

RENTAL VALUE AROUND HVOTL FACILITIES IN RESIDENTIAL NEIGHBORHOODS OF METROPOLITAN LAGOS, NIGERIA

Oluwunmi, Adedamola Olufunke

Akinjare, Omolade Adedoyin

Ayedun, Caleb Ayedun

Department of Estate Management, School of Environmental Sciences,

College of Science and Technology, Covenant University, Ogun State, Nigeria

Abstract

There has been a constant debate that High Voltage Overhead Transmission Lines (HVOTLs) facilitate residential property values diminution. This study therefore tries to capture the pattern of residential property rental values around HVOTLs using a rent comparison basis within Lagos metropolis. Questionnaires were distributed to Estate Surveyors and Valuers, residents within 200m to power lines in Surulere and Alimosho areas of Lagos coupled with an indepth interview with the Managers and field officers of the Akangba and Alimosho PHCN sub station. An average response rate of 66.5% was recorded and collated data were analysed via descriptive and analytical statistics. Findings revealed a homogeneous trend in residential property value and neighbourhood characteristic. Finally, the study encouraged the burial of power lines inclusive of

the strict enforcement of ROWs in Lagos metropolis to play down and abate the unanticipated impact of HVOTL on property investments.

Keywords: HVOTLs, Power Line, Residential Property, Rental Value, Surulere, Alimosho & Lagos Metropolis

Introduction

Ever since the advent of electricity, power lines have existed to convey electricity to consumers in distant locations via remote areas and suburbs. As population increased over time, these remote locations inevitably housed the teeming populace. Also, the continuous stretching of available land resource in the quest to acquire interest in land and landed properties at all cost encouraged dangerous proximal living to power line until mishaps began to occur.

On the 13th of February, 2010 in Port Harcourt, Southern Nigeria, the BBC online news confirmed that at least ten people were charred beyond recognition while many other passengers were electrocuted when a power line cable snapped off a pylon hanger and fell on a commuter bus (BBC News Website, 2010). Following incessant tragedy associated with power lines, substations and other electric power equipments, the Power Holding Company of Nigeria (PHCN) was forced to embark on enlightenment campaigns via the electronic and print media about the hazards associated with power line and the need for people to observe the regulatory setbacks. All these generated controversial discussions as to the safety of lives and property around these electric power installations. This noted incidence in Nigeria brought to the fore the need to study the impact of power line hazards not only on residents living proximal power lines but also on property rental values. The quest to investigate the nature of residential property rental values within and around power line neighbourhoods in order to establish a pattern of values necessary to ascertain the effect of power lines on rental values is thus vital in professionally advising property investors understand the pros and cons of investing in proximity to power lines within Lagos metropolis. The study therefore, evaluates the pattern of rental values around High Voltage Overhead Transmission Lines (HVOTLs), often referred to as power line, on residential neighbourhoods.

Several studies including those of Kinnard (1967), Wertheimer & Leeper (1979), Colwell and Foley (1979), Savitz *et al* (1988) and some recent ones Chalmers and Voorvaart (2009),

Akinjare *et al* 2012), have for long, sort to investigate the impact of power lines on the property values and also its probable effect on the health of residents within close range. The conclusion from these studies have shown varying degrees of findings.

For instance, a study conducted by Hamilton and Caruthers (1993) on the effects of transmission lines on property values in Vancouver, British Columbia. The authors analysed a six year property market data and found a diminution value of 5% on property proximal to power lines by 120 meters. A further study by Hamilton and Schwann (1995) surveyed 12,907 residential dwellings within four neighbourhoods in Vancouver, British Columbia within a period of 6 years (1985-1991). The result of the duo found a 6.3% diminution effect on properties located 100 meters to a 230Kv power lines and a 1.1% diminution effect on properties 200 meters from another 500Kv power lines. Complete removal of the pylon and power lines increased value by a 6.3% margin. Rosiers (1998), agreed with the findings of Colwell (1990) which portrayed a diminution in property values as a result of the visual effects of pylons and power lines. After a survey carried out on 507 single family sales, analysis showed a lesser diminution value on a property physically closer to a HVOTL but with its glare shielded by a wood, unlike other less proximal properties which had the direct glare of the power lines unshielded.

Syms (1996) subjected the professionals in the real estate industry to a psychometric test anchored with a view of assessing their perception regarding contaminated land. Results from this study showed that overhead power cables were perceived to be low risked. This finding differed from the outcome of the study of Slovic (1992) which indicated a greater perception of risk in this regard. Another study by Syms (2001) exposed to the media the issue of power-lines as they affected property values.

In Canada, Des Rosiers (1998) researched into the impact of high-voltage transmission lines on surrounding residential property values using a micro-spatial approach. The research was anchored on a sample of 507 single-family houses in the city of Brossard, Greater Montreal, Canada; 257 of these town cottages sold during the study period between February 1991 and November 1996. The study area comprised three distinct neighbourhoods (R, S, and T) with a 315 kV transmission power line traversing through the center. The data bank includes 25 residential property descriptors relating to physical, environmental, neighborhood, access, fiscal and sales time attributes, as well as a series of power line related descriptors. Standard and

stepwise regression procedures were successively used in the analysis. The model showed that a residential property both adjacent to an HVTL easement and facing a pylon would experience a drop in value due to visual encumbrance by approximately 9.6% of the mean house price. It also revealed that residences located 1 to 2 lots away from a pylon usually benefit from a market premium due to increased visual clearance and privacy. On the average, this premium is within the range of 7.4% and 9.2% of the mean house price. It was discovered that a property located directly beneath the power line would suffer a decrease in value because of low minimal clearance of the lines fostering visual obstruction. This decrease is lesser and averages about 4.7% of the mean home price. Residences with a moderate rear or side view on a power line structure but not adjacent to the easement usually experience a market premium of 2.8% to 3.8% due to the improved visual clearance these residential properties benefit from. The net visual encumbrance defined as the difference between proximity obstacles and advantages was found to reach its peak at about 50 to 100 meters away the easements' external boundary and diminishes quickly and thereafter, entirely faded away 150 meters and beyond. Luxury home prices were also found to be more sensitive to the visual encumbrances of power line structures. It was however noted that, the methodology of this in-depth study was based only on sales value and not the passing rent of residential properties. This present study hence focused the effect of power line on residential rental values.

Wolverton and Bottemiller (2003), an assenting study of an earlier research work by Cowger *et al* (1996). In this study, investigations were made as to whether the outcomes of the original study would hold while using more rigorous and analytical methodologies. Cowger's study used a paired sales analysis in determining observed differences in the sales price of properties adjoining transmission line ROWs in Portland, Vancouver, and Seattle, and similar properties located in the same cities but out of the view of power lines. Though, the original study did not control differences between the subject properties and their comparables Wolverton and Bottemiller attempted to surmount that setback using regression analysis. Analysis of covariance (ANCOVA) was made use of to determine how adjoining power line short change sales price. The data provided by the models did not support any price effect on residential property from being located adjacent to any power line. This affirms the conclusions of the original study of Cowger, that sales prices of properties are not momentarily affected by the presence of a power line. Also, the data showed no discrepancy in appreciation rates between

residences beside power line ROW and residences situated further away from the power line. This study was thorough in using paired sales analysis in line with regression in determining the impact of power lines on residential properties but this current study will be streamlined to utilising the passing rents of various cadres of residential properties in determining the effect of power lines on residential properties.

Using a multiple regression framework, Chalmers and Voorvaart (2009) addressed the impacts of power line on residential property values and prices. The study anchored on the sales of residential properties (between 1999 and 2007) abutting a 345 kV transmission lines in Connecticut and Massachusetts. The authors investigated the influence of actual distance proximity and encumbrance on sales price and found proximity to have an insignificant effect on sales price. It was concluded that “the only variable that appears to have any kind of systematic effect is the encumbrance variable,” although its statistical significance varied and the effect was “generally small.” The authors also addressed potential effects due to the visibility of the transmission line structures and found no significant impacts on sales prices. Though no statistically significant effect was found on residential properties using sales price, this current study aims at determining effects via the use of rental values instead.

A recent study by Akinjare *et al* (2012) in Nigeria investigated the impact of power-lines on the rents of residential properties in high brow Lagos revealed that residential property rents increased as distance from power-lines increased averagely by =N=5,000.00 and a mean value impact of =N=786 on neighbourhood rental value. The study encouraged the use of buried armour cables instead of overhead power-lines in future and the strict enforcement of ROWs within Lagos metropolis where power-lines already exist, in a bid to abate the effect of power line on property investments.

From above, it can be inferred that there is need for more research efforts in this area in Nigeria. Thus, this study not only seeks to compliment existing studies internationally but also to investigate the peculiarity of rents within and outside power line characterised residential neighbourhood in order to establish the pattern of rents in a peculiar real estate market such as that of the Nigeria.

Material and Methods

This study distributed questionnaires to Estate Surveying and Valuation firms within the Lagos metropolis. It also sampled every other residential building along power line routes and

within a 200m perpendicular distance from the four power line routes totalling 31km in Surulere axis. These routes are namely: Akangba-Ojo (11km), Akangba-Isolo (7km), Akangba-Ijora (5km) and Akangba-Apapa (8km) routes. Within the Alimosho power line axis, residential sampling was accomplished along and within a 200m perpendicular distance to the 10km Alimosho double pylon track emanating from the Alimosho PHCN sub station.

Response rates of 56.8% and 53.47% were achieved for Surulere and Alimosho areas respectively while a 76.19% response rate was achieved for Estate Surveying and Valuation firms. In a bid to further understand powerlines, an indepth interview with the Managers and field officers of the Akangba and Alimosho PHCN sub station was conducted for the purpose of this research. In all, the survey recorded an average response rate of 66.5% and collated data was analysed using the descriptive and analytical statistics.

Rationally, the impact of power lines on the rents of nearby residential properties were not expected to be uniform as rents were presumed to increase as distance away from the power line increases, a four point distance range in the order of 0-50m, 51-100m, 101-150m and 151-200m was adopted as shown by Chalmers *et al* (2009) to analyse the impact of power line on the rents of residential properties.

Results and Discussion

In proffering an answer to the study, the rental value of the various types of properties around the two HVOTLs study areas, for the period of 2004 to 2008, were taken. The results obtained are as shown in Table 1.

Table 1: Average Value of Residential Properties around HVOTL Sites (2004-2008)

| HVOTL Axis | Residential Property Types and Their Rental Values (=N= 000.00) | | | | | | |
|---------------|---|---------------|---------------|---------------|-------------------|-------------------|--------------------|
| | Tenement | 1bdrm Flat | 2bdrm Flat | 3bdrm Flat | 2bdrm Bungalow | 3bdrm Bungalow | 3bedrm Duplexes |
| Surulere | 46 | 152 | 230 | 466 | 354 | 714 | 884 |

| | | | | | | | |
|----------|----|----|----|----|----|----|-----|
| Alimosho | 24 | 50 | 65 | 75 | 70 | 90 | 180 |
|----------|----|----|----|----|----|----|-----|

Source: Author's Field Survey (June-November, 2010)

Table 1 indicates that rental values for the 7 cadre of residential property types in Surulere commanded the highest residential property value in comparison to Alimosho area. Observation shows that rental value of tenement properties in Surulere almost doubles that of similar properties in Alimosho axis and also, rents for the 1bedroom flat cadre tripled rents attainable in Alimosho axis. The 3bedroom bungalow cadre commands the highest value compared to rents paid for its likes in Alimosho at a ratio of approximately 8:1. Despite the presence of HVOTLs, this huge difference is traceable to factors such as: Surulere's proximity to core Lagos metropolis, its high population density, its mixed land use nature, high brow nature, proximity to Lagos Island CBD, the presence of the National and Telim Balogun stadia and lastly, the traffic hub of Ojuelegba have undoubtedly promoted the rental values of its residential properties above those of suburban Alimosho axis located at the fringe of Lagos State.

Residential Property Values in Non HVOTL Locations outside 200m of the HVOTL Corridor.

Residential property values in selected non HVOTL locations in the two study areas were surveyed and analyzed in an attempt to compare them with property values within 200m of HVOTLs. This was to ascertain differences in values between the two locations. The residential property values are analyzed in Tables 2 and 3.

Table 2: Residential Property Rental Values in both HVOTL and non HVOTL

Locations within Surulere.

| Location | (=N= 000.00) | | | |
|---------------|--------------|--------------|---------------|------------|
| Property Type | HVOTL | Non - HVOTLs | Diff in Value | % Increase |
| Tenement | 46 | 94 | 48 | 104 |

| | | | | |
|-------------------|-----|-----|----|-------|
| 1-bedroom Flat | 152 | 200 | 48 | 31.58 |
| 2-bedroom Flat | 230 | 276 | 46 | 20 |
| 3-bedroom Flat | 466 | 530 | 64 | 13.73 |
| 2-bedroom Bung. | 354 | 410 | 56 | 15.82 |
| 3-bedroom Bung. | 714 | 770 | 56 | 7.84 |
| 3-bedroom Duplex. | 884 | 970 | 86 | 9.73 |

Source: Field Survey, (2010)

Table 2 showed that tenement properties in non HVOTLs areas in Surulere had a huge difference in value of 104% above those in the confines and vicinity of HVOTLs. Also, the 1-bedroom flats recorded a 31.58% value increase compared to same apartments within the HVOTLs catchment areas. In the former scenario, it could be deduced that the high demand for tenement properties vis-a-vis supply in line with potential threats from the HVOTLs fostered the gallop in value. In the course of the field work, it was observed that very few tenement properties were located beside the HVOTLs and more so, in-depth interview with residents revealed that the bi-annual mode of rent collection enabled mobility of tenants- (easy relocation from one abode to another) whenever HVOTLs threats rises especially during the rainy season. Also, the continuous demolition threat accompanied by demolition acts since 1999 by the Lagos State government had increased the rate at which occupiers of tenement properties scramble out for like properties outside the vicinity of the HVOTL. Percentage increases for other forms of accommodation ranged between 7.84% and 20% respectively. The pattern of residential property values in non HVOTL locations at Surulere showed a wide variation in tenement property values. For the other cadre of accommodation, the pattern of residential property values in non HVOTL locations at Surulere showed that property values were higher than in the vicinity of the HVOTLs.

Table 3: Residential Property Rental Values in HVOTL and non HVOTL Locations

within Alimosho.

| Location | (=N= 000.00) | | | |
|----------------------|---------------------|------------------|----------------------|-------------------|
| Property Type | HVOTL | Non-HVOTL | Diff in Value | % Increase |
| Tenement | 24 | 28 | 4 | 16.67 |
| 1bdrm Flat | 50 | 59 | 9 | 18 |
| 2bdrm Flat | 65 | 72 | 7 | 10.77 |
| 3bdrm Flat | 75 | 84 | 9 | 12 |
| 2bdrm Bung. | 70 | 82 | 12 | 17.14 |
| 3bdrm Bung. | 90 | 110 | 20 | 22.22 |
| 3bdrm Duplex | 180 | 225 | 45 | 25 |

Source: Field Survey, (2010)

Table 3 shows that 3-bedroom duplexes commanded the highest value increase of 25% while 3 bedroom bungalows attracted a value increase of 22.22%. The 3-bedroom duplexes have enjoyed the 25% value increase for the following reasons. First, they are mostly furnished to taste which signifies the original intention of the landlords to occupy such properties themselves but for personal reasons which may include distance of Alimosho from the city core, many of such landlords prefer to stay in other more developed areas only to return after retirement. The presence of an industrial estate and also two Universities namely Covenant University and Bells University of Technology located in nearby Ogun State within 1.5km crow flight from the HVOTLs has encouraged occupancy of 3bedroom duplexes further away from HVOTLs. In the same vein, value increment on other accommodations ranged from 10.77% to 18%. The pattern of residential property values in non HVOTL locations at Alimosho showed that property values were higher than in the vicinity of the HVOTLs. In Surulere and Alimosho, the discussion of

rental value pattern displayed different value patterns from one HVOTL location to another. Results of analysis undertaken from the market survey from the point of view of Estate Surveyors and Valuers established three major facts.

First, four residential property types (Tenement, 1-bedroom, 2-bedroom and the 3-bedroom flats) in Surulere neighbourhood commanded the highest property value increase amongst the two HVOTL neighbourhoods. Second, three residential property types (2-bedroom and 3-bedroom bungalows inclusive of the 3-bedroom duplexes) in Alimosho axis commanded highest property value increase compared to same available in Surulere residential neighbourhood. Finally, there is a wide variation in property value among tenement properties in Surulere than those of Alimosho.

Recommendations

Based on the findings of this research, the following recommendations are hereby put forward for consideration by government and other stakeholders, as might be applicable. The Federal Government of Nigeria should seek the use of alternative and more creative channels of bulk electric energy transfer. Though HVOTLs appear to be the cheapest option, redesigning pylons into more environmentally appealing forms may further reduce the impact of its imposing nature on the built and natural environment. Moreover, the use of insulated overhead cables could further reduce electrical accidents should cables snap off the hanger. Also, the sub-surface mode of electricity transfer should be encouraged as it obtains in the petroleum industry where sub-surface pipeline is employed in transferring oil products from one part of the country to another. Furthermore, there should be effective periodic maintenance by the PHCN on HVOTLs with a view of replacing them with insulated wires (adopted in the UK) conveyed by humanoid pylons (as conceptualised in Iceland). Also, ROWs enforcement throughout the State must be implemented forcefully. This is expected to aid the effective monitoring which in turn would keep vandals at bay and promote safety consciousness in residents living at proximal distances.

Furthermore, it is recommended that the Nigerian Institution of Estate Surveyors and Valuers (NIESV) fund research efforts into new valuation techniques for measuring the impact of environmental disamenities like HVOTLs on the values of various property. Finally, the departments of Estate Management in the various tertiary institutions should be encouraged to

review their curriculum to take into account of environmental challenges such as those from HVOTLs.

Conclusion

Major highlights of the results obtained from the analysis showed that the pattern of residential property values in the study areas showed homogeneity in value trends and neighbourhood characteristics. This implied the need for the various tiers of Government in enforcing the ROWs in the entirety of Lagos State to play down or permanently abate the unanticipated impact of HVOTL on properties owned by residents of the host communities. Lastly, the research encourages the government to furthermore improve and sustain the present level of maintenance and management of ROWs.

References:

- Akinjare, O. A., Oluwunmi, A. O. and Iroham, O. C. (2012). Impact of HVOTLs on Residential Property Rental Values in High Brow Lagos Metropolis. *Ethiopian Journal of Environmental Studies and Management*, 5(1), 56 – 63.
- Alexander, D. (1993). *Natural Disasters*. London: University of College London Press.
- BBC News. (2010), Ten die as cable hits bus. [Online] Available: Retrieved from <http://news.bbc.co.uk/go/pr/fr/-/2/hi/africa/8514694.stm>.(Nov. 3, 2010)
- Chalmers, J.A. and Voorvaart, F.A. (2009). High-Voltage Transmission Lines: Proximity, Visibility and Encumbrance Effects. *The Appraisal Journal*, (Summer ed.), 227–45.
- Colwell, P.F (1990). Power Lines and Land Value. *Journal of Real Estate Research*, 5(1), 117–27.
- Colwell, P.F. and Foley, K.W. (1979). Electric Transmission Lines and the Selling Price of Residential Property. *The Appraisal Journal*, 47(4), 490–99.
- Cowger J.R and Bottlemillar S.C., MAI and James M. Cahill (1996). Transmission Line Impact on Residential Property. *Right of Way*, September/October.
- Deyle, R. E., French, S. P., Olshanky, R. B., and Paterson, R. G. (1998). Hazard Assessment: A Factual Basis for Planning and Mitigation. (In R. J. Burby (Ed.), *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*, (pp. 119-166). Washington, DC: Joseph Henry Press. Alexander.

- Hamilton S.W. and Schwann G.M. (1995). Do High Voltage Electric transmission Lines affect Property Value? *Land Economics*. 71(4), 436-44.
- Hamilton, S. W. and Carruthers, C. (1993). The Effects of Transmission Lines on Property Values in Residential Areas. University of British Columbia, Vancouver, B.C.
- Kinnard, W.H. Jr., (1967). Power lines and Residential Property Values. *The Appraisal Journal*, 35, April 269-284.
- NIESV (2009) Directory of Estate Surveyors and Valuers, The Nigerian Institution of Estate Surveyors and Valuer.
- Rosier F.D. (1998). The Impact of High Voltage Power lines on Housing Prices. A Paper presented at the American Real Estate Conference Monterey California. April 15-18. Cited in Bond and Hopkins (2000).
- Savitz D, Wachtel H, Barnes F, John E, and Tvrdik J. (1988). Case Control Study of Childhood Cancer and Exposure to 60Hz Magnetic Fields. *American Journal of Epidemiology*, 128(1), 21-38.
- Slovic P. (1992). Perceptions of Risk: Reflections on the psychometric paradigm, cited in Social Theories of Risk, S. Krimsky, D.Golding (eds) Praeger, Westport, Connecticut, 117-152.
- Syms P. (2001). The Effect of Public Perception on Property Values in Close Proximity to Electricity Distribution Equipment. RICS Foundation Cutting Edge 2001, Oxford Center for Real Estate Management, Oxford Brookes University, Headington.
- Syms, P. (1996). Perceptions of Risk in the Appraisal of Contaminated Real Estate Paper presented at RICS Cutting Edge. Estates Gazette, 26th Oct 1996. Issue 9643,146-148.
- Wertheimer, N. and Leeper, E. (1979). Electrical Wiring Configurations and Childhood Leukemia in Rode Island, *American Journal of Epidemiology*, 109, 273-284.
- Wolverton, M. L. and Bottemiller, S.C. (2003). Further Analysis of Transmission Line Impact on Residential Property Values. *The Appraisal Journal*, (July ed.), 244–252.