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Causes and Effects of Building Collapse in Urban Transitioned Zone of Ebute –Metta, Lagos State

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Abstract

*One major phenomenon of the zone is the illegal change in building use which is a pointer to building collapse. The objective of the study is to examine the causes and effects of building collapse in the study area. The study adopted a survey design approach. A total of 120 buildings were randomly selected. A structured questionnaire and assessment chart were used to collect data. Data collected revealed that majority (76 percent) of the buildings have undergone change in use out of which 80 percent were loaded with equipment such as generators of varying capacity, and intense commercial activities. The study also revealed that majority (60 percent) of the buildings that have undergone change in use were in poor condition, 28 percent were in fair condition while12 percent were in good condition. However, the 24 percent of the buildings which still retain their residential use has majority (41 percent) in fair condition, 31 percent in good condition while 28 percent were in poor condition. The result of rs = -1 for **RES to RES/COM** and **RES to RES/IND** with the result of rs = +0.5 for **RES**, were indication of change in use as an important probable factor of building collapse in the zone. The enforcement of planning regulations; reinvigoration of the building certification agency; adoption of urban renewal scheme; and the adoption and adherence to land use zone plan were recommended.*

Keywords: Urban transition, Change-In-Use, Building Collapse, Building Condition, Planning Regulations.

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Introduction

The incessant collapse of buildings in Nigeria has been a major nightmare in the building industry as many lives and properties have been lost, while Adedeyi & Eziyi (2010) described Nigeria as majorly an urban country with about 50 percent of the population already lives in urban area. Umo et al., (2018) identified the collapse of buildings as an occurrence in Nigeria that has reached an alarming level which should prompt both the professionals in the building industry and the various government agencies at all levels to rescue the situation, in the form of regulation initiation, conceptualisation, and implementation. However, Ajayi (2022) noted that in the last twelve years (2010 – 2022), a chain of motion of events expressed in the form of losses have taken place where losses of lives and properties have been recorded. Umo et al pointed out that the buildings are to serve as places of abode for man in the form of shelter, shelter for properties and valuables, and provides bundle of services such as comfort, security, prevention from harsh weather condition, and offer both good health and pleasing aesthetics.

Imafidon & Ogbu (2020) noted that building collapse is a global problem and that cases such as a six storey apartment building collapse in Italy on November 1999, eight storey garment factory building collapse in Dhakar, Bangladesh on 24th April 2013, the collapse of a five storey building in Mumbai, India on the 27th September 2013, and the collapse of a balcony in Berkeley California were all regarded as a global issue. In Nigeria, Imafidon & Ogbu (2020) identified Lagos state to be the world's junk-yard of collapse building and that the qualification of the financial cost of building collapse may be far above N500 billion (N360=$1) since independence in 1960. In literature, several researchers on causes of building collapse have identified the causes of building collapse with less emphasis on building change as a major factor particularly in zones which has undergone transitioned in terms of physical growth and development. However, Arilesere (2000),

and Oloyede et al (2010), attributed the followings as factors that cause building collapse ranging from inadequate design standard and improper construction practice to structural failure at the latter years due to poor quality building materials. Windapo & Rotimi (2012) noted that the approach of professionals in incorporating anticipated structural adjustment in design is on a negative side and this makes the goals of sustainable environment in a built environment unrealistic.

Gbadegesin et al (2011) noted that among the consequences of urbanisation in developing countries is slum formation, and that a major factor responsible for this is lack of enforcement of planning laws. However, Fabiyi (2011) pointed out that proper analysis of the factors responsible for urban decay is desirous in order to adopt the best alternative of urban renewal strategies. It is important to note that Imafidon & Ogbu (2020) observed that the only way to enhance the coordination of measures for preventing building collapse in Nigeria is by obtaining an unsupervised grouping of the cases of building collapse and that such a grouping should take cognisance of peculiarities of areas in assigning responsibilities to undertake appropriate preventive measures.

A clear understanding of the morphology of urban areas in addressing the issue of building collapse is imperative owing to the fact that the processes of urban growth and development expressed in terms of urbanisation varies from one urban centre to another, though a general characteristic may be displayed at the inception of the process. However, a transitioned urban area/zone is characterised by competing building uses due to the intensification of commercial/industrial activities occasioned by ever increasing population with limited urban space. This character and dimension of urban growth and development becomes a factor in the analysis of causes of building collapse. It is on this premise that the study area (Ebute – Metta, Lagos) is identified with its urban characteristics and the issue on building collapse is considered and analysed.

The main focus of this research is to examine the character of change in use of buildings in the study area, with respect to the transition nature of its physical development, and the conditions of the building as a basis or a causal factor to building collapse in the study area. Hence, the status of change in use of buildings and conditions of the buildings are germane to the research and these variables are cross examined in order to establish any significant association between these variables as a causal factor to building collapse in the study area. It is on this premise that the objective of the study is to examine the causes and effects of building collapse in the study area.

Problems associated with illegal change in use in urban transitioned areas have been established by various researchers in urban planning. The urbanisation process is an important factor of change in the use of buildings and this transition is closely connected to the competing land use of urban centres which results into displacement and succession of a new building use. These changes are responses to the change in the rental value occasion by the pressure exerted on the use of land/space. However, Kadiri (2009) has observed that Lagos is among the few states in Nigeria that is reacting to urbanisation trend in two ways, namely, by expansion, and by adjustment of land use intensity along the line of change in use of buildings.

Umo et al (2018) pointed out that the unregulated rented value played a vital role in shaping the pattern of the land use with negative consequence on the building industry if urban planning principles are not fully explored in order to achieve a sustainable urban development while the two types of change in use were identified to include legal and illegal change in use. Ajayi (2022) observed that the rate of illegal change in use of buildings in the urban centre are alarming and it negative consequence may be disastrous. Potential consequences of change in use of buildings include structural adjustment of buildings, expansion of space within the area covered by the building, existence of facilities such as generator for power supply.

Conceptual and Theoretical Framework

Concentric Theory Zone of Burges

This theory is essentially one of the theories of Urban Land use classical theories and it identified a centre known as the Central Business District (CBD) with other zones as shown in fig 1

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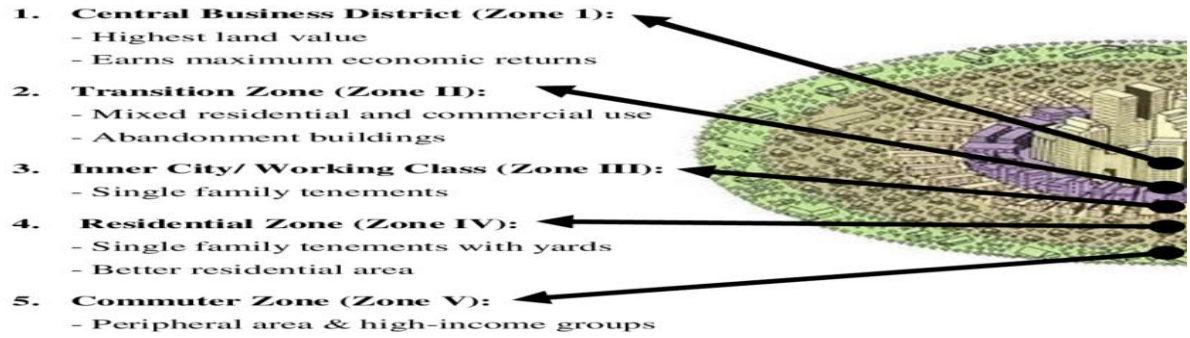

Fig 1: The Concentric Zone Theory

In the Concentric Zone Theory, the Transition Zone is an area where change in use occurs due to competing land uses, and the resultant effect of this competition between or among the land uses is the increase in rental value. However, there is an increase in the rental value inwardly into the CBD and decrease in the rental value outwardly from the CBD. However, the inward increase of the rental value is further explained in the Alonso Rent Theory and this theory has been useful in explaining the consequences of urbanisation on land use values in relation to the spatial interactions that exist among the various land uses with a specific geographical space (that is the urban space). The relevance of the concentric zone theory within the context of building collapse is the identification of the transition zone and the character displayed at the CBD, as a probable factor of change in use which may either be legal and illegal.

Alonso Rent Theory

The Alonso Rent Theory is a theory that explains the relationship between the distance and the rental value, taking into cognisance the competing nature of land used to acquire spaces in both the Central Business District (CBD) and the Transition Zone. The theory has established that as rent increases inwardly to the CBD, and that at the transition zone, an existing land use is displaced due its inability to pay for the rent, while the land use that can pay succeeded in acquiring the space. Hence, there exist interplay between land use displacement and land use succession, and the determinant factor is rent.

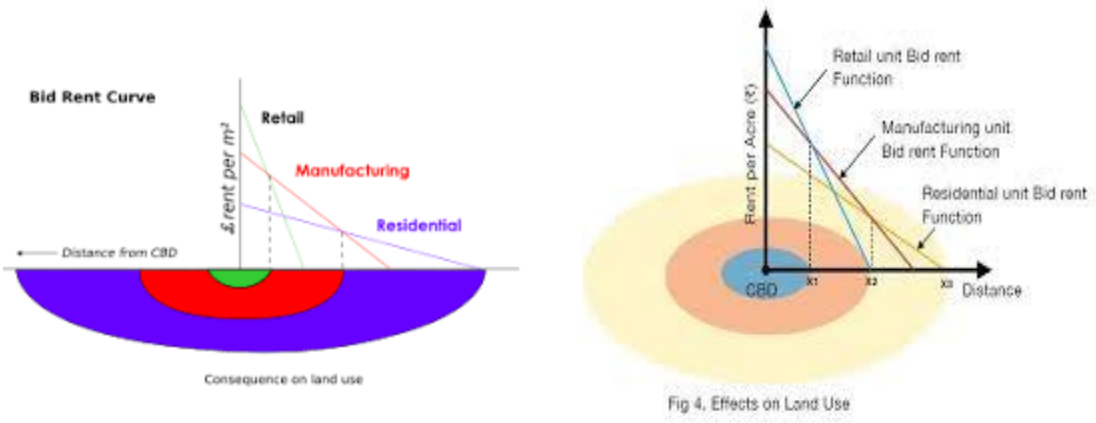

Fig 2: Alonso Rent Theory

The relevance of this theory to building collapse is the identification of a variable which is responsible for change in use (that is, the rental value), and its effects on the land use as shown graphically in Fig.4. However, the illegal or unapproved change in use results into building collapse. It is therefore

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mandatory to attribute change in rental value which is occasioned by the processes and forces of urbanisation to the character of urban centre, and that the urban centre should be perceived as a product of various metamorphoses within the urban range.

Materials and Methods

The Study Area

The study area is Ebute-Metta, is located within the mainland Local Government Area of Lagos. It is located at the Eastern end of the metropolis and located approximately between latitude $6^{o}\ 9^{1}$ and $6^{o}\ 15^{1}$ North and longitude $4^{o}\ 10^{1}$ and $4^{o}\ 30^{1}$ East (Lagos in Map 1999). The study area is bounded by Costain and Surulere in the east and the Lagos lagoon in the west, and Oyingbo and Iddo in the south, and the northern boundary is formed by Adekunle and Yaba. The study area is accessible by Carter, Eko, and Third Mainland Bridge.

Fig 3: Map of Nigeria showing Lagos State

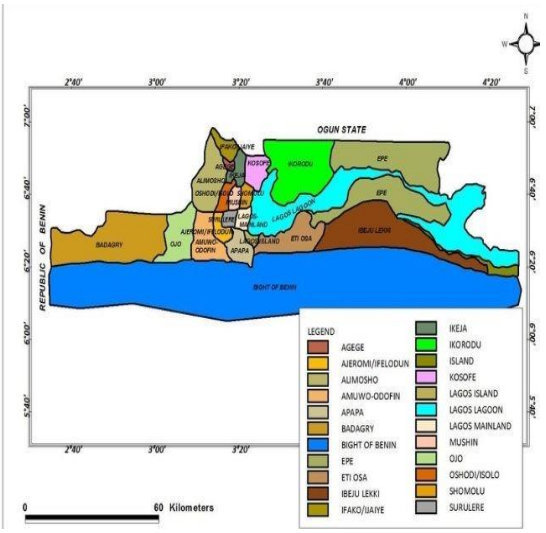

Fig 4: Map of Lagos State showing the 20 LGAs

Fig 5: Street Map of Ebute Metta Showing selected Streets – Lagos Street; Abeokuta Street; Ibadan Street, Ondo Street and Bola Street.

Population, Sample and Sampling Technique
Population
The population for this research comprises of the total number of buildings in each of the street of the sample frame and the aggregate of the buildings within the sample frame. An area cluster sampling method was adopted and five streets were selected from the study area. The five streets selected were; the Lagos Street with a total of forty one (41) buildings; Abeokuta Street with a total of forty five (44) buildings; Ibadan Street with a total of thirty eight (39) buildings, Ondo Street with a total of twenty one (22) buildings and Bola Street with a total of twenty three (25) buildings. The aggregate number of buildings in the sample frame is therefore one hundred and seventy one (171).

Sample and Sampling Technique

Yamane Sampling Size Method of Computation was adopted in determining the sample size:

$$\boldsymbol{n = N \div (1 + (e)^2)}$$

Where n = the sample size

N = the population size

e= the acceptable sampling error 95% Confidence level,

and P = 0.05

N = total number of occupied flats multiply by the average household size. N= 171

$n = 171 \div (1+171\ (0.05)^2)$

n= 120

The sample size is 120 buildings.

Twenty four (24) buildings were randomly selected in each of the street without replacement after the determination of the sample size.

Data collected through the use of interview guide were; the year of change in use of the buildings; and reasons for change in use, while an assessment chart for the assessment of the conditions of the buildings is used. Descriptive and inferential analyses were adopted while ideographic graphic presentation was used.

Results and Discussion

Results
Building Status is an essential aspect of this research in order to establish the change in use of buildings in the study area. However, three (3) categories of change in use were revealed in the course of investigation, and these are; buildings that have undergone change in use from Residential to mixed use of Residential/Commercial use; building that have undergone change in use from Residential to mixed use of Residential/Industrial use (Service Industry); and buildings that have retained their full Residential Status.

Table 1: Building Status Analysis (Change in use)

Building Status	No of Buildings	%
Buildings that have undergone change in use from Residential to mixed use of Residential/Commercial use (**RES to RES/COM**)	73	61
Buildings that have undergone change in use from Residential to mixed use of Residential/Industrial use (Service Industry) (**RES to RES/IND**)	18	15
Buildings that have retained their full Residential Status (**RES)**	29	24
Total	120	100

Source: Author's field Survey May 2024

***Note: RES to RES/COM =** Buildings that have undergone change in use from Residential to mixed use of Residential/Commercial use

RES to RES/IND = Buildings that have undergone change in use from Residential to mixed use of Residential/Industrial use (Service Industry)

RES = Buildings that have retained their full Residential Status

The trend of change in use of buildings is presented in Table 2 as the analysis of the years of change in use of buildings in the study area, while the conditions of the buildings revelation of impact of trend of urbanisation as dictated by change in use as presented in Table 3.

Table 2: Analysis of the Years of Change in Use of Buildings by Building Status

S/N	Building Status	Year	No of Buildings	%
1	**RES to RES/COM**	Less than 15 years	10	11
		16 years- 30 years	41	71
		Above 31 years	22	18
		Total	**73**	**100**
2	**RES to RES/IND**	Less than 15 years	2	17
		16 years- 30 years	5	55
		Above 31 years	11	28
		Total	**18**	**100**
3	**RES**	Less than 15 years	1	4
		16 years- 30 years	7	24
		Above 31 years	21	72
		Total	**29**	**100**

Source: Author's field Survey May 2024

The conditions of buildings in the study area are major factor of building collapse. Major aspect of the assessment of the conditions of the buildings is the conditions of the structural components of the building, which is observed in the form of dilapidated walls, failure of foundation footings and the roofing conditions.

Table 3: Conditions of Buildings

S/N	Building Status	Conditions of Buildings by Year of Change in use			
1.	**RES to RES/COM**	Year	Condition	No of Buildings	**%**
		Less than 15 years	Good	**2**	**20**
			Fair	**3**	**30**
			Poor	**5**	**50**
			Sub-Total	**10**	**100**
		16 years- 30 years	Good	**7**	**17**
			Fair	**11**	**27**
			Poor	**23**	**56**
			Sub-Total	**41**	**100**
		Above 31 years	Good	**1**	**5**
			Fair	**6**	**27**
			Poor	**15**	**68**
			Sub-Total	**22**	**100**
		Total		**73**	
2.	**RES to RES/IND**	Year	Condition	No of Buildings	**%**
		Less than 15 years	Good	-	-
			Fair	**1**	**50**
			Poor	**1**	**50**
			Sub-Total	**2**	**100**
		16 years- 30 years	Good	**1**	**20**

			Fair	**1**	**20**
			Poor	**3**	**60**
			Sub-Total	**5**	**100**
		Above 31 years	Good	**-**	**-**
			Fair	**3**	**27**
			Poor	**8**	**73**
			Sub-Total	**11**	**100**
		Total		**18**	
3.	**RES**	Year	Condition	No of Buildings	**%**
		Less than 15 years	Good	**1**	**100**
			Fair	**-**	**-**
			Poor	**-**	**-**
			Sub-Total	**1**	**100**
		16 years- 30 years	Good	**3**	**42**
			Fair	**2**	**29**
			Poor	**2**	**29**
			Sub-Total	**7**	**100**
		Above 31 years	Good	**5**	**24**
			Fair	**10**	**47**
			Poor	**6**	**29**
			Sub-Total	**21**	**100**
		Total		**29**	

Source: Author's field Survey May 2024

Table 4: Analysis of the Conditions of Buildings and the Ranking Values

Building Status	Conditions	Ranking	No of Buildings	Ranking
RES to RES/COM	Good	**1**	10	**3**
	Fair	**2**	20	**2**
	Poor	**3**	43	**1**
	Total		**73**	
RES to RES/IND	Good	**1**	1	**3**
	Fair	**2**	5	**2**
	Poor	**3**	12	**1**
	Total		**18**	
RES	Good	**1**	9	**2**
	Fair.	**2**	12	**1**
	Poor	**3**	8	**3**
	Total		**29**	

$$rs = 1 - \frac{6\varepsilon d^2}{n(n^2-1)}$$

RES to RES/COM

Conditions (Y)	No of Buildings (X)	D	d ^{2}
1	**3**	**-2**	**4**
2	**2**	**0**	**0**
3	**1**	**2**	**4**
			$\sum d^2 = 8$

$rs = 1 - \frac{6x8}{3(3^2-1)} = 1 - \frac{48}{24} = 1 - 2 = -1$

RES to RES/IND

Conditions (Y)	No of Buildings (X)	D	d ^{2}
1	**3**	**-2**	**4**

2	**2**	**0**	**0**
3	**1**	**2**	**4**
			$\sum d^2$ =8

$rs = 1 - \frac{6x8}{3(3^2-1)} = 1 - \frac{48}{24} = 1 - 2 = -1$

RES

Conditions (Y)	No of Buildings (X)	D	d^2
1	**2**	-1	1
2	**1**	1	1
3	**3**	0	0
			$\sum d^2$ =2

$rs = 1 - \frac{6x2}{3(3^2-1)} = 1 - \frac{12}{24} = 1 - 0.5 = +0.5$

Discussion of Findings

The study revealed that the majority (76 percent) of the buildings have undergone change in use out of which 80 percent were loaded with equipment such as generators of varying capacity, and intense commercial activities. The study also revealed that the majority (60 percent) of the buildings that have undergone change in use were in poor condition, 28 percent were in fair condition while12 percent were in good condition. However, the 24 percent of the buildings which still retain their residential use has majority (41 percent) in fair condition, 31 percent in good condition while 28 percent were in poor condition.

A coefficient of -1 shows a perfect negative association between the two variables, which is the number of residential buildings that have undergone change in use and their conditions. The result of rs = -1 for **RES to RES/COM** and **RES to RES/IND** revealed that as the number of residential buildings which undergo change in use (over a period of time) increase, the conditions of the buildings in terms of housing quality decrease, while the result of rs = +0.5 for **RES** revealed a moderate positive association between the number of residential buildings that retained their residential status and their conditions, indicating that the responsiveness of the housing quality of the residential buildings that retained their residential status (over a period of time) is moderate.

The implication or a contribution of this research to knowledge is that the study on the trend of housing development in terms of change in use in the study area and the conditions of the buildings has revealed that an association exist between the two variables. However, the study has established that the study area has undergone a unique transformation expressed in the form of residential use to either mixed use of residential/commercial use or residential use to mixed use of residential/industrial use, with the latter taking a significant percentage of change in use. However, the retained residential status of the buildings under this category still established the fact that the study area is a residential area, though undergoing change in use. It is therefore important to consider the change of use when attributing factors to the causes of building collapse, particularly in areas that have undergone the four (4) stages of urban development as identified by Champion (2000) to include urbanisation; suburbanisation; counter-urbanisation; and re-urbanisation.

The effects of illegal change in use of buildings in the study area have manifested in the poor condition of buildings, and this poor condition has been attributed as one of the probable factors of building collapse in the study area. Loss of lives and properties are consequences of building collapse, and these losses are often associated with negative ripple effects which are intangible in nature. However, the magnitude and dimension of this consequence vary from one area to another depending on the types of the building. It is important to note that the closeness of buildings and the intensity of land uses in the study area are contributory factor to high level of destruction when building collapse occurred.

Conclusion and Recommendations

Building collapse is a nightmare in the building industry and its consequences are highly negative in nature, ranging from tangible losses to intangible losses. However, several studies on the assessment of the causes of building collapse have not taken cognisance of the nature of the urban area, with major reference to the trend of development as a factor responsible for the change in use in the area. It is importance to note that the free nature in the urban housing market where the rent is dictated by the interplay of many market forces leading to displacement of a particular land use and the succession of another is a causal factor to be considered when assessing the causes of building collapse in urban area.

The physical characteristics of the study area has been examined in line with the nature of change in use, and the Spearman Rank correlation adopted has established the significant association that exist between the condition of buildings and the status of the change in use of the buildings understudied. However, the perfect negative association between the two variables, (**RES to RES/COM** and **RES to RES/IND),** with rs = -1 and the moderate positive association between the number of residential buildings that retained their residential status and their condition with of rs = +0.5 have revealed the responsiveness of the identified variables. It is on this premise that the following recommendations are made.

a. The study of the causes of building collapse should take into cognisance the nature of the study area in terms of its morphological development. In the consideration of physical development, the proper analysis of each zone of the area should be the bedrock in assessing the causal factors of building collapse.
b. Reducing or eliminating the incidence of building collapse should be directed toward appropriate development control, particularly within the context of enforcing planning laws relating to change in use. The rationale behind this recommendation is based on the outcomes of this research where a significant proportion of buildings with change in use in the study area have undergone illegal change in use.
c. The reinvigoration of the agency in charge of building certification is of necessity owing to the fact that the urban centres are characterised by buildings of old aged, which have undergone change in use, with high possibility of poor structural conditions.
d. An area of high level of physical obsolescence should be identified within an urban space for urban renewal. Hence, an urban renewal scheme should be considered when a significant number of buildings of poor condition agglomerate in the urban centre. It is important to note that this urban renewal scheme requires a detail assessment of the physical conditions of all the buildings in the identified cluster, and appropriate urban renewal procedure becomes imperative.
e. The need to control the market forces in the urban housing becomes imperative, though it may be difficult. The land use zone plan becomes a veritable tool for achieving an urban area devoid of building collapse, and its adherence through development control reduces the extent of the interplay between or among the forces in the urban rent bid.

Reference

Adedeji, D. & Eziyi, O. I. (2010). Urban Environmental Problems in Nigeria: Implications for Sustainable Development.*Journal of Sustainable Development in Africa*, 12 (1), 124-145.

Ajayi, O. O. (2022). Incessant Building Collapse in Lagos State, Nigeria: Beyond A Legal Framework.*Nnamdi Azikiwe University Journal of Commercial and Property Law*,9 (3), 149-164.

Arilesere, M. O. (2000). The roles of Professionals In Averting Building Collapse. A paper at in the workshop on Building Collapse: Causes, Prevention and Remedies. The Nigerian Institute of Builders (NIOB) Lagos. 60-88.

Champion, A. (2000). Urbanisation, Sub-urbanisation, Counter-urbanisation, and Re-urbanisation in R.Paddison and W. Lever (eds). Handbook of Urban Studies, London:Sage

Fabiyi, O. O. (2011). Analysis of Urban Decay From Low Resolution Satellite Remote Sensing Data: Example From Organic City In Nigeria. *International Journal of Development and Management Review* (INJODEMAR),6(1), 172-189

Gbadegesin, J.T., Oladokun, T.T. & Ayorinde, O.I. (2011). Urban Renewal as a Tool for Sustainable Urban Development in Nigeria: Issues and Challenges .*Journal of Sustainable Development and Environmental Protection*, 1(1), 57-68.

Imafidon, M. O. & Ogbu, C. P. (2020). A Taxonomy of Building Collapse Causes in Lagos State Nigeria.*Nigerian Journal of Technology* (NIJOTECH), 39(1),74 – 86. http://dx.doi.org/10.4314/njt.v39i1.8.

Kadiri, W. A. (2009). Change in use in Urban Areas: Is it Inevitable, Avoidable, or Manageable? In W.A.Kadiri (Ed.), Our Cities, Our Future. Dialogue on Urban Planning Challenges and Management, 82-100. GGA Publication, Abeokuta, Ogun State.

Oloyede, S.A., Omoogun, C.B., &Akinjare, O.A. (2010).Tackling Causes of Frequent Building Collapse in Nigeria. *Journal of Sustainable Development*, 3(3), 127-132.

Umo, P.U., Okonkwo, M. M. & Umo, U.U. (2018). Building Collapse in Nigeria (Main Causes, Effects and Remedies*).Journal of the Nigerian Institute of Architects Enugu State Chapter*. 1,1-43.

Windapo, A.O., & Rotimi, J. O.(2012). Contemporary Issues in Building Collapse and Its Implications for Sustainable Development .*Buildings*,2(3),283-299. https://doi.org/10.3390/buildings2030283.