A COMPARATIVE STUDY OF THE EFFECTS OF PUBLIC AND PRIVATE HOUSING INVESTMENTS ON RESIDENTIAL ENVIRONMENTAL QUALITY OF ENUGU METROPOLIS

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Abstract
Dearth of public and private housing investments mounts pressures on facilities, amenities, neigbourhoods and available housing units in Enugu metropolis with various implications on environmental quality. This study compared the effects of public and private housing investments on residential environmental quality in Enugu metropolis. The study area was stratified into low, medium and high density neighbourhoods. Questionnaires were used to collect primary data. Factor analysis was used to reduce the environmental quality variables to a singular factor. Multiple linear regression analysis was used to establish the nature of relationship between the environmental quality and public and private housing investments in the study area. Private

housing investments impacted more on the environmental quality of the area than public housing investments. It was recommended that the State and Federal Governments should rise up to the challenge of public housing investments that will effectively complement the efforts of the private sector.

Introduction

It has been observed that the situation in some parts of Enugu metropolis like Achara Layout (built up mainly in block of flats) shows that the area which hitherto used to be mainly occupied by lower middle class individuals as medium density area is now no longer so. Some of the residents are households that vacated their accommodation in low density areas to this area so as to be able to meet with the rents demanded from the areas.

Besides, closer observation reveals that some of the flats in the area are being shared by two or more households. This, the occupants claim was as a result of non availability of enough of the dwelling units, hence, the rate of demand being greater than the rate of supply. Meanwhile, the flats were originally built to accommodate a household in each case, and the facilities/amenities provided were meant to serve as such. Hence, there has been increased rate of facilities/amenities breakdown in the metropolis and some people see it as a consequence of pressure on the existing facilities and amenities.

The implications of the situations to residential environment are numerous and pose enormous challenges. Against this background, the aim of this study was to examine the role of housing investments in the residential environmental quality of Enugu metropolis. To actualize this, the following null hypothesis was formulated: there is no

significant relationship between the residential environmental quality and housing investments in Enugu metropolis.

Literature Review

Many people invest in housing with the objective of holding it for income and profit (Richmond, 1985). The residential group of building that attract investments include, detached houses, semi detached houses, bungalows, block of flats as well as tenement buildings (Okeke, 2004). The method of conducting transactions in housing market and the lack of information generally contribute to imperfection in housing market (Johnson et al, 2005). Musa (2010) opined that the Land Use Act of Nigeria does not make investments in housing move fast, as it takes time for transfer to be effected in the events of sales and purchases.

However, certain studies have been carried out on housing investments and environmental quality worldwide. Brasington et al (2005) in the United States of America (USA) estimated the relationship between housing price and environmental disamenities using spatial statistics to confirm that nearby point-source pollutants depress house price. Six spatial hedonic regressions for Akron, Cincinnati, Cleveland, Columbus, Dayton and Toledo were determined. The highlight of the results showed that the implicit prices of environmental quality and related characteristics from the house price hedonics the estimate of a demand curve for environmental quality, a price elasticity of demand of 0.12. There was evidence of significant spatial effects in both the hedonic and demand estimations. Also, environmental quality and house size were substitutes.

Alkay (2009) studied the relationship between environmental quality level and housing sale prices in Istanbul metropolitan area. The research was carried out in two steps.

In the first step, the environmental quality index was measured, applying the principal component analysis. In the second step, relationship between the environmental quality index and housing sale prices of the districts were explored. The result showed that the weight of dwelling indicators and satisfaction from housing environment indicators were positive, while the economic, social and accessibility indicators were negative for the casual factor which explained the environmental quality at district level in the area. Hence, the result eventually showed how environmental quality of housing areas can be part of competition in a metropolitan area, because the higher the environmental quality index in the district, the higher were housing sale prices in them.

Florida, Cendrero and Fischer (1997) worked on the procedure for assessing the environmental quality of coastal areas for planning and management, based on the identification of certain characteristics. This they did, using certain indicators, including number of storms per year, and thereby proposing numerical indices which could be used to assess different qualities on the basis of the indicators. The indices could be used for mapping environmental quality and monitoring its change with time. Furthermore, they could be applied to both "natural" environmental unit and coastal jurisdiction. The method could help to determine whether existing management and policy trends move away or towards sustainability, as the indices provide a means to determine whether environmental quality in a coastal area is decreasing or increasing. Again, it could facilitate the integration of scientific assessment into the process of coastal planning and management through the application of indices which give the summary of environmental characteristics in terms that should be significant to planners and managers.

Studying the environmental quality of Brazilian Amazon, Perz (2011) emphasized that deforestation was not the only issue of importance concurring changes in environmental quality of the Amazon. Three dimensions of urban environmental quality considered were the production of environmental hazards through industrial, sewage and waste pollution; the degrees of protection from such hazards through high quality housing construction and amenities, and the capacity to defend against environmental hazards, as indicated by household, income and access to health care. Census data and health services statistics were used. The study compared enchanters of environmental quality urban population of Amazon in 1980 and 1991 quantitatively. Thirty environmental quality indicators were used in all. The results indicated that environmental quality in the region deteriorated during the 1980s as the production of and exposure to environmental hazards rose while resources to ward off hazards eroded. The finding s also showed that environmental quality was particularly poor in more rapidly growing urban centres.

Using Europe and America as case studies, Cendrero et al (2003) worked on the procedure for sustainability assessment in coastal areas, based on a series of indicators and indices that reflected environmental quality. Three dimensions of environmental quality taken into consideration were functions, interaction and component. Through the procedure, sixty-seven environmental quality indicators were initially selected and stepwise procedure established for calculation of indices. The procedure offered the possibility of expressing environmental quality of the coastal areas in numerical form, through the use of indices based on clear and replicable method, using indicators that can be measured or objectively determined. The method appears to be sensitive

enough to detect changes in the environmental quality with time and therefore could be used for environmental monitoring and auditing as basis for decision making in environmental management. Hence, it could provide a useful tool for monitoring environmental quality, thus helping to assess sustainability of existing policies and practice.

Bernauer and Koubi (2004) carried out a study on the effect of various political variables such as the type of political system, the type of democratic government, civil liberties and labour union strength on environment quality. They took into account the effect of economic variables. Air pollution was used as the dependent variable. Annual observations for the years 1991-1996 from 291 observation sites located in 107 major cities in 42 countries (2,555 observations) constituted the data for air pollution. Combining the environmental, economic, political and site specific component, a statistical model was obtained. The air pollution was regressed against the explanatory variables. Resuts showed that higher income, higher intensity of economic activity and greater trade openness contributed to lower pollution levels. The study could be useful for environmental quality monitoring and control. However, being an issue specific in nature, it cannot be generalized to other forms of environmental quality.

Palma et al (2007), assessing the inequality in the spatial distribution of accessibility and environmental quality in Paris Metropolitan region, asserted that local amenities are generalized capitalized into housing market. Data from IAURID GIS data base and metropolitan computation were used. The empirical analysis of the study showed that considerable inequality existed in the spatial distribution of the local amenities and social indicators. Spatial representation and Lorenz curves were used to examine the degree of inequality in theses amenities. These provided evidence that

some amenities were much more inequitably distributed than others, e.g. noise.

Alem and Martinsson (2011) investigated the importance of environmental quality to the poor and what the policy makers knew about it in Addis Ababa, Ethiopia. The citizen and policy makers were asked to rank the areas that they think government should focus on. The ranking areas were (a) Better health services education and housing (b) Creating environmental opportunity (c) Controlling price rise (d) Improved solid waste disposal and (e) Improved liquid waste disposal. In the findings, although standard determinants of subjective well being in Western countries seemed to explain happiness in Addis Ababa, environmental quality variables were ranked lowest by the citizens, yet they were important for the happiness of the people. On the other hand, the policy makers considered little effect on happiness and ranked quality of a higher priority area. While the government officials had more focus on long term perspectives, the citizens on their part focused more on short-term issues. However, the government of the country went as far as introducing a strict control over prices of basic commodities, adopting the views of the citizens in this regard.

In Nigeria, different people have equally worked on environmental quality as it affects different cities or towns. Olorunfemi (2009) studied the willingness to pay for improved environmental quality among the residents living in close proximity to two landfills at Olushoshun and Abule Egba in Lagos metropolis. The main instrument used in the collection of primary data was structural questionnaire. Certain socio-economic variables also collected were age, household, education, occupation, length of stay in the area and in the house, type of building occupied by household (owner occupier or rented), among others. A contingent

valuation method was used, which solicited the residents' preferences through survey techniques to state their willingness (WTP) for the benefit gains from an improvement on environmental quality or for a loss caused by degradation of quality. Results indicated that the presence of the landfills and the associated environmental impact was an important factor contributing to respondents' willingness to pay for environmental improvement in their neighbourhood. Furthermore, the proportion of respondents willing to pay decreased consistently as distance increased away from landfills in the two locations. This is probably that people may not see any reason to pay for environmental improvement since they live farther away from the landfill and may not feel much of the impacts. Again, respondents were not generally willing to pay high amount for environmental improvement. This possibly could be for economic reason, as income per capita is usually low in developing countries, like Nigeria.

Studying the housing improvement of core residential environmental quality of Ogbomosho town, Afon (1998) made use of 20 variables and identified 10 environmental quality indicators. The indicators were, water availability, economic opportunities, clean and healthy environment, availability of electricity, good condition of road, nearness to health facilities, safety, accessibility to transportation network, availability of waste disposal facility and nearness to primary school. Correlation matrix was compared to determine the relationship existing between pairs of the variables. Correlation of the ten proved positive with electricity and water being highest among them. Results showed that it was no use for planners to impose their ideas on the public because people were better planned for when they had inputs into policy and programmes that affected their present and/or future. Hence, it was asserted that it will be more effective if

core residential housing improvements were carried out through the utilization of core residents' environmental quality indicators.

Ekurekong and Jacob (1998) carried out a study on compliance that ensures high attachment of environmental quality in housing estate in Uyo, Akwa Ibom State. This study revealed that contraventions in development of the estate were mostly committed by members of the ruling government, i.e. the political class. The housing estate by all indicators was deficient in facilities and service provision. The study also showed that more than 70% of the total area of the estate had been used for residential development, leaving less than 10% for the provision of facilities and services. The analysis showed that the existing faculties were undoubtedly inadequate to support the huge population in the estate. Hence, increased demand for water and electricity, recreational space, residential accommodation space as well as increased private vehicular traffic congestion in the estate were anticipated based on increase in population. An environmental quality unit was recommended to be established to monitor and control the quality of the environmental in the estate. The unit should ensure that the land use intensity ratio specified for various sections were maintained. The unit was expected to be empowered to implement all measures to maintain quality. Such measures include evacuation of wastes, maintenance of parks, public schools and health centres.

Ede et al (2007) studied housing and neighbourhood quality for Yenegoa, Bayelsa State. The studied five neighbourhoods in the city to examine the problem using questionnaires and physical observation as instruments. The results showed that sanitary services among other independent variables have the greatest significance level of 99. Okeke

(2000) described the extensive use of temporary structure in the high density neighbourhoods of Nigeria urban centres as the forerunner of squatter settlement development, while Umeakuka and Mba (1999) observed that storm water drainage paths were totally blocked in Onitsha with solid wastes, which in turn, induced urban flood. In Enugu, the numerous and interlinked causes of urban solid waste management problems and the attendant economic, social and health costs as well as environmental and esthetic costs were the inertia factor, the demographic factor, institutional factor as well as absence of public participation (Nwafor, 2008).

The Study Area

According to the Enugu State Mininistry of Information (2002), Enugu metropolis is located between, latitudes $6^{o}27$ N and $7^{o}28'$ N and longitudes 7^{o} 30'E and 8^{o} 19E. The urban land area is roughly 72. 8 square kilometers with the rural environs covering an additional area of about 200 square kilometers. The study area comprises three local government areas (LGAs), namely, Enugu North, Enugu East and Enugu South. Enugu metropolis is bounded on the north by Isi Uzo LGA, on the south by Nkanu West LGA, on the east by Nkanu East LGA and on the west by Udi LGA.

The metropolis, which lies on an altitude of 232.6 metres above sea level, exists with natural domes in the south and undulating plains forming the foothills of Udi escarpment in the north, and widening out into the upper Ebonyi river plains. It has an annual rainfall of 1247.8 mm, and the rainfall is mostly during the months of April through October, having July as the peak period.

The temperatur variation within the season is normally less than 10 ^{o}C. The relative humidity fluctuates between 40 and 80 percent. The prevailing winds are the local monsoons -

the north cast trade wind and the south west trade wind - resulting in dry and raining seasons respectively.

The metropolis has a type of soil that is predominantly reddish brown in colour, with the underlying rock having a high load-bearing capacity. This makes the soil suitable for intense building construction. The soil also supports moderate agricultural activities.

The natural vegetation in the metropolis is primarily of tall, medium and short grasses. Most of the trees are deciduous and include Isoberlina, sheer butter, locust beans, among others.

Enugu started as a photo-urban settlement near the mines, following the discovery of coal in the Udi hills about 1909. Iva Valley and Ogbete, which were the first areas to develop, functioned primarily as coal miners residences. With the discovery of deep sea harbour in Port Harcourt, construction work commenced in Enugu in 1914 (Enugu-Port Harcourt Rail line). In 1917, Enugu attained township status and was then refered to as Enugu Ngwo. As a result of its rapid expansion towards areas owned by other indigenous communities rather than towards Ngwo highland, it was renamed Enugu in 1928. By 1939, Enugu had become the headquarters of the then southern province. It became a regional capital and the most important administrative centre in the eastern region with the creation of three regions in Nigeria in 1961.

The Enugu State Housing Development Corporation (ESHDC, 2011) reported that the earliest developed residential quarters in Enugu are Coal Camp, Iva Valley, and Government Reserved Area (GRA). Other established neighbourhoods presently in the metropolis are Uwani, New Haven, Abakpa, Emene, Achara Layout, among others.

The population of the metropolis has been on the increase within the last few decades, as a result of rapid urbanization and subsequent influx of people. The population rose from 63,000 in 1953 to 482, 977 in 1991 and to 722, 664 in 2006 (NPC, 2006).

Methodology

The study adopted the survey design. Thirty neighbourhoods in Enugu metropolis - stratified into low, medium and high density neighbourhoods - were used. Samples were selected randomly from the neighbourhoods. The sample size for each stratum of neighbourhoods was determined using Bowley's proportional allocation statistical technique.

Questionnaires were used to collect primary data. They were designed using five point linkert scale to address the objective of the study. The validity of the research instrument was measured using content validity. Test-retest method was used to determine the reliability of the research instrument. Also, field tests were carried out to determine the noise level, as well as the air quality of the study area.

Two major variables used in the study were the dependent and the independent variables. Environmental quality variables constituted the dependent variables, while public and private housing investment made up the independent variables. The hypothesis was tested at 0.05 level of significance, using factor analysis and multiple linear regressions. Factor analysis (principal component analysis) was first used to reduce the various environmental quality variables. Varimax rotation was introduced to get the aggregate factor score as the "y" variable. Then multiple linear regression was used to establish the nature of relationship between environmental quality of the study area and public

and private housing investments (x_1, x_2 respectively) in the area.

Results and Discussion

Twenty-one residential environmental quality variables were used in the study, made up of 11 dwelling unit variables (condition of floor, condition of wall, condition of windows, condition of ceiling condition of roof, condition of lighting, structural condition, landscaping, nuisance, poor condition of units, neighbourhood problem), 5 parcel quality variables (condition of drives, fair condition of units, sanitary condition, drainage, noise level), and 5 basic residential quality variables (crowdedness, good condition of units, air quality, waste disposal and source of domestic water supply). The variables were used in obtaining data in all the 30 neighbourhoods of the study area.

The cost of housing investments were determined in both public and private investments in the area. Thereafter, the mean values of investments in each of the neighbourhoods were found. SPSS version 13 was then used to analyse the data. The SPSS output from regression analysis are presented in Tables 8.1-8.3 as odel Summary, ANOA b and Coefficients b respectively.

Table 8.1: Model Summary

Model	R	R^2	Adjusted R^2	Std Error of the estimate
1	975	.949	.915	7.02218

a. predictors (constant), privest, pubinvest

Table 8.2: ANOVA b

Model	Sum of squares	df	Mean square	f	Sig
1 Regression	6.731.305	2	1346.334	26.866	.000 a
Residual	350.243	27	50.115		
Total	7082.057	29			

a. predictors (constant) prinvest, pubinvest
b. dependent variable, aggscore

Table 8.3: Coefficients b

Model	Unstandardized coefficient		Standardized coefficient	t	Sig
	B	Std. Error	Beta		
1	24.248	13.407		3.809	.042
(constant)	-1.354	2.519	.150	5.537	.013
pubinvest	-2.247	2.551	.236	4.236	.023
prinvest					

Dependent variable: aggscore

Results showed a strong significant relationship between residential environmental quality and housing investments in the study area. R^2 = 0.949. This means that 94.9% of variation in the dependent variable (environmental quality) can be predicted from the independent variables (public and private investments).

However, to generalize the finding to the population beyond the sample, the adjusted R^2 is employed. Adjusted R^2 = .915. This means that the best coefficient of determination is 91.5%. Thus, 91.5% (explained variance) of the variables is capable of predicting the value of environmental quality in the

area. This leaves 8.5% of the variation unexplained, suggesting that the explanatory variables could be regarded as being high.

Also, P-significance = .00 and P< 0.05 significance level. Interestingly, the pubic investment has P-significance level of 0.013 and private investment has P-significance value of 0.023 which were all significant at 0.05 significance level. The standard error of the estimation = 7.02218, which is the standard deviation of the error term.

To measure the significant interactions in the model, the coefficients of the independent variables are employed. The coefficient 'b' table indicates the relative impact of each variable on the dependent variable to predict the dependent variable. It is pertinent, however, to note here that private investment variable impacts more on the environmental quality of the area than public housing investment. This suggests that housing investments in the study area are more of private investment than of public investment.

Conclusion and Recommendations

Housing investments in the metropolis is not commensurate with the teeming population of the area. Enugu metropolis is not left out of the population upsurge in Nigeria. The increased population is indeed, making great demand on the available housing stock in the area as well as the surrounding neighbourhoods. Consequently, the existing housing units are deteriorating fast, solid waste management is posing a serious problem, some amenities are depleted and certain facilities have totally broken down in the area, boiling down to degradation in the environmental quality of the area. Hence, unless urgent practical steps are taken, the current wave in the global trend of environmental quality sustainability will continue to be a vision of illusion in the area.

The government ouhjt to regard occupation of residential housing units as a need, which should not always serve as a profit making venture. Hence, the Enugu State Government should arise and make every frantic effort towards embarking on realistic housing projects that will effectively complement the efforts of the private sector. However, the site and services scheme, part of the Enugu State Government effort to encourage private housing investment, should be seriously embarked upon to attract various categories of private investors. Besides, the Enugu State Government should reconsider the decision of privatizing some of the public housing units because they go a long way to augment the private sector provision. Where the Enugu State Government deems it necessary to go on with the programme for reasons outside the scope of this study, the civil servants, low and medium income earners, should be made to be the first beneficiaries.

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