AN ASSESSMENT OF THE CAUSES AND EFFECTS OF BUILDING COLLAPSE IN NIGERIA

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ABSTRACT

The research investigated the causes and consequence of building collapse in Nigeria using historical data from 1974 to 2009 and also proffers appropriate solutions. Relevant books, seminar papers, workshop papers, articles, etc. were reviewed so as to examine the general view of individuals that have worked on similar study. Data for the study were obtained through historical data of past building collapse in Nigeria. The data were presented and analyzed using tables, percentile, Pearson moment correlation coefficient (r) and linear regression analysis to generate a model. Seventy (70) buildings that collapsed in the country were gathered, upon which the analysis was carried out. The study revealed that poor maintenance culture, design error, poor quality of materials and workmanship, natural phenomenon and excessive loading contributed to about 7%, 13%, 53%, 7%, and 20% respectively of building collapse in Nigeria with most of them being private residential buildings executed by indigenous contractors. The study finally recommended that Standard Organization of Nigeria (SON) should increase their effort in sanitizing building materials in the market. More so, professional bodies in building industry should ensure proper supervision of workmen and efficient checking of materials before incorporation into building works.

Keywords: Assessment, Building Collapse, Historical, Nigeria.

INTRODUCTION

In the past few years, incessant building failure has been reported resulting in the loss of lives and properties in Nigeria. However, there has been a dearth of information regarding any findings about the collapse of the building structures.

There are frequent media reports of collapsed of buildings in major Nigerian cities like Lagos, Abuja, and Port Harcourt, etc. and other parts of the world. Unfortunately, Since independence, the Nigeria government has desperately continued to make concerted effort in the area of quantitative (but not qualitative) supply of mass housing through huge budgetary and policy provisions but, surprisingly, the rate at which existing ones are collapsing calls for an urgent attention. Incidences of building collapse in Nigeria are posing serious challenges to all the stakeholders in the building industry- building consultants, governments, developers, landlords and users. One could imagine what edifices these buildings would have been if only they were constructed accordingly. It has been reported that Nigeria, especially Urban centers has become the "world's junk-yard" of collapsed buildings worth billions of naira (Famoroti, 2005). The site of building collapse scattered across the length and breadth of Nigeria is quite alarming that it is unimaginable what effects it will have on the building industry and Nigeria economy as a whole. It is quite unimaginable that a county blessed with so great potentials in its construction industry can experience such magnitude of building collapse.

Fadamiro in 2002 defined building as "an enclosure for spaces designed for specific use, meant to control local climate, distribute services and evacuate waste". Buildings can be defined as structural entities capable of securing self by transmitting weights to the ground. More so, buildings are defined "as structures for human activities, which must be safe for the occupants" (Odulami, 2002). However, these same buildings have been posing treats and dangers to people either during or after construction as a result of its collapse. Collapse as a whole occurs when part or whole body of a structure fails and suddenly gives way, the structure, as a result of this failure, could not meet the purpose for which it was meant for. Building collapse is an extreme case of building failure. It means the super- structure crashes down totally or partially (Oguntimehin, 2009). Building failure occurs when there is a defect in one or more elements of the building caused by inability of the material making up the components of such building elements to perform its original function effectively, which may finally lead to building collapse. Buildings are meant to provide conveniences and shelter to

the people, but the same building has been a danger trap to the same people. Building is expected to meet certain basic requirements such as buildability, design performance, cost effectiveness, quality, safety and timely completion (Olusola, Atta & Ayangade, 2002). Generally, buildings are expected to be elegant and functional but many projects are constructed that do not meet any of these basic requirements. Many studies has been carried out and various workshops organized in major cities of the country by various bodies, government agencies and institution in order to look into causes of the incidence of building collapse in Nigeria, but none has been able to come out with how each of the determined factors directly lead to building collapse in the country. There are many factors that cause building collapse in Nigeria and they are structural design and quality management according to Olusola(2002). The quality management entails material variability, testing variability, judgment factor, contractors' variability, poorly skilled workmen and unprofessional conduct. The study aimed at examining causes of building collapse in Nigeria with respect to historical data of available incidence of building collapse.

LITERATURE REVIEW

Building Industry

The building industry is the most complex of all the industries in the economy and the basis of its complexity is founded on the simple fact that, all other industries and sector of the socio-economy depend on it for the environment in which they operate. The building industry is to all practical purpose an all-comers affair (Omenihu, F.C., Onundi, I.O. & Alkali, M.A. (2012), It is an industry where all manners of local and foreign materials, professionals and equipment's co-habit in order to achieve quality buildings of high standard. The building industry plays an important and dynamic role in the process of sustainable economic growth and development of any nation due to its size and complexity. It is to be noted that up to one-sixth of the total amount allocated to construction projects by Nigeria governments takes the form of building as observed from past budget of the country.

Whether a country is just developing like Nigeria or is already developed like Britain, buildings all over the world, constitute the most valuable assets of mankind (Chinwokwu, 2000). More so, while these buildings provide humanity with a great variety of accommodation in form of residences, mosques, churches, offices, schools, factories, hospitals, stadia, ports, hotels, and so on, it also provides employment for the skilled and

unskilled persons. The building industry plays an important and dynamic role in the process of sustainable economic growth and development of any nation due to its size and complexity. It is to be noted that up to one-sixth of the total amount allocated to construction projects by Nigeria governments takes the form of building as observed from past budget of the country. The purpose of the building industry is to provide suitable accommodation for the whole community, of the quality that can be appreciated by the community, at the cost that the community can afford, within the time required by the community and within the capacity of the building industry. However, it could be deduced that the ultimate goal for any building projects is for such projects to be delivered within the shortest possible time, at the lowest possible cost, within the highest possible quality so as to minimize the problem and the burden of future maintenance and building collapse.

Causes of Building Collapse

Buildings fail through mainly ignorance, negligence and greed (Bamidele, 2000). Ignorance has to do with when incompetent personnel are in charge of design, construction or inspection. One of the major areas of negligence is in specification writing where that of a past project is adopted without crosschecking those areas that need improvement, addition or omission. Greed on the part of building contractors e.g. diversion of building materials, cement in particular, meant for the production on the client's site to his own site, the use of sub- standard materials so as to achieve high profit, etc.

In discussing the issue of building collapse, distinction must be made between buildings, which fail during construction or within the service life and to those that fail after the service life, which is usually 25 years (Olusola, 2002). It can be deduced that the collapse that causes the greatest loss is that which occurs when a building has been in use for long a time or shortly after its construction.

Inadequate preliminary works:

Preliminary works are operations which include site investigation and foundation. Building collapse is imminent where these operations are carried out shoddily. Site investigation is to determine the properties of the soil strata. Seeley (1987) said that all potential building sites would need to be investigated to determine their suitability for buildings and the nature and extent of the preliminary work that would be needed. Particular attention should be given to the nature of the soil and its probable load-bearing capacities, as there may be variations over

the site. The past history of the site should be investigated with particular reference to the former existence of trees, water level, borehole log, underneath soil strata and waste dumps. A careful study should be made of adjacent structure to ascertain whether failure can result due to localized conditions. According to Bell (1987), soil is an unconsolidated assemblage of soil particles between which voids. These voids may contain water, air or both. Soil is derived from the breakdown of rock materials by weathering and erosion and may have suffered some amount of transportation prior to deposition. Neville and Chatterton (1987) asserted that the development of soil mechanics which relates to the understanding of the physical properties of any particular soil type in relation to loads was really the main stepping stone towards a scientific approach to foundation problem and construction. However strong, rigid or structurally stable a building may be, its satisfactory performance depends exclusively upon the ground which supports it. Adequate site investigation prevents the issue of foundation problem because it would ensure that the most appropriate foundation is prescribed.

Brief and design deficiencies:

The inadequacies in the brief supplied by the clients can bring about defects even at the inception of the project when client fail to give all the necessary information on the functional requirements of the building (Fadamiro, 2002). He further said that design deficiencies also come under calculation errors, bearing support problems, deformation, secondary stresses, elastic cracking, temperature and shrinkage problems, detailing and drafting problems, errors in assumed loading, changes and alterations in existing buildings, all contributing substantially to building structural failures, disasters and may finally lead to building collapse.

Foundation Problems:

Foundation is one of the major structural members of any building and any problem arising from it will surely affect the whole building. Fadamiro (2002) averred that the crushing and collapse of concrete footing or other foundation members are usually due to unequal settlements which may be cause by changing sub-grade condition or by wrong assumptions in the design, inadequate or unequal support for foundations, soil and ground water movements as well as expanding soils. Hence, the most common form of abuse of foundation occurs due to abnormal loading situations especially in structures being converted to new use or having additional floors.

Natural Occurrence:

One of the major natural factors that result into building collapse is rainfall; others may include temperature, pressure, etc. When there is a heavy downpour of rain, there is a possibility that one or more buildings (completed or uncompleted), somewhere, would carve in (Chinwokwu, 2000). The fact remain that this is a natural factor that cannot be stopped, buildings therefore need to be constructed adequately bearing in mind such uncontrollable factors.

Quality management:

The need for stringent quality control in material utilization within the construction industry in Nigeria today cannot be over emphasized (Olusola, 2002). The neglect of quality control in the construction industry has resulted in many defective and ugly looking buildings and the rise in number of collapse buildings in the past years. A number of factors influence the quality achieved in the Nigerian building industry and they are explained below.

Poorly Skilled Workmen:

This sometimes in conjunction with contractors' variability is one of the reasons behind the incidents of building collapse in Nigeria. The level of competencies of different categories of labour in Nigerian building industry (though varies from one city and contractor to another), through investigation, is found to be reducing day after day. It has been noted that even the workmen that went through apprenticeship training are no better than their master. Poor skill makes it difficult or impossible for workers to perceive and apply the concepts of quality control and limits of tolerance for building production (Olusola, 2002).

Inadequate Maintenance:

Generally, less attention is paid to maintenance in Nigeria as observed by Fadamiro, (2002). Normally, the maintenance of a building should start from the very time excavation is dug. For instance, if the foundation excavation shares before or after placement of concrete, it must be cleared and maintained because earth impurities impair the strength of concrete.

Unprofessional conduct:

Generally, it is believed that unprofessional conducts contribute in no small measure to the menace of building collapse in Nigeria. Such unprofessional conduct such as bribe collection from contractors, professional acting in the capacity beyond the scope of his profession, etc. has a negative effect indirectly on the building and may finally result into building collapse. The role of professionals in the construction of buildings in Nigeria is such a fundamental one (Adebayo, 2005). It is therefore a shame that a large population of building construction

in the country still does not have the full participation of the relevant professionals.

Consequences of Building Collapse

Apart from loss of lives (mostly innocent citizens), many other people has been rendered permanent disable in one form or the other as a result of increasing rate of building collapse in the country. Economic loss as a result of this incidence is immeasurable in that many have been rendered homeless with loss of countless properties. More so, various site of building collapse scattered across the length and breadth of Nigeria is making the environment unhealthy as such collapsed buildings has become hidden houses for robbers, touts, etc. a very good example is that of NIDB building located in the heart of commercial area of Lagos state in Nigeria. Dangerous animals like snake have also made such buildings their place of abode, which is a danger threat to the people living within the vicinity of the environment.

Table 1: Showing Some Reported Cases of Collapsed Buildings in Nigeria

S/N	Building location	Type	Date	Suspected causes	Remarks life lost
1.	Mokola, lbadan Oyo state	Multi-storey building under construction	Oct. 1974	Excessive loading	27
2.	Bamawa housing Estate Kaduna	Residential Building	Aug. 1977	Faulty Design	28
3.	Govt. Secondary Sch. Markafi, Kaduna	School Building	July, 1977	Carelessness	7
4.	Bamawa Housing Estate, Kaduna	3 Residential buildings	1980	Faulty Design	6
5.	Iponri Lagos	Uncompleted 4 storey building	May, 1995	Excessive carelessness	13
6.	Ojuelegba Road Lagos	Residential Building	May, 1985	Rain Storm	Undisclosed
7.	Lagos Island, Lagos	Uncompleted	July, 1985	Excessive loading	9
8.	Gboko, Benue	Residential	Sept., 1985	Carelessness	1
9.	Allen Avenue, Lagos	Residential	1985	Carelessness	0
10.	Osogbo, Osun State	Mosque	May, 1986	Faulty design	2
11.	Adeniji Adele, lagos	Residential	1985	Carelessness	2
12.	Ona, Street, Enugu	Residential	1986	No investigation	2
13.	Isiala, Imo State	Residential	1986	Collapse ceiling	2
14.	Agege Lagos	2 Storey building	May, 1987	Carelessness	undisclose
15.	Idusagbe lane, Idumota	Residential	Sept. 1987	Ignorant	17
16	Lagos	Residential	Sept. 1987	Storm	4
17.	Calabar, Cross river	Residential	Oct. 9 1987	Storm	3
18	Akinwumi Street, Mende village, Lagos	6 storey	Oct. 1989	Faulty Design	0

Source: Fakere, 2012

Table 2: Recent Occurrences of Building Collapse in Nigeria

S/N	Building Location	Date	Suspected Causes	Remarks (life
1	Mushin, Lagos	2000	Faulty Construction	Nil
2	Oke-Bola, Ado-Ekiti	2000	Poor quality control, rain storm	Nil
3	Ogbagi street, Ikare	2001	Fire disaster	Nil
4	Odo Ikoyi, Akure	2001	Foundation problem	Nil
5	Odoso compound, Ikare	2002	Fire disaster	Nil
6	Ojuelegba, Akure	2003	Poor workmanship & under-reinforcement	Nil
7	Stadium road, Akure	2003	No structural members	Nil
8	Onyearugbulem market, Akure	2003	Poor workmanship & under-reinforcement of the cantilevering end	Nil
9	Ebute Meta	2003	Structural defect	8 injured
10	Elias Street, Lagos	2004	Rain storm	8 Died
11	Iponri	2005	Inappropriate Foundation	Nil
12	Oke Suna, Lagos	2005	Structural degeneration	1
13	Broad Street, Lagos	2006	Rainstorm	Not disclosed
14	Ebute Meta	2006	Structural defect	37
15	Oworonsoki	2006	Faulty Construction	1
16	Abuja	2008	Faulty Construction	3 died, 10 injured
17	Apongbon	2008	Structural defect	3 injured
18	Ikeja	2008	Faulty Construction	Several Injured
19	Alade Street, Lagos	2008	Structural defect	3 Died,5 Injured
20	Ojerinde Street,Idiaraba	2009	Excessive Loading, Faulty Construction	9 Died,3 missing, 21 Injured
21	Ajegunle, Apapa Lagos	2009	Structural degeneration	Not disclosed
22	Abuja	2010	Faulty Construction	Not disclosed
23	Garki, Abuja	2010	Overloading	23 died, 10 injured
24	Kano	2011	Rain storm	6 died
25	Abuja	2011	Overloading	100 died
26	Abuja	2012	Unsupervised demolition	2 died
27.	Lagos	2019	Structural degeneration	13died, 23 injured

Sources: Fakere, (2012); Ogunsemi, (2002); Oke, (2011); Researcher's field work 2019

Research Methodology

Relevant and necessary data were collected from secondary sources in order to achieve the aim of the research, which is to assess the causes and effect of building collapse in Nigeria and suggest various ways of eliminating the incidence. The data were collected through investigation of past building collapse in Nigeria.

Analysis of past documents (secondary data) sources was adopted as the research instruments in gathering data on various incidence of building collapse in the country. The data (regardless of the location and based on the available information) were partly gotten from The Nigeria Institute of Architects, previous research works and various newspapers were also consulted (through the dailies and their website). All the available incidences of building collapse as at the date of analysis of the data were included in the historical data. The following parameters were considered as the bases of the findings:

(i.) Name of the building (ii.)Type of the building (private or public), (iii)Purpose of the building (commercial, residential, educational or religious), (iv) Date of collapse, (v) Location of the building, (vi) Major cause of the collapse, and Calamities (deaths and injuries).

The analysis of the collected data was carried out using the following descriptive and analytical scientific methods: percentiles, Pearson product moment correlation coefficient and regression analysis methods.

Pearson Product Moment Correlation Coefficient (r): This method was adopted in this research to assess the causal relationship between building collapse and its causes.

The basis of decision according to Okonko (2001) is on the premise below:

Table 3: Guidelines to interpreting Pearson's correlation coefficient

	Coefficient, r	
Strength of relationship	**Positive**	**Negative**
Little or No correlation	0.1 to .3	-0.1 to -0.3
Low Correlation	0.3 to .5	-0.3 to -0.5
Moderate Correlation	0.5 to 0.7	-0.5 to -0.7
High Correlation	0.7 to 0.9	-0.7to -0.9
Very high Correlation	0.9-1.0	-0.9 to -1.0

Source: Okonko, 2001

Table 4: Building collapse in Nigeria and their causes.

No	Causes	Total		Building Type		Major Building Use				Calamities	
		No	%	Pr	Pb	Res	Co	Re	Ed	De	In
1	Poor maintenance culture (PMC)	5	7.14	3	2	2	1	2	0	11	18
2	Design Error (DE)	9	12.86	6	3	5	2	1	1	47	32
3	Natural Phenomenon (NP)	5	7.14	4	1	2	1	2	0	95	61
4	Poor Materials and Workmanship (PMW)	37	52.86	25	12	20	12	3	2	138	112
5	Excessive Loading (EL)	14	20	8	6	5	6	1	2	47	28
	Total	**70**	**100**	**46**	**24**	**34**	**22**	**9**	**5**	**338**	**251**

Source: Gathered historical data of building collapse in Nigeria.

Key: Pr - Private, Pb- Public, Res – Residential, Co – Commercial, Re –Religious, Ed – Educational, De- Death, In - injury

Findings and Discussion

Causes and Effects of Building Collapse

Table 4 show the summary of information on past building collapse in Nigeria. This is based on the available information that was gathered as at the time of this research. Five factors that cause building collapse were adopted as highlighted by Bamidele (2000) in Oke (2011).

Seventy cases of collapsed buildings were summarized out of which poor quality of materials and workmanship led to thirty-seven of them, representing about 53%.It could be observed that out of these Seventy buildings, forty-six (46) of them are private owned while the remaining twenty-four (24) are public buildings. Of these buildings, poor quality of materials and workmanship led to collapse of twenty-five (25) private and twelve (12) public buildings respectively. This is a very significant factor as it represents 54% and 50% respectively, showing that the factor has almost the same effect on private and public buildings.

More so, it was observed that out of the seventy building that collapsed, poor quality of materials and workmanship was responsible for twenty (20) of the thirty-four residential buildings (representing 59%), twelve (12) of the twenty –two (22) commercial buildings (representing 55%), three (3) of the nine (9) religious buildings (representing 33.3%) and two (2) of the five (5) educational buildings (representing 40%).

The analysis above showed that this very factor has more effect on residential building, followed by commercial buildings, followed by educational buildings while it has the least

effect on religious buildings. This can be justified since most of the residential buildings are erected without consulting any professionals neither are they ready to search for appropriate materials, but make use of the available one all in the name of getting a place to leave.

Three hundred and thirty-eight (338) deaths and two hundred and fifty-one (251) injuries were observed as resultant calamities of building collapse in Nigeria out of which poor quality of materials and workmanship accounted for one hundred and thirty-eight (138) deaths (representing 41%) and one hundred and twelve (112) injuries (representing 45%) respectively. This also depict that this very factor has a significant resultant effect on building collapse in Nigeria.

Relationship between Quality of Materials and Workmanship and Building Collapse

Due to high percentage of poor quality of materials and workmanship as observed, there is a need to examine the overall impact of this factor on building collapse in Nigeria.

Hypothesis 1

H_o = Quality of materials and workmanship has no significant effect on building collapse in Nigeria.

H_1 = Quality of materials and workmanship has significant effect on building collapse in Nigeria

In order to assess the causal relationship between quality of materials and workmanship and building collapse in Nigeria, two test statistics were employed i.e. regression analysis and Pearson product moment correlation coefficient.

Number of collapsed buildings as a result of poor quality of materials and workmanship (X) were recorded against the total number of collapsed buildings (Y) within the range of the years (5 years Interval) as shown in table 5.

A mathematical model (linear regression equation) was generated to Show the relationship between these variables as shown below.

Y = 1.45X + 2.35

Table 5: Causal relationship between causes of building collapse and number of collapsed Buildings in Nigeria

S/N	Year	Total	PMC	DE	PMW	NP	EL
1.	1974-1978	3	0	0	1	1	1
2.	1979-1984	07	1	2	02	0	2
3.	1985-1989	04	0	1	02	0	1
4.	1990-1994	11	1	0	06	2	2
5.	1995-1999	12	1	1	07	0	3
6.	2000-2004	13	0	1	10	2	0
7.	2005-2009	20	2	4	09	0	5
	Total	**70**	**05**	**09**	**37**	**05**	**14**

Source: Researcher's field work 2019.

KEY: PMC – Poor maintenance culture, DE – Design error, PMW – Poor materials and workmanship,

NP – Natural Phenomenon, EL – Excessive loading.
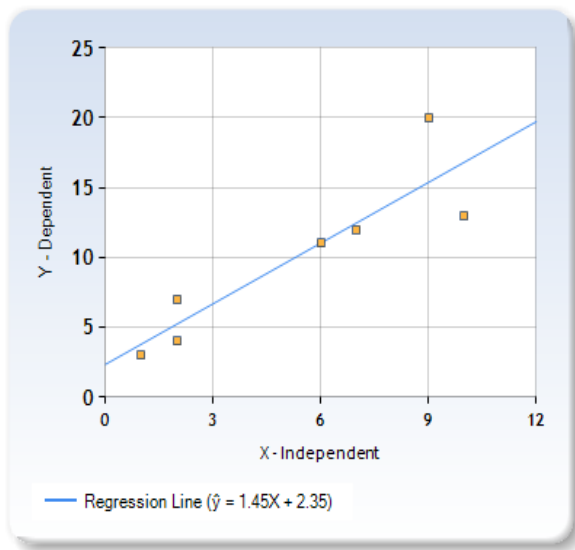
Calculation Summary

Sum of X = 37, Sum of Y = 70

Mean X = 5.2857, Mean Y = 10

Sum of squares (SSX) = 79.4286

Sum of products (SP) = 115

Regression Equation = $\hat{y}$ = bX + a

b = SP/SSX = 115/79.43 = 1.44784

a = MY - bMX = 10 - (1.45*5.29) = 2.34712

$\hat{y}$ = 1.44784X + 2.34712

Where Y is the rate of building collapse and X is poor quality of materials and workmanship. In order to further test the strength of the model, Pearson product moment correlation coefficient was calculated to be:

Result Details & Calculation

X Values
$\sum = 37$
Mean = 5.286
$\sum(X - M_x)^2 = SS_x = 79.429$

Y Values
$\sum = 70$
Mean = 10
$\sum(Y - M_y)^2 = SS_y = 208$

X and Y Combined, N = 7

$\sum(X - M_x)(Y - M_y) = 115$

R Calculation
$r = \sum((X - M_y)(Y - M_x)) / \sqrt{((SS_x)(SS_y))}$

$r = 115 / \sqrt{((79.429)(208))} = 0.8947$

Meta Numerics (cross-check)
r = 0.8947

This is a strong positive correlation, which means that high X variable scores go with high Y variable scores (and vice versa)

N= 7: R cal = 0.89: Rcritical = 0.006525 for $p < 0.05$ (0.05 level of significance)

Decision: Rcalculated > Rcritical at 5% level of significance: a very high positive correlation (or relationship).

Hence, the null hypothesis (H_0) is rejected and hypothesis (H_1) which state that "Quality of materials and workmanship has significant effect on building collapse in Nigeria" is accepted. The relationship is of a very high and positive type. This denotes that quality of materials and workmanship has a very high causal effect on building collapse in Nigeria.

Discussion of Findings

The findings revealed that poor quality of materials and workmanship has accounted for about 53% of causes of building collapse in Nigeria. Contrary to this finding, Oke (2011) confirmed that this factor is responsible for about 50% of building collapse; also, Ogunsemi (2002) confirmed that this factor has been responsible for only 37% while it accounted for 27% in another study by Fadamiro (2002). Due to increased population sample for this finding, the result of the research could be said to be more comprehensive than that of Fadamiro (2002) and Ogunsemi, (2002) despite the fact that the same number of factors were adopted as the causes of building collapse. In furtherance to what Chinwokwu (2000) asserted that, private buildings are more prone to collapse than public ones, the analysis also confirmed that poor material and workmanship is the most significant factor of all the causes of collapse in all type of buildings regardless of their developer nor the use subjected to.

Conclusion

The study revealed that, poor maintenance culture, design error, poor quality of materials and workmanship, natural phenomenon and excessive loading contributed to about 7%, 13%, 53%, 7% and 20% respectively of building collapse in Nigeria with most of them being private building and mostly residential dwellings.

Moreover, the study concluded that poor quality of materials and workmanship has a very high and positive effect on building collapse in Nigeria (r = 0.89) with respect to the mathematical model (linear regression equation) generated from the findings of the research.

The Collapse of buildings in Nigeria can be seen as results of Collapse in National Values

Recommendations

Based on the findings, the following recommendations will help reduce the incidence of building collapse in Nigeria:

i.   The Standard Organization of Nigeria (SON) should be more proactive in their responsibility of sanitizing building materials that are offered for sale in Nigerian market.

ii.   All Professional bodies in Building Industry should be involved in the building materials sanitization process. Material Engineers should also be attached to large building projects by their developer.

iii.   All Government functionaries and building developers should be properly trained and encouraged to always give construction of large scale buildings to competent and registered contractors who will also be supervised by a registered Structural Engineering consultant and Architect who preferably have designed such projects

iv.   All building construction materials like sand, cement, aggregates, reinforcement bars and particularly foundation soil should be tested before commencement of any construction. The mineralogy and alkalinity tests of coarse aggregates should be done to know whether the material contains some percentage of impurities, which deleterious and injurious to cement and reinforcement rods.

v.   Design specification of Architect and other allied professionals should be strictly followed on site

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