude to the cause of a smell affects his view of the smell itself e.g. the employees in the tannery associate the smells with their source of income and soon ignore them, but any psychological accommodation to an inevitable smell has been termed as a hardening of sensitivity and destruction of at least some aesthetic subtleties(see for example Richard Scorer 1968).and we have no right to impose smells on others on the ground that if they had the right mental attitude to them(smells)they would object. When a nose has been rendered more or less insensitive to the elements causing it. Odour usually are measured by organoleptic methods' that involve people's ratings of odour strength. Even though individual odour perception abilities frequently differ by order of magnitude, the human nose remains more accurate than other measuring instruments, particularly when several different compounds interact (see Agrafiotis, 1978).

The protection of the environment in Kenya falls under the Ministry of Environment and Natural Resources. The Kenya National Environment Action Plan (NEAP) 1994 acknowledges

A common odour judgment scale ranges from zero to five

0 – no odour

1 – Threshold odour

2 – Slight odour

3 – Moderate odour

4 – Strong odour

5 – Very strong odour

That there is a growing public concern that over the many forms of economic development activities that damage the environment. A major environment and development challenge today is to maintain the equilibrium between population, ecosystems and development, and how to meet the human needs in ways that do not destroy the environment. In regard to gaseous emission and solid wastes, the NEAP proposes among other measures formulation of a policy on control and management of gaseous emissions; enactment of supporting legislation: promotion and support of 'cleaner' production technologies with economic incentives: provision of adequate storage facilities for solid: waste collection and disposal frequencies; review location of disposal sites and development of acceptable procedures for waste management.

The Government is aware of the conflict between economic development objectives and environmental pollution. The 1994-1996 development plan details the government's commitment to integrate environmental consideration in development programs and projects and calls for increased efforts towards management and conservation of the environment. Often decisions have to be made as between investing in a private good or in unpriced public good such as air pollution control rather than new output capacity. Alternatively the comparison may be between two or more unpriced public goods such as air quality versus water quality. In this choice context it is necessary to impute a value to the environmental good or service. Imputing values involves finding some measure of willingness to pay for environmental quality in circumstances where market fail to reveal that information directly.

Market failure is more pronounced when the negative externalities of the polluting firm are borne by the residents who inhale polluted air. Failure to account for these negative externalities gives rise to a misallocation of resources through application of technologies that do not minimize pollution. Making better informed choices to avoid this misallocation of resources involves understanding the value of the "external" costs and then finding a mechanism for integrating these values back into the original decision to choose an appropriate technology that may reduce air pollution.

Choosing "instruments" is the mechanism where the resulting values are reflected in decision making. Where waste disposal of a tannery give rise to loss of wellbeing then the value of that loss should be reflected in the private costs of disposing the wastes. This might be achieved by taxing the waste discharges or by setting some environmental standard for the effluence or by requiring the discharger to buy permits for the effluence. Valuation is essential if the scale of tax or strength of regulation is to be determined. In practice environmental standards are often set by criteria that incorporate some features of the valuation process. E.g. Damage to health would be an integral part of any valuation process where people would be willing to pay to avoid health risks from pollution and waste. In some cases environmental standards are set without any clear or detailed rationale. Economic valuation is therefore useful as a check on the criteria implicitly being used.

In the light of the above the present study will attempt to identify the factors that determine the willingness to pay for reduction in air pollution in Zimmerman.

1.3 Objective of the study

i. To identify the factors that determines the willingness to pay for reduction in air pollution in Zimmerman.

2.0 LITERATURE REVIEW

2.1 Property Values and Benefits Estimation

The use of residential property value data as the basis for estimating the benefits of changes in measures of environmental quality such as air pollution was pioneered by Ronald Ridker (1967).

He based his argument on the view that some environmental characteristics such as air quality may affect the productivity of land as either a producers' good or consumers' good. Where this is so the structure of land rents and prices will determine productivity differentials. This aroused considerable interest among economists about the possibility of using data on land rent or land value for residential properties to measure benefits to households brought about by improvements in environmental characteristics such as air quality .Ronald Ridker (1967) argued as follows:-

"If the land market were to work perfectly, the price of a plot of land would equal the sum of the present discounted streams of benefits and costs derivable from it. If some of its costs rise or if some of its benefits fall the property will be discounted in the marker to reflect people's evaluation of the changes. Since air pollution is specific to locations and the supply of locations is fixed there is less likelihood that the negative effects of pollution can be significantly shifted on to other markets. We should therefore expect to find the majority of effects reflected in this market and we can measure them by observing associated changes in property values".

Ridker and Henning (1967) regressed median census property values on a measure of sulphate air pollution and found significant inverse relationship. Specifically they argued that the coefficient on the air pollution variable in the regression equation could be used to predict the change in the price of any residence conditional to a change in its air pollution level and that the sum of all changes could be taken as a measure of the benefit of improving air quality in the urban area.

Since Ridker (1967) an extensive literature developed on the proper interpretation of air pollution-property value data. Following Ridker's initials insight by examining how and under what circumstances changes in property values over time could be predicted and used as an estimate of benefits.

Lind (1973) established that property value changes measure benefits accurately only when some mechanism exists to ensure that all potential surplus[3] [are] eliminated by higher land rent. If potential land users are forced to bid against each other for the use of a parcel of land with improved air quality, rents and property values will rise until land users are indifferent between improved parcels at higher rents and more polluted parcels at lower rents. Then land users willingness to pay for cleaner air is completely captured by land owners rent. Whether surpluses are eliminated depends on the pattern and determinants of demand for land and whether the land

market under consideration is part of a larger open economic system. This was best explained by an example where land is used only as input in production, in a valley with homogenous agricultural land but where land for example in the south unlike the north is exposed to air pollution which reduces agricultural productivity and supposing the air pollution is eliminated in the south raising productivity of land to equal the north. If the increased output from south land is sufficient to depress agricultural prices, at least some of the benefits of air quality improvement accrue to consumers of agricultural products in the form of surplus. These benefits are not captured by change in land rents. A necessary condition for land rents changes to measure benefits is that there be no changes in output prices of other inputs. Rents in the north are unaffected by the improved air quality in the south. Land in the south area now has the same productivity as the north land. The rise in rent accurately measure the benefits of improved air quality. In the case where there are many different types of activities within the valley, some may enter while others may exit, while entirely new activities might enter the valley motivated by an improvement in profits given by the new patter of land rents and prices.

2.2 The Hedonic Price Function

The concept of hedonic prices uses the notion that the price of a heterogeneous good like a house or a job can be decomposed into the prices of the attributes that make up the good such as air quality in the case of a house. This follows the works of Lancaster (1966) Ridker and Henning (1967), Harrison and Rubinfield (1978a and 1978b). Blomquist and Worley (1981), Freeman (1982) and Palmquist (1984) that consumers consider the level of air quality as well as the other characteristics of houses when deciding about their location for living and therefore it is expected that house prices will differ depending on the level of air quality at their location.

The theoretical origin of the Hedonic price model was by Rosen (1974). He observed heterogeneous goods like houses are valued for the bundle of utility bearing attributes embodied in a particular heterogeneous good changes, the value of the good changes for both consumers and producers.

Rosen (1974) assumed a competitive market where consumers and producers interact to determine the equilibrium prices for heterogeneous goods. Consumers and producers demand and offer house attributes in a number of implicit non-observed market for the different attributes are also in equilibrium and there exists an equilibrium implicit market price for each attribute of the good.

2.3 The Expenditure Approach

Michelson and Tourin (1996) have suggested that direct expenditures on pollution abatement can be proxy for the benefit of environmental quality.

This method however neglects the real issues of what are the gains in social welfare from the clean-up and whether the optimal level of abatement has been selected. On cannot argue that the value equals the cost of facilities. Organisations dealing with abatement of pollution such as local authorities may pass costs to others or may be subsidized by the central government. Only part of the damaged is paid for and some of the damage cannot be repaired. This pollution abatement method implies that environmental quality values change with technological progress in control methods.

Maler and Wyzga (1976) argued that many economic approximations for environmental pollution costs can be based on the costs of clean-up such as cleaning costs for materials or buildings, vehicles, accelerated replacement of metals or other material and equipment, and growth retardation of flora and fauna.

2.4. WILLINGESS TO PAY WTP VERSUS WILLINGNESS TO ACCEPT (WTP)

Once CVM is adopted there is often a problem of how to value preferences for commodities. Should the preferences be measure by WTP or WTP and why? Peace and Markandya (1994) submit that the choice of the method is determined by the choice of decision in question. Removal of a bad necessitates the use of WTA while introduction of a good calls for WTP. Suppose a project that has diverse health effects on residents is introduced in an area. If the project must progress, residents would need to be compensated in some form for the loss in the welfare. The measure of the minimum compensation that would fully indemnify their welfare losses is termed as WTA.

Suppose now that the project was socially beneficial and residents were campaigning to obtain it. The maximum amount each resident would pay to express his need for the project is described by WTP.

Until recently it was estimated that in most practical situations the difference between WTP and WTA was small. Willing (1976) analysed this issue and concluded that in a variety of market situations the difference would be negligible. Russell (1978) also held the view that the difference between WTP and WTA in empirical studies is by chance and should not be taken seriously.

2.5 Empirical review

Knetsh (1990) perceived the differences to be significant and sought to explain them. He argued that people tend to overstate that they must receive and understate what they must pay so as to make again. Available evidence of people tend to overstate what they must receive and understate what they must pay to make again. Available evidence of people's behaviour shows that a loss of say Ksh 500 from ones salary is felt more painfully than the joy of an increment of the same amount. Therefore policy measures that mitigate losses may thus be more painfully than the joy of an increment of the same amount. Therefore policy measures that mitigate losses may thus be more desirable than those that allow the damage to occur and then compensate the individuals effected.

Whether an elicitation question in a contigent valuation is phrased in terms of willingness to pay or willingness to accept depends on which Hicksian consumer surplus measure the researcher wants to obtain. The choice between the WTP or WTA formulation is a question of property rights, does the agent have the right to the good in question of if he wants to enjoy it does he have to buy it Coase(1960), Knetsh (1983,1985) and Polinsky (1979). Since we are dealing with a public good this question is not easy to answer. The traditional way of measuring benefits is based on the estimation of some form of ordinary demand curve which allows the researcher to obtain the Marshallian consumer surplus. The Marshallian consumer surplus avoids the problem of having to make a decision about the appropriate property right but it suffers from the serious flaw of not being a true measure of an agents welfare change. as a result the researcher is faced

with the task of deciding with Hicksian consumer surplus measure to use for a given welfare change . The CVM provides the only way of directly measuring both WTP and WTA.

Compensating variation is the measure of what a consumer is willing to pay to secure a price fall so to leave him as well of as before. on the other hand equivalent variation is measure of the amount that a consumer would need to be paid to forgo a price fall so as to as well of as before the new price.

Bishop and Heberlain (1979, 1980) argued that the differences in WTP and WTA in CVM surveys may be as a result of rejection of the WTA property right. People are motivated to give higher WTA values because they reject the property rights implied by the WTA format.

Hoehn and Randall (1983, 1985a, 1987) argued that the difference between WTA amounts and a higher WTA amounts than they would under conditions of uncertainty. Hoen and Randall (1983, 1985a, 1987) have proposed that these differences will converge if people are given the chance to become familiar with WTA and WTP converged after repeated trails. The change comes in decreasing values of WTA.

Kahneman and Trersky (1979) argued that WTP and WTA disparities is based on 'Prospect theory ' which replaces utility theory's emphasis on final asset positions with a framework for analysing preferences based on gain or losses from a neutral reference point. The 'prospect' theory predicts a higher amount of compensation hence higher WTA values.

Donald Coursey, John Havis and Shulze (1987) argued that the explanation in WTP/WTA discrepancy is that individuals are simply not familiar with the sale of an item as with its purchase . Several studies have been done using the two methods to estimate the value benefits of environmental amenities like pollution reduction.

Brookshire Ires and Shulze (1976) adapted CVM and employed WTP to estimate the value of the impact on air visibility of a proposed plant on the shores of Lake Powell in Utah. The amenity the respondents were asked to value was the benefit of having their view of Lake Powell inscribed by the visible presence of a power plant and the smoke from the plant.

Trolley et al (1986a) and Douglas Rae (1984) adopted CVM and Employed WTP to estimate valuation of visibility improvements in Eastern United states cities. The studies established that households would pay approximately US4 26 annualy for a ten percent improvement in Visibility. Loehman Boldt and Chaikin (1981) applying CVM and WTP reported annual WTP per household of US$101 for a ten percent improvement in visibility in San Francisco.

In Morocco, Mohammed Belhaj (1996) adopted CVM in valuing willingness to pay to reduce air pollution in Rabat-sale cities. The study established that WTP to reduce air pollution was positive with a mean WTP of 67.25 'dirhams' or 8 dollors 1$=8.4 dirhams per month.

3.0 METHODOLOGY

The basic concept of economic valuation is the willingness to pay (WTP) of individuals for improvements in an environment resource like air. The WTP for a reduction in environmental pollution by consumers is proxy for the prices the consumers (households) would pay if they were purchasing clean air in an open market.

Munasighe in his paper "Environmental Economics and Sustainable Development" (1993 pg 23) has noted that the theoretically correct demand function to use is the compensated or Hicksian demand function which indicates how demand varies with prices keeping the user's utility level constant. Equivalently the change in value of an environmental amenity could be defined in terms of the difference between the levels of expenditure (or cost) functions which shows the minimum amounts required to achieve a given level of utility for a household before and after varying the quality of prices of and / or access to the environmental resource in question while keeping all other aspects constant. However, problems of measurement may arise because the commonly estimated demand function is the Marshallian, which indicates how demand varies with the price *ceteris paribus.*

One of the methods available for valuation of the benefits of a reduction in air pollution is contingent valuation method (CVM). One of the advantage of CVM is in its ability measure both use and non-use values. According to economic theory, the quantity demand (Q) of a commodity by a consumer is determined by among other factors, its price. In order to test the relationship between willingness to pay (WTP) and the variables stated above variation of the following multiplicative model will be estimated. This model was used by both Abala (1987) and Walingo (1995) in similar studies.

Multiple regression analysis will be employed to determine the relationship between willingness to pay (WTP) and the identified explanatory variables. Ordinary least squares (OLS) will be applied to estimate equation model equations. Other statistical inferences will be applied in the study such as tests for the presence of heteroscedasticity (violation of the assumption of constant error variance) or multicollinearity (lack of independence among the explanatory variables in the data set). If the data has to give consistent and efficient results. It should not suffer from these problems. In case any one of these problems exists, appropriate remedies will be applied. The model is also evaluated on goodness of fit.

The questionnaire was designed to be completed in less than fifteen minutes so as to reduce respondents' fatigue and boodt the response rate. The questions asked were short, simple clear and to the point. The method of sampling used in the study was systematic random sampling. An Asamoklingh frame compromising household in Zimmerman was accessed from the population census and projection report. The sample was limited to 150 households depending on the limited time and financial resources. Data on the respondents' willingness to pay was collected.

The willingness to pay constitutes the dependent variables. In the model as specified in chapter three, income, age, size of the household and years of formal education constitute the continuous independent variable. The other variables included in the model were marital status, ranking of the pollution problem in relation to other problems and the incidence of a household member or members having an illness related to air pollution.

4.0 RESULTS

4.1 Basic Information

4.1.1 Income

The income reported was a summation of both incomes from the respondents' main occupation and other sources. The minimum income reported was Ksh.7747. It was further classified as low

middle and high income groups. According to the Central Bureau of Statistics low income groups ranges from Ksh. 0-1999, middle income group from 2000-7,999 and high income group from Ksh. 8000 and above. The result based on this classification is shown in table 1 below.

Table 1 Frequency Distribution for Income

Category	Number of People	Percentage
0-1999	30	20
2000-7999	80	53
Over 8000	40	27
Total	**150**	**100**

Table 1 shows that 20, 53 and 27 percentages of the respondents were grouped into low and middle and high income groups respectively. On the basis of this classification, it can be inferred that majority of the residents of Zimmerman fall in the middle income group.

4.1.2 Education

Data on education in table 2 below showed that the maximum number of years of formal education attained was 19 years i.e up to university level while the lowest recorded was 7 years i.e. up to primary education level.

Table 2 Education Level

Classification	Number	%
Up to primary school level	25	16.7
Up to secondary school level	89	60
Secondary school and above	36	23.3

From the data presented on table 2 it can be inferred that majority of residents have had education up to secondary school level. This is expected given that house rents in Zimmerman are relatively low, where the middle income (group who form the majority) would be expected to have at least a secondary level of education.

4.1.3 Size of Household

Data on size of the households reported that the maximum number of people per household were 9 while the minimum was 1 person per household with a mean of 3 people per household. It can be inferred then that majority of people per household are relatively few. This is expected given that the structure of houses (e.g size and number of rooms) can comfortably accommodate small families including house helps or other depends.

4.1.4 Marital Status

Classification according to marital status showed that 103 out of 150 or (69%) were married. This could mean that most residents in Zimmerman are married. The significant of marital status as determinant of willingness to pay is tested in the hypotheses in chapter three.

4.1.5 Ranking of Air Pollution Problem Compared To Other Problems

Data captured on this variable showed that 136 out of 150 or (91%) ranked air pollution problem second to none. This observation can be attributed to the fact that Zimmerman Estate closely borders the air polluting tannery. The minority group could be assumed to be the group that spend few nights indoors eg those on night duties such as security men. A pre study visit established that the tannery operates between 6.00 pm and 6.00am.

4.1.6 Incidence of Illness in the Household Caused by Air Pollution

Although the household did not provide documentary evidence or diagnosis of any illness related to the air pollution as evidence, data collected indicated that 84 out of 150 or (56%) had claims of illness mostly on children. Most claims were related to recurring colds and loss of appetite whenever the tannery was operational. Because of difficulty in isolating the illness associated with air pollution from other sources, this variable was treated as a dummy.

4.2 Willingness to Pay and Willingness to Accept Payment

Section three of the questionnaire sought data on willingness to pay for reduction in air pollution and willingness to accept compensation to live with the problem. The mean willingness to pay was Ksh. 318.5 with maximum and minimum values of Ksh. 5000 and Ksh.15 respectively. This showed that resident were willing to be compensated more than they were willing to pay by a ratio of 1.1.9

4.3 Regression Results and Hypothesis Testing

This section presents the multiple regression results and testing of the hypotheses enumerated. The results show that income, education and ranking of the air pollution compared to other problems were significant determinants of willingness to pay for reduction in air pollution problem compared to other problems had the expected signs and were significant at 95% level. The other variable age, family size, marital status and incidence of air pollution related illness had the expected signs, but were not significant at the 95% level as the t-values fell below the critical value of 1.96.

4.3.1: Hypothesis One

It was hypothesised that income does not influence the WTP for reduction in air population against the alternative hypothesis that it does. The null hypothesis is rejected (at 95% confidence level), in favour of the alternative hypothesis, since the value of t-calculated value (3.458) is greater than the critical one of 1.96. In additional the positive sign means that as income increase, the WTP increases i.e. an increase in income by one percent would increase WTP by 0.33 percent.

4.3.2: Hypothesis Two

Hypothesis two stated that the size of the household does not influence the WTP. Since an absolute t- value of 1.416 obtained is less than the critical one at 95 percent confidence, we accept the null hypothesis that the size of the household does not influence the WTP for reduction in air pollution. However we note that the relationship between WTP and size of household is negative meaning that the larger the size of the household the lower the WTP.

4.3.3: Hypothesis Three

Hypothesis three stated that the education level of a respondent does not influence the WTP for reduction in air pollution. Since a positive t-value of 4.895 was obtained which is greater than the critical value at 95 percent level, we reject the null hypothesis in favour of alternative, thus the higher the level of education the greater the WTP for reduction in air pollution.

4.3.4 Hypothesis Four

Hypothesis four stated that marital status does not influence the WTP for a reduction in air pollution against the alternative hypothesis that it does. Since the t- value of 1.495 obtained is less than the critical one of 1.96, the null hypothesis that WTP for reduction in air pollution is not influenced by an individual's marital status is not rejected.

4.3.5 Hypothesis Five

Hypothesis five stated that the age of an individual does not influence the WTP for reduction in air pollution against the alternative that it does. On the basis of equation 5.5,1 above, we see that the relationship is positive. However since the t-value obtained of 1.113 is less than the critical one of 1.96 at 95 percent level of confidence level. We do not reject the null hypothesis.

4.3.6: Hypothesis Six

Hypothesis six states that an individual's ranking of the air population problem in relation to other problem does not influence the WTP for reduction in pollution. The regression result in equation 5.5.1 above indicate that there is a positive relationship between WTP and an individual's ranking of air pollution problem in relation to other problems such as clean water , waste disposal or general security . Since the t-value obtained of 6.767 is greater than the critical one of 1.96 at 95 percent level of confidence, we reject the null hypothesis in favour of the alternative hypothesis.

4.3.7: Hypothesis Seven

Hypothesis seven stated that incidence of a pollution related illness in a household does not influence the WTP for a reduction in air pollution against the alternative that it does. We note from the regression results in equation 5.5.1 that there is a positive relationship between WTP and incidence of a pollution related illness in a household. Since the t-value obtained of 0.684 is less than the critical one at 95 percent level of significance we do not reject the null hypothesis

5.0 Conclusions

Amajor finding of this paper is that there exists awareness towards environmental problems in Zimmerman estate. The willingness to pay is positive. An individual's ranking of the air pollution problem in relation to other problems such as clean water, solid wastes or general security appears to be the best predictor of the willingness to pay for reduction in air pollution. This is followed by the income level of the respondents as the next important predictor of WTP for reduction in air pollution. This study has also shown that size of household, age, marital status of respondent and incidence of a polluted illness in a respondent's household are related to the willingness to pay for reduction in air pollution although they are insignificant at the 95 percent level of significance. However, the estimated values should be regarded as approximations because they are not only contingent upon the hypothetical market scenario presented to the respondents, but also upon the statistical analysis as well.

5.1 Policy Implications

The government can help reduce the housing problem by solving the air pollution problem which will further encourage investments in residential housing units in the undeveloped parts of Zimmerman given that it is an important residential estate for the lower middle class to the upper middle class groups as evidenced from the income data gathered.

Therefore policy instruments based on these variables may be effective in achieving the desired objectives. For example increasing the income of the individuals may lead to an increase in the charges for air pollution abatement. Educating the people about the virtues of a pollution free environment may increase their willingness to pay for air pollution reduction via payment vehicle such as taxes and service charges or higher prices.

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