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Effect of Environmental Disamenities on Property Value A Hedonic Approach

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Abstract
Environment or natural environment can be defined as biological, chemical and physical surrounding upon which living organism depend for their basic survival and existence. Economy which is one of the major concerns of modern ages depends upon natural environment in three distinctive ways, first environment provides both renewable and non-renewable raw material which is used as an input for different production processes, second natural environment provides a function of natural depository for the waste generated by humans through production and consumption processes third it provides the function of natural beauty and environmental amenities. The production processes on one hand is beneficial for the economy in a way that goods and services can be produced by firms for profit motives which engages a large number of people from different income groups be it an entrepreneur or a worker. This production processes on the other hand produces pollution as a by-product which has adverse effects on the environment. . These adverse effects can be seen in the form of environmental disamenities which are air pollution, water pollution, ozone depletion by toxic gases and most important of all global warming which is one of the major issues of modern time. This study is based on the hedonic property model with an assumption that environmental disamenities affect property price negatively. Hedonic model is used to analyse the effects of environmental disamenities on the property value of ground floor of houses in Peshawar Pakistan. The study indicates that if there is a presence of an environmental disamenties in an area it leads to adverse effects on the properties of the associated areas. The government authorities need to focus on such issues and design such developmental policies which are beneficial for the consumers living in such area which are affected by environmental disamenities.
Keywords: Environment, Renewable, Non-renewable, Amenities. Disamenities, Hedonic, Peshawar.

1. Introduction

Environment or natural environment can be defined as biological, chemical and physical surrounding upon which living organism depend for their basic survival and existence. This environment has use, non use and optional value. Use value is one that in which an individual is directly associated to the natural environment in form of production or consumption. Non use value refers to the preference of people for presence of environmental resources even they are not planning to use these resources. Optional value is the willingness to pay of an individual to have an option of using a resource in future (Robert and Sheila, 2009). Economy which is one of the major concerns of modern ages depends upon natural environment in three distinctive ways, first environment provides both renewable and non-renewable raw material which is used as an input for different production processes, second natural environment provides a function of natural depository for the waste generated by humans through production and consumption processes third it provides the function of natural beauty and environmental amenities. The production processes on one hand is beneficial for the economy in a way that goods and services can be produced by firms for profit motives which engages a large number of people from different income groups be it an entrepreneur or a worker. This production processes on the other hand produces pollution as a by product which has adverse effects on the environment. These adverse effects can be seen in the form of environmental disamenities which are air pollution, water pollution, ozone depletion by toxic gases and most important of all global warming which is one of the major issues of modern time.

Our area of concern is the environmental disanmeties which pose a serious threat to various aspects of life and individual's property is one of those aspects. Property is anything that an individual posses and in our context property refers to the purchase or renting of house which an individual posses for living. The willingness to pay of an individual for an economic good reflects his/her preference and the purchase of property is no different. This willingness to pay leads to the price of property which reflects many of its physical characteristics like number of bedrooms, bathrooms, availability of drawing room, square footage, garage space etc. Some of the implicit factors which an individual prefers are the indirect characteristics related to a house that are neighbourhood, security, distance from workplace, distance from parks, distance to school, greener areas or environmental amenities. These characteristics are now becoming more explicit and they are preferred by individuals hence these factors are acting as environmental goods and are part of consumer utility.

Due to non substitutable nature of environmental services there exist a major issue of nonexistence of market for environmental goods and commodities which leads to inefficiency of allocation of these resources in both private and public sector. Economist in different part of world has attempted to estimate the value of natural resources by using different techniques. These techniques measure the monetary value of environmental

commodities for both public and private sector and by use of such techniques we also internalise the externalities by estimating the environmental value using different techniques i.e. willingness to pay or willingness to accept. Willingness to pay is used in private sector so as to estimate the increase in consumer's surplus due to increased environmental quality.

An individual's utility is based on the direct consumption of market goods as well as on the environmental good which is incorporated indirectly into the utility function the consumer's utility function. These utility functions contain various variable characteristics of environment for which consumers are willing to pay a monetary value (Nogueira and Medeiros, 1997). This research attempts to estimate the monetary value for such environmental goods and services which increases the utility of consumers directly or indirectly. We use hedonic pricing method to estimate how environmental quality affects the property prices. Hedonic pricing method is used in order to estimate that what people are willing to pay for characteristics of an economic good. Here in our case the economic good is property or houses for rent and the characteristics that affect the house rental prices can be environmental conditions i.e. good air quality, water quality, presence of a park, condition of sewerage system, green fields etc, these characteristics adds up to the value of a property where as bad odour, open sewer system, air pollution level in a specific area, bad water quality, etc adversely effects the property prices.

2. Literature Review

Several studies have been conducted both in developed and developing countries to estimate the effects of environmental disamenities which included air, water, noise, soil pollutions and also due to the presence of several toxic waste sites on property value.

Muhammad Irfan (2013) conducted research in Rawalpindi Pakistan using hedonic property value method to estimate the effects of environmental disamenity .i.e. bad odor emitting from a sewerage system in city. 1000 household data was collected using survey techniques. 30% of the closed sewerage system serves the city whereas the remaining 70% is open drain system. The study estimated the demand for housing in city and estimated the effects of open sewer system on house rent variation. House rental prices were related to the presence and absence of bad smell due to the sewerage system. Hedonic price model was used to estimate the value of sewerage disamenities in city. Model was based on the assumption that environmental disamenities effect property price negatively where as amenities has positive effects on property value. Both linear and log-linear functional forms were used to estimate the equation. Nine explanatory variables were used for housing characteristics which represented the preference of the consumers and five indicators were used to measure environmental disamenities. The estimated difference in rent was only for the ground floor and the houses size ranged from below 90 square yard, 90-210 square yard and above 210 square yard. Distance rings were also formed to calculate the gain in house rent if the house was located away from the open sewer system. Results of the study indicated that if the house is located 200-400 meter away from the open sewer system there was an increase of 9.9% rent where as if the distance increase to 400 meters form open sewer so there was an increase of 12% in house rent. The difference among the rents of houses located near and closed sewer system was 10% or the house rent decreased by 10% for the houses located near the open sewer system.

A study was conducted by O.A.Akinjare, Oloyede and Ayedun (2011) in Lagos, Nigeria to estimate the effects of four landfills of different size, history and operating status on the residential housing value. Results were obtained by gathering primary data using questionnaire from residents and state supervisors. Data was collected from the residents who were living within 1.2km proximity of the four landfills. Concentric ring model was also used for the sake of uniform results 300-1200 meter rings were formed. Results suggested that property with highest value was located between 600-900 meters away from the landfill which included 30.6% of property. Also property value increased as the distance from waste site increased and the property value increase relative to distance averaged 5.75% for all the landfills within the concentric rings.

Abdul Hamid b. Hj. Mar Iman, Hamidi, and Liew (2009) examined the effects of water and noise pollution on the residential values situated in Malaysia. Various housing characteristics and two environmental variables water and noise pollution were taken into account. Two sites were selected one which was close to a polluted river and other close to an area with noise pollution. House value within 200 meter proximity showed a large amount of drop in its value as compared to 200m-500m. The marginal price reduced was 174-305/sqm for water polluted area and 119-245/sqm for noise polluted area within a distance of 0-500m. These results showed that house buyers prefer environmental quality as an important factor in property transactions.

M.N.Murty, Gulati and Banerjee (2003) used hedonic property prices to estimate the benefits received from reduction in level of air pollution in urban areas the study also provided the estimates for consumer's surplus due to reduction in air pollution concentration of suspended particulate matter to WHO standards. The study was conducted in two metropolitan cities of India named Delhi and Kolkata. Household survey was use to collect the data for socioeconomic conditions, housing and neighbourhood characteristics a sample data of 1250 was collected for each city. Data for SPM, NOx and SO2 were collected from monitoring stations in both the

cities. Result from both pooled and individual data showed that for individual household there was an annual gain in rental value due to reduction in SPM concentration to safe level was Rs.19870.70 in Delhi and Rs.8435.71 in Kolkata for individual estimates for both the cities and Rs.11699.16 for both Delhi and Kolkata from pooled estimates.

Sergio Batalhone, Nogueira and Mueller (2002) attempted to value environmental goods and services using hedonic property method and also to measure the social cost of air pollution. Study was conducted in Brasilia which is the capital city of Brazil to estimate the economic impacts of smell originating from a sewerage treatment plant. The hypothesis was that negative environmental externalities affect the price of property used for residential purpose. Four econometric models were used each having a dependent variable of hedonic price and twenty independent variables eight variables were related to different housing characteristics, nine variables were for quality of services available, one variable was related to distance of each house from environmental disamenity, one variable for air characteristics and one for population income. Linear functional form was used for hedonic property model with a sample of 9522 apartments. Model 1 had the best statistical result with an R^2 of 0.9512 the variable smell had an expected negative sign in all models. Results of the research concluded that all the apartments in the proximity of sewerage treatment stations had lower prices as compared to the apartments located in more distant areas.

B. James Deaton and John P. Hoehn (2002) used hedonic pricing method to examine the effects of hazardous waste site and undesirable land use on the sales of surrounding property. Four thousand housing sales observation were taken between1992-2000 using distance to site and distance to industry variables. Two waste sites were taken into account which was located in northern section of Lansing, MI and in proximity of highly industrial activity. One of the sites was also on national propriety list by EPA in 1986. Proximity to waste site, housing characteristics, distance to industrial area and a set of dummy variables were used. Log-log functional form was used to estimate the econometric equation. Ordinary least square method was used to estimate the hedonic property model with an industrial variable. Estimated model 1 suggested that a 10% increase in distance from superfund site leads to 0.3% increase in housing price and model 2 suggested that a 10% increase in distance from an industrial area will lead to 2.8% increase in housing price.

Rachel A. Bouvier, Halstead, Karen, and Alberto (2000) examined six landfills which differed in history of contamination, size and operating status. The study was conducted in rural area of Massachusetts United States. 385 single-family home sales from January 1992 to August 1995 was used which included data from 6 different town selected on two tier process. Landfills with different characteristics were isolated also towns with medium income and similar population were selected. Results indicated that five out of six towns landfills did not showed any spastically significant evidence for the effects of landfills however remaining landfill indicated that house in proximity of that landfill had an average loss 6% in its value.

Nelson, Genereux and Genereux (1992) studied the effect of a Ramsey, Minnesota landfill on 708 house sales between 1979 and 1989. The house sales prices examined were within 2 miles proximity of landfill. Property sales prices were taken as dependent variable where as different housing characteristics and distance from landfill were taken as independent variables. Houses located within 2 miles of landfill had a negative impact and the results also indicated that a house located at the boundary of landfill faced a loss of more than 12% in its value and a house situated a mile away from the landfill had a 6% decrease in its value.

Gerald E. Smolen, Moore and Conway (1991) worked on an operating toxic waste landfill licensed by federal government in Toledo, Ohio. The research was conducted of residential prices for the year of 1986-1990 which was situated in a metropolitan area with a proximity to a landfill. Marginal price distance impact on housing prices was also estimated due to the presence of a landfill in an urban area. Two waste sites were studied one was a new radioactive site and other was for chemical waste. Distance rings were formed from 0-2.6miles, 2.61-5.75 miles and above 5.75 miles a total of 1312 and 1237 transaction were used from housing sales data. Property within 2.6mile showed most consistent result with an R^2 of 57% and also the results indicated that there was an increase of $14000 for every additional mile located further away from the Envirosafe landfill. The second waste site for chemical waste showed a negative impact on the property prices but the effect diminished because the site was soon closed due to public resistance.

Janet E. Kohlhase (1989) analysed the impacts of announcement made by the environmental protection agency on the housing market. A new market for safe housing was created after the announcement. Marginal price in the new market was calculated and was estimated that marginal price to avoid toxic waste site disappeared after the site was cleaned. 703 sites were added on the national priorities list and announcements were made which had an important impact on the public's perception regarding the dangers related with the toxic sites.

EPA announcements' could have several effects on consumer's future expectation regarding environmental quality. Negligible effects would be reflected by consumer's behaviour if the consumers are already aware of health hazards related to the toxic waste site. A positive effect would occur of consumers expect a better environmental condition and a negative effect would occur if the consumers are informed for the

very first time regarding health hazards due to environmental disamenities. Eight landfill sites were analysed which were situated in Huston Harris County Texas and were placed on EPA superfund list by 1985. The estimates of the effects of disamenities were for three time periods two before the announcement in 1976 and 1980 and one after the announcement in 1985. A multiple linear regression model was used to estimate the variables of housing characteristics, neighbourhood dynamics and distance to the nearest toxic waste site. A sample of 1511 houses was collected within 7miles radius to nearest landfill. A hedonic model was used in semi log form for explanatory variables. Results suggested that marginal price of the distance to the nearest site estimated in 1976 and 1980 were $880 and $1180. The marginal price more than doubled to $2364 after the announcement made by EPA which indicates that in the presence of an environmental disamenity the property value is affected negatively.

The study is aimed to estimate the relationship between property value and the presence of environmental disamenities near a residential housing property and also to estimate the willingness to pay of people for specific environmental goods.

3. Methodology

3.1 Background of the problem

The city of Peshawar is capital of province KPK and also the economic hub and administrative centre of FATA Pakistan. The city covers an area of 1,257 km^2 (485 sq mi) with a total population of 1.439 million and ranks seventh in most populated cities of Pakistan (World Bank, 2013). The city is also ranked number six for the most polluted cities in the world (WHO, 2013). The research areas selected within Peshawar are Hayatabad, Peshawar city (Shehar) and Board. The oldest among all these areas is the Peshawar city (Shehar) as compared to the rest with different historical sites including the fort (Qila Bala Hissar) and also the historic Qissa Khawani Bazaar. Peshawar city (Shehar) also comprises of residential area which includes both the tenants and owners of the houses. This includes the area of Gulbahar, Faqeerabad, Hashnagri, Kareempura, Kohati etc. Most of the residential area is located near main road and commercial area which consists of small shops, hotels and restaurants. Peshawar city (Shehar) is based on old construction design with improper sewerage system which is one of the major issues faced by the residents. Beside this the air quality due to the presence of commercial area and also the heavy traffic is strongly affected causing the air pollution levels to increase. The area of board is a residential area which is situated next to an open sewerage system. It comprises mostly the residents from FATA, Afghan migrants and also IDP'S from different part of country. The resident in this area face the problem of inappropriate water and air quality. In most of the areas the water lines cross the sewerage lines which contaminates the water used for drinking and for domestic use due to broken lines. This contaminated water spreads different oral-fecal diseases causing many health issues to the residents of board. The air quality on the other hand is adversely affected due to the presence of unconstructed roads and smell emitting from the open sewerage system. The residential area of Hayatabad on the other hand is new and developed as compared to other two areas. The development and planning of the area is executed by the Peshawar development authority (PDA). Hayatabad is divided into seven phases the area selected for research in Hayataabad is phase 1 which consists of houses ranging from 126.45 sq meters to 252.9 sq meters. Majority of residents are educated and are from high and middle income groups.

Since Peshawar offers two different type of localities one with good environmental and residential characteristics and the rest with inappropriate environmental and residential conditions. In this study an attempt is made to estimate the effects of environmental goods which are water quality, air quality and the presence of closed sewer system on the rental values of ground floor of house situated in all the three areas.

3.2 Statement of the problem

Environment is considered to be one of the major issues in both developed and developing states of the world. It plays an important role in production and consumption processes the consumer seeks to maximise their utility by combining market goods or composite goods with the environmental goods. This utility maximizing process emphasizes onto the importance of the environmental services. The issues associated with the environmental services are that it does not contain any market which can provide a platform for exchange of these goods like other traditional economic goods. An attempt is made to estimate the effect of such environmental externalities on the property value and also to estimate the environmental value using the willingness to pay of individual by hedonic pricing approach.

3.3 Objective of the study

The objective of the study is to estimate the effects of presence of environmental disamenities on the property values in Peshawar Pakistan. The assumption is that the negative environmental externalities affect property price negatively. These externalities can be the air pollution due to the emission of industrial gases or the emission from automobiles. The externalities may also include the water pollution or the quality if water in an

area or the sewerage treatment units. In deciding to purchase or rent a property in the proximity to such area consumer evaluate such environmental externalities.

3.4 Hypothesis

Ho: Environmental disamenities do not affect rental prices negatively.
H1: Environmental disamenities affect rental prices negatively.

3.5 Significance of the study

The research is focused to emphasize on the importance of environmental services which directly or indirectly increases consumer's utility. It also focuses on contributing in the identification of the present policy gaps regarding the environmental regulation or the role of government for improving the environmental conditions in the residential areas of Peshawar. As the city is considered to be the seventh most polluted cities of Pakistan government needs to take into account the consumers preferences and design policies in such a way that it should lead to meet the quality standards and also maximize the utility of consumers.

3.6 Methodological Framework

Hedonic model is basically used to estimate the effects of a characteristic associated to a specific good. In our study Hedonic prices model is used to estimate the effects of housing characteristics on its rental value for the ground floor. These characteristics include number of bedrooms, number of bathrooms, availability of drawing room, square footage, garage space etc and also the environment. The term environment used in context of environmental quality means level of air quality, water quality, presence of a park or amenities it may also include presence of environmental disamenites which may affect the property prices. Since there is no existence of physical market for the exchange of environmental commodities so we use the hedonic model to estimate the affects of presence or absence of environmental goods on property prices.

The model is based on the assumption that the presence of environmental disamenities affects property prices negatively. We also assume that each consumer utility is a function of a composite good which can be represented as (X), before purchasing the house consumer take into account the housing characteristics C (where C= C1, C2, C3,....Cn), the neighbourhood characteristics N, (N=N1, N2, N3,...Nn) also the utility function includes various environmental characteristics E (where E=E1, E2, E3,...En). The utility function for the Ith individual can be written as.

$$Ui = U(Xi, Ci, Ni, Ei) \quad (1)$$

The rental price of the Ith house can be written as

$$Rpi = R(Ci, Ni, Ei) \quad (2)$$

The budget constraint faced by an individual for maximizing his/utility is

$$Yi - Rpi - Xi = 0 \text{ here Y is the income of an individual.} \quad (3)$$

The consumer maximizes his/her utility by combination of composite good (X), the environmental good (E) and the housing characteristics (C). Various combinations can be obtained within a given budget it should be noted that budget is a constraint for purchasing goods and to maximizing the utility. The first order condition taken with respect to environmental good (E) gives us the implicit value for that attribute,

$$\frac{\partial Rpi}{\partial Ei} = \frac{\partial U / \partial Qi}{\partial U / \partial Xi} \quad (4)$$

This equation shoes that the marginal rate of substitution (MRS) for the environmental good (E) and any composite good (X) is equal to the rate at which consumers are willing to trade off a composite good (X) for environmental good (E). The ratio between the price of an environmental good and the composite good reflects the change in the rent of the property Rpi due to a change in the environmental characteristic.

It is important to use an appropriate functional form so to estimate hedonic price model. Generally used model for hedonic studies are linear, log linear and log-log function forms. The linear model use to estimate the relationship between the variable shows the partial effects between the property prices and the housing characteristics. The log linear model gives us the non linear price effects (Allen, 1997). This study is based upon the linear functional form used to explain the effects of air quality, water quality and sewerage system on the rental value of ground floor of a house. Various housing characteristics (C), environmental characteristics are selected as an explanatory variables in our analysis. The linear hedonic price model is given as.

$$Y = \alpha 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \beta 8X8 + \beta 9X9 + \beta 10X10 + \beta 11 D_1 A_i + \beta 12 D_2 W_i + \beta 13 D_3 Sw_i + Ui \quad (5)$$

In above equation X1-X13 represent various housing characteristics or the explanatory variables that affect the rental value of a house. D1-D3 represents dummies for different environmental variables air quality, water quality and sewerage system that affect the rental price Y. The variables used in the hedonic price model are discussed below.

House Rent (Y): It is taken as a dependent variable for our analysis as the objective of the study was to estimate the difference between the rental prices of the houses located near and away from the environmental disamenities. It represents the rent of the ground portion of the house. These prices were collected during data collection through questionnaire. The monthly rent for the ground floor was collected from both the tenants and house owners.

Plot Size (X1): It represents the total of the house it is measured in Marlas or Square meter. It ranged from 126.45 sq meters to 252.9 sq meters.

Basement (X2): This variable refers to the presence of a portion below ground floor this portion of the house contains rooms, drawing room, bathroom and lounge.

Bedroom (X3): It represents the number of rooms on the ground portion of the house.

Drawing room(X4): This variable is used to represent the area in a house used for the guests and not for sleeping purposes.

Bathroom(X5): this variable represents the number of bathroom on the ground floor of the house.

Garage(X6): This variable refers to the availability of a space in a house to pak at least one car inside the house.

Distance from park(X7): The distance of the house from the public park is measured in meters.

Distance from market(X8): The distance of a house from a market place which is used for the purchase of household goods is measured in meters.

Distance from mosque(X9): The distance of a house from a mosque where people go for prayer is also measured in meters.

Distance from open sewera1ege system (X10): This variable refers to the distance of a house located near an open sewerage system (nali) which is calculated in meters.

Air quality (D_1A_i): It is selected as a dummy variable it represents the level of air quality. It is divided into three categories fresh, dusty and smelly.

Water quality(D_2W_i): It is selected as a dummy variable it represents the level of water quality of a residential area. It is divided into three categories very good, good, satisfactory and bad.

Sewerage system (D_3Sw_i): A dummy variable is used to represent the condition of the sewerage system in an area that whether it is closed or open.

3.7 Data collection

Primary data is used for the analysis from three different locations i.e. Hayatabad, Board and Peshawar city (Shehar). Fifty observations from each location were collected using questionnaire as total of 150 observations were collected. Questions based on the research were asked from each representative of the house which included both the tenants and also the house owners. Unstructured interviews were also conducted from the associated real estate or property dealers to verify that whether the data provided by the individuals of the houses actually exist or not. The information provided by the property dealers and the home purchasers was similar which indicated that the data was reliable enough to conduct the study. The questionnaire was based on twenty five questions which included the information on the representative age, gender, household size, education level, awareness regarding environmental hazards, job status, income level, residency, plot size, occupying status, rent of ground floor, availability of basement, availability of garage, availability of drawing room, number of bedroom, number of bathroom, distance from park, proximity to market, proximity to mosque, air quality, water quality, type of sewerage system and proximity to open sewerage system. The purpose of using primary data was to obtain the information directly from the consumers and also to analyse the preferences of the consumers regarding environment.

4.Analysis

Interpretation table 4.1

Model summery shows the values of R-squared which is the coefficient of determination it is a statistical measure used to analyse that how close the data is to the estimated regression line. In model the R-squared value is 0.90 which means that there will be 90% of variation in the dependent variable house rent due to explanatory variables. Durbin Watson is used to test the problem of autocorrelation in the model its value ranges from 0-4 if it equals to 2 there is no autocorrelation if the value is less than 2 so there exist a problem of negative autocorrelation and if its value is greater than 2 and approaching to 4 so there exist positive autocorrelation .In above model the Durbin Watson value is 2.084 which is approximately equal to two which indicate that there is no problem of autocorrelation in the model.

Interpretation table 4.2

In the above table 1.2 the value of our use is of the column value under sig. This represents that the overall model is significant or insignificant. . Our assumption is that the environmental disamenities do not affect

property prices negatively. In above ANOVA table the value in sig column is equal to zero this is considered as the p-value and is compared with the value of 0.05. In above table the p-value is less than 0.05 so we reject Ho and conclude that the overall model is significant hence accepting the alternative.

Interpretation table 4.3

To check whether data is normally distributed or not we use histogram for this purpose. If the histogram is bell shaped it indicated that the data is normally distributed and if the histogram is not bell shaped so it represents that there exist some outliers in the data. The above (table 1.3) shows that the histogram is bell shaped and that the data used for the estimation of variables is normally distributed.

Interpretation table 4.5

The estimated econometric equation can be represented as

Y= 12577.440+ 679.164X1+ 898.171X2+ 243.538X3+ 149.890X4+ 1207.744X5+ 475.427X6+ 252.511X7+ 1237.869X8+ 2122.338X9+ 0.388X10+ 1.295X11+ 5.174X12+ 12.707X13+ (-238.011)Z1+(-928.877)Z2+ (-321.268)Z3+ (-1059.018)Z4

The above table 1.4 shows the parameters of the estimated regression line. Least square method is used to econometric model which included seventeen independent variables. Nine variables represent various housing characteristics which an individual takes into account before purchasing or renting a ground portion of a house.

Three independent variables are associated to an individual which include the information regarding income, education level and awareness on environmental issues. Three categorical variables are used which represent the environmental characteristics for location of a house dummy variable were used for these three environmental variables. The intercepts represents the overall intercept in a multiple regression model that includes dummy explanatory variables in above mode the value of intercept is 1257.440. The slopes of the independent variables represent the effects of the variables on the dependent variable. The slope of variable education shows 679.164 units increase in dependent variable house rent due to one unit increase in education level of an individual. The slope of variable awareness shows 898.171 units increase in dependent variable house rent due to one unit increase in awareness of an individual. It means that if an individual is aware of environmental issues so he/she is willing to pay 898.171 rupees for a house located in an area with good environmental conditions. The slope of variable income shows 243.538 units increase in dependent variable house rent due to one unit increase in income level of an individual. The slope of variable plot size shows 149.890 units increase in dependent variable house rent due to one unit increase in plot size which is measured in square meters. . The slope of variable basement shows 1207.744 units increase in dependent variable house rent due to availability of a basement in a house. The slope of variable bedrooms shows 475.427 units increase in dependent variable house rent due to an increase of one bedroom in the ground portion of a house. The slope of variable drawing room shows 2252.511 units increase in dependent variable house rent due to availability of a drawing room in the ground portion of a house. The slope of variable bathroom shows 2237.869 units increase in dependent variable house rent due to an increase of one bathroom. The slope of variable garage shows 2122.338 units increase in dependent variable house rent presence of a garage of parking at least on car in house. The slope of variable distance of house from a Public Park shows 590.354 units increase in dependent variable house rent due to one square meter decrease from house. The slope of variable distance of house from a market shows 1295.579 units increase in dependent variable house rent due to one due to one square meter decrease from house. . The slope of variable distance of house from mosque shows 517.4 units increase in dependent variable house rent due to one square meter decrease from house. . The slope of variable distance of house from an open sewerage system shows -1270.7 units decrease in dependent variable house rent due to presence of an open sewerage system nali the distance is calculated in square meters. The dummy variable used for the air quality shows the quality of air in a residential area it is divided into categories fresh, dusty and smelly. The category fresh is selected as a base or reference category and its value is represented in the constant. The category dusty represents the air quality of an area which constitutes of dust particles in the air its slope show that an area with dust in air effects property price negatively with a slope value of -2380.11 it means that the house rent will decrease by 2380 rupees if air consists of dust in it. The category smelly represents the air quality of an area which constitutes of smell in the air due to the open sewerage system its slope show that an area with smell or bad odor in air effects property price negatively with a slope value of -3185.000 it means that the house rent will decrease by 3180.00 rupees if air consists of bad odor in it. The dummy variable used for the water quality shows the quality of water in a residential it is divided into four categories very good, good, satisfactory and bad. The category very good is selected as a base or reference category and its value is represented in the constant. The category good represents the water quality of an area and its slope show that an area with good water quality affect property price positively with a slope value of 795.296 it means that the house rent will increase by 795.296 rupees if water quality is good. The category satisfactory represents the water quality of an area and its slope show that an area with satisfactory water quality affect property price negatively with a slope value of -

928.877 it means that the house rent will decrease by 928.877rupees if water quality is good. The category bad represents the water quality of an area and its slope show that an area with bad water quality affect property price negatively with a slope value of -321.268 it means that the house rent will decrease by 321.268rupees if water quality is good. The dummy variable used for the sewerage system is divided into two categories open and closed sewerage system the close sewerage system is selected as a base or reference category and its value is represented in the constant. The category open represents the type of sewerage system of an area and its slope show that an area with open sewerage system affect property price negatively with a slope value of -1071.000 it means that the house rent will decrease by 1071.000rupees if the sewerage system is open in a residential area. All the variables selected are significant because the p-value is less than 0.05.

5.Conclusion and policy recommendation

The results obtained from the study clearly indicate that there exist substantial effects of environmental disamenities on the rental value of a house. People do prefer to live in an area with good environmental conditions and this is reflected in their decision of purchasing or renting a house. Their preferences are reflected in their willingness to pay for a specific environmental characteristic as these characteristics increase the utility of an individual by indirectly entering into an individual's utility function. However disamenities on the other pose a disutility for a consumer and this is reflected in the property prices associated in an area with such diamenities. The results reflected that a house located in a good environmental condition has a higher rental value as compared to the house located in an area with disamenities in its surroundings. These disamenities can be the bad air and water quality the presence of an open sewerage system etc. The houses located near an environmental amenity i.e. public park reflected an increase of Rs.590 in its rental value. Where as a house located near an environmental disamenity i.e. open sewerage system reflected a decrease of Rs.1071.00 in its value. The results obtained also support the hypothesis that the environmental disamenities affects property prices negatively and are also in accordance with the prevailing studies. It also clears the idea of emphasises on the importance of internalizing the externalities. The environmental characteristics should be valued because it has always affects the utility of consumers directly or indirectly. For the sake of consumers utility the government should design policies that should be able to improve the environmental condition be it from the point of view of pollutant paying principle or by providing incentives to the individual who are willing to contribute in the environmental improvement programs. Also the residential areas located in the open sewerage system should be considered important and the efforts should be made to change the nature of such sewerage system which affects property prices negatively.

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Model Summary

Model	R	RSquare	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin Watson
					R SquareChange	F Change	df1	df2	Sig. F Change	
1	0.954	0.909	0.896	19.148	.909	68.753	19	130	.000	2.084

Table 4.2 **ANOVA[b]**

Model		Sum of Squares	df	Mean Square	F
1	Regression	4.836E9	19	2.545E8	68.753
	Residual	4.813E8	130	3702345.156	
	Total	5.318E9	149		

a. Predictors: (Constant), OPEN, HouseHold_Size, Occupying_Status, BAD, Drawingroom, Education, Distance_OpenSewerage_Meters, Basement, Bedrooms, Income, Bathroom, Distance_Mkt_Meters, Garage, dusty, PlotSize_Marla, Distance_Park_Meters, SATISFACTORY, Awarness, Distance_Mosque_Meters

b. Dependent Variable: House_Rent

Table 4.3

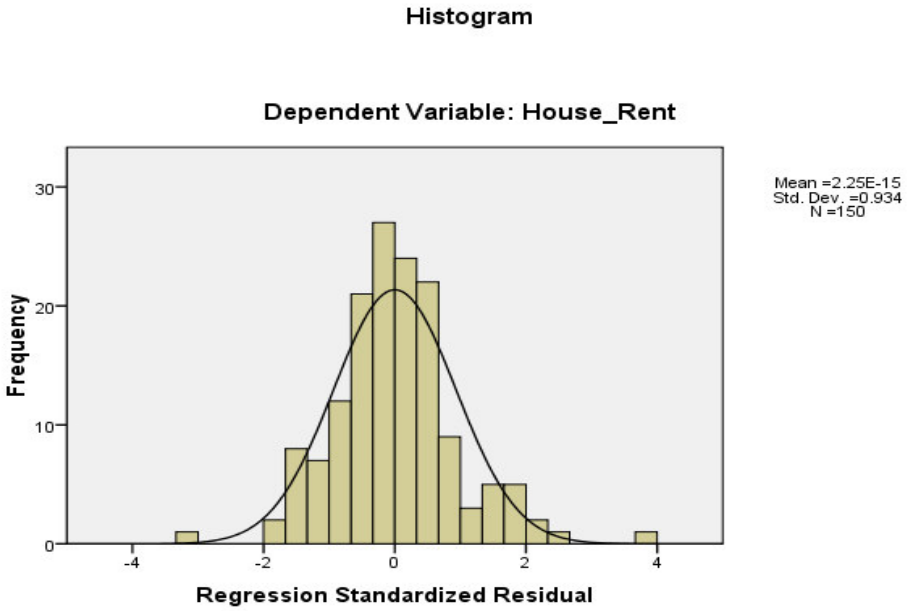

Table 4.4 Coefficiennts

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1257.440	1899.747		6.621	0.000
	Education	679.164	298.574	.090	2.275	0.021
	Awarness	898.171	693.438	.060	1.295	0.029
	Income	243.538	195.743	.044	1.244	0.018
	PlotSize_Marla	149.890	86.786	.076	1.727	0.047
	Basement	1207.744	507.318	-.074	-2.381	0.019
	Bedrooms	475.427	434.349	.044	1.095	0.002
	Drawingroom	252.511	857.073	.009	.295	0.006
	Bathroom	2237.869	428.155	.107	2.891	0.004
	Garage	2122.338	515.283	-.159	-4.119	0.000
	Distance_Park_Meters	590.354	.379	.044	1.023	0.003
	Distance_Mkt_Meters	1295.579	1.736	.053	.746	0.019
	Distance_Mosque_Meters	517.4	1.926	-.192	-2.687	0.008
	Distance_OpenSewerage_Meters	-1270.7	12.613	-.033	-1.007	0.006
	Dusty	-2380.11	612.744	.188	3.884	0.000
	SATISFACTORY	-928.877	580.666	-.073	-1.600	0.112
	BAD	-321.268	811.064	-.013	-.396	0.049
	OPEN	-1071.000	549.686	-.848	-19.493	.000

a. Dependent Variable: House_Rent