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FEDERAL UNIVERSITY OF TECHNOLOGY  
MINNA, NIGER STATE, NIGERIA**

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**SETIC  
2020  
INTERNATIONAL  
CONFERENCE**

**BOOK OF PROCEEDINGS**

**MAIN THEME:**

**Sustainable Housing And Land Management**



**3RD -5TH MAY, 2021**



**SCHOOL OF ENVIRONMENTAL TECHNOLOGY COMPLEX,  
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**School of Environmental  
Technology International  
Conference  
(SETIC 2020)**

**3RD – 5TH MAY, 2021**

**Federal University of Technology Minna, Niger  
State, Nigeria**

**CONFERENCE PROCEEDINGS**

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**ISBN 978-978-54580-8-4**

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SETIC 2020 International Conference:

“Sustainable Housing and Land Management”

School of Environmental Technology, Federal University of Technology, Minna  
3<sup>rd</sup> – 5<sup>th</sup>, May 2021.

# Proceedings of the 3rd School of Environmental Technology International Conference (SETIC 2020)

**Published by**  
School of Environmental Technology,  
Federal University of Technology Minna.  
PMB 65, Minna,  
Niger State Nigeria.

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ISBN 978-978-54580-8-4

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3<sup>rd</sup> – 5<sup>th</sup>, May 2021.

# Effect of Urban Land-Use Planning Regulations on Residential Property Investment Returns: Evidence From Literature

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## Abstract:

*Different socio-economic activities in the urban areas take place on land, a unit whose relationships and significance is guided by policies. Literature have clearly shown that urban land use planning and management policies and regulations influence residential price due to its latitudinal bond with locational, structural and neighbourhood attributes in the housing market. This paper reviewed related literature and observed that the trends in studies on the effect of urban land use planning regulations on residential property investment returns have been advancing in continents like Asia, America, Australia and Europe but lagging behind in African countries like Nigeria. It was found that computable but varied price premium were paid for housing attributes such as bedrooms, greenbelt land and proximity to school by buyers/renters for residential properties. Hence, these variables are significant predictors of housing price/rent. This paper recommends that these variables should be considered in urban studies of developing countries like Nigeria with a history of ineffective urban land use planning and management policy to unearth the peculiarities of their urban regions.*

**Keywords:** Urban, Land-use, Regulations, Residential property, Returns.

## 1 INTRODUCTION

Countries often engage in active land use planning by imposing restriction. Arguably, to guarantee investment decision. Jha et al. (2010) observed that urban land use planning regulations (ULUPRs) is a communal policy exercise that defines and controls the use of a particular land in order to enhance the economic, physical, social efficiency and safety of a people in a geographical location. Every geographical area have unique ULUPRs. Indeed, it is pervasive and fundamentally determine the form of a city, physical development pattern and occupancy, transport and cost of housing (Lovkovich et al., 2018). Hence, ULUPRs could affect rent/housing price directly, through a particular use permitted in the neighbourhood or indirectly by creating a residential neighbourhoods and cities of certain feature (Kok et al., 2014), this influence are observed in form of local amenities or disamenities and significantly shape the extrinsic and intrinsic attributes of housing in price definition (Rahadi et al., 2013). Interestingly, economists have observed that ULUPRs affect residential property in three specific ways: amenity effects, restrictive effects and scarcity effects, these effects are part of the driving forces in urban property market (Jeager, 2007). In addition, Monkkenon (2013) is of the opinion that places where ULUPRs are not stringent, their influence on the housing markets are not clear. Hence, requires empirical study. The effect of ULUPRs on housing have a latitudinal bond within the property market in terms of its location, structural and neighbourhood attributes that determine housing price. Obviously, these attributes have been utilized in hedonic models globally and have advanced significantly over the years.

Housing price/rent is a reflection of the intrinsic and extrinsic attributes of a property, as a result price is arrived at through a series of negotiation by parties involved. Effective demand can only be attained if the buyer/renter is willing to pay (McDonald and McMillen, 2007). Most at time buyers rely on a lot of features before they offer their bid and among them are the triple attributes which play a significant role in influencing the decision of the buyer/renter. Understanding renter and/or buyers housing welfare and the performances of the property

market in urban centre in this context is of crucial concern to the real estate developers, investors, urban planners, policy makers, economists and researchers.

At the same time, there are limited academic literature (see table 1) on developing countries studying the relationship between various attributes of ULUPRs and residential property investment returns (RPIRs), although widespread in the existing literatures of property value models of developed Nations (Michael and Palmquist, 2010; Gyourko and Molloy, 2014). This review unearth persistent housing attributes used in literatures to study ULUPRs and RPIRs. The rest part of the review is structured as follows. Section 2 attempt an overview of the global literature from 2007-2019 and classification of housing attributes that have been utilized in hedonic models/theory. Section 3 present empirical literature on the effect of ULUPRs on RPIRs whilst in section 4 Conclusions.

## **2 FUNCTIONING OF HOUSING ATTRIBUTE IN URBAN AREAS AND HEDONIC PRICE MODEL**

Literature utilized in this study suggest that researchers utilised Rosen (1974) hedonic price theory/model to understand and explain the relationship between components of housing attributes and housing price/rent. The theory provide an insight into relationship between price/rental trends and output of housing as a product. In the housing price model the renter/buyer relate the worth of real estate to its various tangible attributes thus obtaining their minimal contribution or the hedonic price. Consequently, the rent or selling price is the exogenous variable. Endogenous variable describe the property intrinsic and extrinsic features, this include among others nearness to commercial centre, number of rooms, and lots size of the property.

From available literature less attention have been given to reviewing housing attributes that are commonly used in studying ULUPRs and housing prices/rent. Ajibola et al. (2012); Michael and Palmquist (2010) suggested frequent usage of location, structural and neighbourhoods regulations attributes in hedonic price model because they are the fundamental determinant of housing price/rent. Hence, it is pertinent to uncover in this review the attributes that are in use consistently in studies of ULUPRs and housing value. This will specifically guide future studies on choice of variables particularly in developing economies where there are dearth of empirical studies; and have a history of ineffective land use policy and management (Awuah et al. 2014). Table 1 below, shows 33 articles from reputable journals which were reviewed between 2007- 2019. The table suggested that there is no general concise on the sample size to adopt, hence the sample size may have been determine based on analytical tool used and population of study because 84.85% of studies employed sample size that ranges from 42 to 9027 while 15.15% adopted above 10000. Also 96.97 % of the studies adopted quantitative research approach and utilized regression signifying that this methodology is universally acclaimed for a research of this nature. Hence should be utilised in subsequent studies.

Subsequently, 30 structural regulations attributes were identified to have been utilised in hedonic price studies globally from 2007 to 2019. Table 2 below present existent structural attributes and the number of time each occurred. Most occurring structural regulations attributes include: Plot size, age of a house, floor to area ratio; averagely occurring are number of bedrooms, number of bathrooms and number of lot tree; whilst fairly occurring are garage, water source, floor level, material for roof, living area, finished area of the house, property right and level of services. The cumulative incidence of manifestation of these structural attributes account for about 80% of the structural variables utilized in hedonic studies. This indicates that the outcome of the most occurring, averagely and fairly occurring structural attributes unearth, are likely to be strong predictors of RPIRs which could either be positively (amenity effect) or negatively (disamenity effect).

As a result, it is suggested that depending on the various ULUPRs used across a geographical area, the choice of structural regulations attributes to be incorporated in future hedonic studies can include these 14 structural variables. For instance variable such as numbers of trees in cold

and polar region might not be of significance as such will not be pertinent for incorporation in the price model though in dry, tropical and temperate region it will assume a significant role

**Table 1: Overview of empirical studies**

S/No	Study	Study area/Continent	Sample size	Methodology
1	Ihlanfeldt (2007)	Tallahassee/ N.America	136,158	Quantitative/Regression
2	Jeagar (2007)	Oregon/ N. America	1993	Quantitative/Diff-in-diff
3	Yusuf and Resosudarm (2009)	Jakarta /Asia	470	Quantitative/Regression
4	Tang and Yiu (2010)	Hong Kong/ Asia	378	Quantitative/Regression
5	Donovan and Burty (2011)	Oregon / N. America	985	Quantitative/Regression
6	Huang and Tang (2012)	USA	327	Quantitative/Regression
7	Jeagar et al. (2012)	Oregon /N. American	1993	Quantitative/Diff-in-diff.
8	Ajibola et al. (2012)	Lagos/Africa	260	Quantitative/Regression
9	Monkkenon (2013)	Indonesian/Asia	42	Content analysis
10	Boamah (2013)	Ghana/Africa	741	Quantitative/Regression
11	Bello and Yacin (2014)	Maiduguri/ Africa	372	Quantitative/Regression
12	Awuah et al. (2014)	Ghana/Africa	45	Quantitative/Regression
13	Kok et al. (2014)	San Francisco/USA	7358	Quantitative/Regression
14	Wen et al. (2014)	Hangzhou/Asia	649	Quantitative/Regression
15	Turner et al. (2014)	USA/North America	2729	Quantitative/Regression
16	Boyle et al. (2014)	Florida/ N. America	3500	Quantitative/Regression
17	Du and Zhang (2015)	China/ Asia	410	Quantitative/Regression
18	Wen et al. (2015)	Hangzhou/Asia	2887	Quantitative/Regression
19	Zou, (2015)	China/Asia	2160	Quantitative/Regression
20	Lima and Neto (2015)	Brazil/S. America	5498	Quantitative/Regression
21	Jackson (2017)	California/ America	420	Quantitative/Regression
22	Guo et al. (2017)	Adelaide/Australia	2700	Quantitative/Regression
23	Lai et al. (2017)	Shenzhen/Asia	120	Quantitative/Regression
24	Brueckner et al. (2017)	China/Asia	2589	Quantitative/Regression
25	Wen et al. (2017)	Hangzhou/Asia	660	Quantitative/Regression
26	Levkovich et al. (2018)	Netherlands/Europe	71578	Quantitative/Regression
27	Brueckner and Singh (2018)	Washington/N. America	9027	Quantitative/Regression
28	Severen and Plantinga (2018)	California/ N. America	10794	Quantitative/Regression
29	Greenaway et al. (2018)	New Zealand/Europe	1984	Quantitative/Regression
30	Li et al. (2018)	China/ Asia	47,790	Quantitative/Regression
31	Kim et al. (2019)	Korea/Asia	11,498	Quantitative/Regression
32	Jeon (2019)	Korea/Asia	1040	Quantitative/Regression
33	Tan et al. (2019)	Wuhan/Asia	7090	Quantitative/Regression

The importance of neighbourhood regulations attributes in hedonic price studies cannot be overemphasised in urban studies. The distinct variables of these groups of housing attributes employed in hedonic price model is therefore a concern. Table 3 presents the attributes used to describe neighbourhood subset of the hedonic price models in empirical literature.

Sequel to the review of 33 empirical literature, 15 neighbourhood regulations variables were also discovered to be used in hedonic price models. These variables were described in various range of attributes as each of the empirical literatures contextualize the variable to suit the respective studies’ operationalization. Hence, might not be realistic to have a common ground categorization of the attributes that are habitually utilised in hedonic price model in literature studying housing rent/price and ULUPRs in urban studies. This is in line with the view of Laerdal and Vorkinn (2017) that environmental conditions and relative importance placed on neighbourhood and location attributes may sway their choice to be included in a given hedonic price model of a given case study.

*Table 2: Occurrence of structural variable in the empirical studies*

S/no	Structural variable	Numbers of. variable appearance
	Variables that occurs most	
1	Lot size /Plot size	14
2	Age of house based year	17
3	Floor to area ratio (density of development)	11
	Variables that occurs 6 to 10 times	
4	Number bedrooms	10
5	Number of bathrooms	7
6	Floor level	7
7	Numbers of lot trees	6
	Variables that occurs 4 to 5 times	
8	Living area	5
9	Finished area of the house (size of the house)	5
10	Property right (C of O)	5
11	Garage	4
12	Water source inside (pipe)	4
13	Material for roof	4
14	Level of facilities/service	4
	Variables that occurs 2 times	
15	Building permit	2
16	Property management	2
17	Material for floor	2
18	Construction materials	2
19	Type of heating	2
20	Type of fire place	2
21	orientation	2
	Variables that occurs once	
22	Air conditioning	1
23	Architectural design	1
24	Family size	1
25	Use change permit	1
26	Lightening condition (orientation)	1
27	Ventilation	1
28	Outside wall material	1
29	Liquid waste disposal	1
30	Solid waste disposal	1

*Table 3: Attributes defining neighbourhood in the reviewed empirical studies*

Type of attributes	Attributes	References
neighbourhood	Distance to nearest school	Yusuf and Resosudarmo(2008); Awuah et al. (2013); Monkkenon (2013); Wen et al. (2015); Guo et al. (2015);Wen et al. (2017); and Brueckner et al. (2017) Li et al. (2018) and Tan,(2019)
	zoning	Ihlanfeldt (2007); Jeager et al. (2012); Monkkenon (2013); Jackson et al.(2016)
	Electricity	Awuah et al. (2013); Monkkenon (2013); Bello and Yacin (2014) and Lima and Neto (2015)
	Distance to arterial road	Guo et al. (2015); Brueckner et al. (2017); and Yusuf and Resosudarmo (2009) and Tan (2019)
	Paved street	Awuah et al. (2013); Wen et al. (2014) and Monkkenon (2013)
	Sport facilities	Tang and Yiu (2010); Wen et al. (2015) and Wen et al. (2017)
	Property management	Wen et al. (2015) and Wen et al. (2017) and Li et al. (2018)
	Drainage system	Awuah et al. (2013)and Monkkenon (2013)
	sewerage	Monkkenon (2013) and Lima and Neto (2015);
	Surrounding facilities	Boyle et al. (2014); Wen et al. (2017); and Li et al. (2018)
	Neighbourhood planning	Ajibola et al. (2013) and Monkkenon (2013)
	traffic	Yusuf and Resosudarmo (2009) and Wen et al. (2014)
	Street lightening	Monkkenon (2013)
	Telephone line	Awuah et al. (2013)
	Security	Donovan and Burty (2011)

Table 4 also, shows the attributes commonly used to describe location subclass of the hedonic price models as utilised in empirical literature. After the review, 13 location variables were found to be used in hedonic price models.

*Table 4: Attributes describing location used in hedonic price models in the reviewed studies*

Type of attributes	Attributes	References
Location	Distance to park	Donovan and Burty (2011); Awuah et al. (2013); Kok et al. (2014); Zhang et al. (2014); Guo et al. (2015); Brueckner et al. (2017) Li et al. (2018); Kim et al. (2019) and Tan (2019)
	Distance to city centre	Ihlanfeldt (2007); Yusuf and Resosudarmo (2009); Tang and Yiu (2010); Donovan and Burty (2011); Kok et al. (2014); ;Li et al. (2018);Kim et al. (2019) and Tan (2019)
	Distance to subway station and bus stop	Tang and Yiu (2010); Levkovichet al. (2018); Li et al. (2018); Kim et al. (2019) and Tan (2019)
	Number of street trees	Donovan and Burty (2011); Bello and Yacin (2014).
	Distance to garbage dump, police station, and slum.	Monkkonen (2013)
	Distance to earthquake fault line and work place	Kok et al. (2014)
	Distance to hospital	Li et al. (2018)

### 3. Effect of urban land use planning regulations on residential property values

In the developed world there has been consistency in studies on different features of ULUPRs on property values. After the review, three group of studies in the hedonic price model across the urban areas were unveiled.

First subset focused on using model to quantitatively evaluate the amenity and disamenity effect of ULUPRs on housing price (capital value). These Studies were led by Pogodzinski and Sass (1990); Ihlanfelt (2007) and Tan (2019) that ULUPRs restrictive measures raise house premium price. While some of the studies centred on predicting the future economic benefit and cost derivable, others concentrated on the immediate pecuniary benefit accruing as a result of ULUPRs. While other benefits may not be pecuniary (Awuah et al. 2014).

Li et al. (2018) in their study in Shanghai observed that 1% increase in floor area and 1% increase in number of metro-station has a corresponding 0.05% to 0.08% and 0.03-0.04 % of housing price premium respectively. This is in contrast with finding of Brueckner and Singh (2018) from cities in United State and Guangzhou that number of bedrooms is not significantly positive to housing price premium due to averse nature of buyers for an additional bedroom.

Also, Lai et al. (2017) in a study of 120 property in Shenzhen found a 62% difference between property with full property right housing and those without. Recently, Jeon (2019) in a study in Korea unveil that land under zoning have 76.5% house price premium as compared to others. Also, Jackson (2017) observed in California using data from California land use regulatory index that increase in regulation is proportional to 5% house price premium indicating a positive correlation. While, Wen et al. (2014) observed in China that the presence of a school within 1 km from the community improve housing price premium by 0.300 %, whereas houses situated less than 1 km from school enjoy price premium by 2.737% or 0.904%. This unveil the significance of laws on education facility in the residential market.

More so, study by Tan (2019) have shown that metro station increase average price premium of a home within 400m by 26.6% than homes further away in Wuhan, this buttress the need to adhere to regulations for establishment of neighbourhood facility. On the contrary, Du and Zhang (2015) in a study in China observed that home purchase restriction law decrease housing price by 7.69 %. Monkkonen (2013) also unearthed in his study in Indonesian that restrictive measure decrease house price because of flexibility in enforcement and the proliferation of informal housing sector.



Second subset look at ULUPRs in terms of its effect on rent levels (rental income). Donovan and Burty (2011) discovered an additional tree in lots increase rent by \$5.62 and also on public right of way by \$21 in Oregon. Also, Lima and Neto (2015) also document through intercity analysis and matching method an increment of 5.4 to 6.3% premium rent as a result of zoning in Brazil. In a later paper, Jeon (2019) in his study of 120 properties in Korea discovered that neighbourhoods with urban growth boundary regulations (zoning, greenbelt land) have 60.1% price premium rent compared to others.

Final subset look at price elasticity of housing supply. Grimes and Mitchel (2015) in a study in Auckland observed that 90% of developer decision are affected by stringency of building height restrictive regulations, balcony requirements, minimum floor to ceiling height and conforming to Council's desired mix of apartment typologies thus causing delay and uncertainty to housing production at the long run. Huang and Tang (2012) analysed data of 300 cities in US and demonstrated that cities with stringent ULUPRs experience housing price premium between 2000-2006 and greater price decline between 2006-2009 owing to land supply constraint laws. On the other hand, Jackson (2016) discovered that an addition of zoning and general control regulation reduce residential permit by 4% explaining the reduction in single and multiple family permits.

This phenomenon of volatility in housing price/rent and elasticity of housing supply could be explained by Dempsey et al. (2016) in their study in the United State, that stringency rules are implemented at different levels across municipalities with diverse demographic and socio-economic structures. In other words, the magnitude of the effect of ULUPRs will vary with the social system and background of each geographical region, hence contextualization of hedonic studies. For example, countries in Sub-Saharan Africa have record of ineffective land use planning and management (Awuah and Hammond, 2014). There is therefore the need to unearth their peculiarity in urban studies for lessons to be drawn.

From this study, majority of findings indicated that substantial price premium are paid by buyers of residential interest in form of rental/ capital income owing to ULUPRs which shape the structural, location or neighbourhood attributes of housing. This insight is from the purview of buyers of residential attributes. It is only natural to agree that having an insight to the effect of housing attributes on the performance of residential real estate (return on investment and capital appreciation) will assist to understand housing returns dynamic at a time when global emphasis is on investment returns Nwankwo et al. (2018); Nassi et al. (2019) instead of emphasising on rental/capital value that cannot be equated to stocks and bank shares. Understanding the utility derivable by renters and buyers of residential properties in urban centres particularly of developing countries where there is dearth of such studies in addition to ineffective land use policy and management will be opportunities for further studies on housing investment performance/returns.

## **CONCLUSIONS**

The reviewed literature have shown the commonly employed structural attributes of housing in hedonic price studies in the urban property market from 2007-2019. These attributes include plot size, age of house, floor to area ratio, numbers of bedrooms, numbers of bathrooms, floor levels, numbers of trees, Living area, size of the house, property right, presence of garage, water source, material for roof and level of facilities. This structural variables are suggested as vital for inclusion in property hedonic price model.

Also, we discovered that every geographical study contextualised the location and neighbourhood regulations attributes. Therefore, based on this literature review the following categorization is made for neighbourhood variable to guide future studies on choice of variables to be used in studying the relationship between ULUPRs and housing values/RPIRs.

Neighbourhood planning: encompasses planning the various neighbourhoods within the study area housing the estates to be sample. Others include zoning (greenbelt, urban growth boundary), traffic, orientation, and distance to nearest school.

Neighbourhood interior amenity encompass availability of public service like drainage, electricity, property management, sewerage, paved street (tarred road).

Neighbourhood exterior environment include: surrounding facilities like streetlight, sport facilities, sewage plant, telecommunication, property management (external to house), distance to arterial road, surrounding environment.

While on the location categorization the variable could be group to include.

Distance variable indicating accessibility to public and social service including proximity to hospital, bus stop, subway station, police post, parks, and street light.

Distance variable showing accessibility to place of employment including proximity to work place, city centre.

Distance variable indicating accessibility to disamenity including proximity to garbage dumps, earthquake fault lines and distance to slums.

Conclusively, this study has demonstrated that the impact ULUPRs on housing has an aesthetic component which affect the price/rental premium paid (positively or negatively) for property in residential market globally. The desire for amenity effect on structural, location and neighbourhood housing attributes are on the rise and outweigh the disamenity. This study call for research on ULUPRs and RPIRs of a developing nation like Nigeria with history of ineffective urban land use planning regulations from the purview of tenant and buyer of residential properties to unearth their peculiarity in urban studies.

### **ACKNOWLEDGEMENTS**

The authors' affiliations are respectively: Bayero University, Kano; Federal University of Technology, Minna and Niger State Polytechnic, Zungeru. In addition, the authors want to acknowledge the reviewers of this conference paper for helpful comments during the development of this paper.

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