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COLLAPSE OF BUILDINGS A SERIOUS TRAGIC IN NIGERIA

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ABSTRACT

Collapse of buildings in Nigeria have becomes a frequent occurrence in recent times, their were reports of building collapse on the pages of our national media in major cities such as Lagos, Port-Harcourt, Abuja, Ibadan etc, and other part of the world where lives were lost and properties worth billions of dollars got wasted. Despite many protests from different quotas to seek the assistance of government and professionals to intervene on the deft ear the building industry handled collapsing of building. In other to find a lasting solution to this problem, this paper examines causes of building collapse in Nigeria and also enumerated specific areas the government, stakeholders in the building industry and the general public are affected. The problems range from faulty design, extraordinary loads, faulty construction, negligence, incompetence, foundation failures, corruption and forces of nature. Some recommendations were made as part of lasting solutions to conquer the challenges.

KEYWORDS: Collapse of Building, Building Industry, Extraordinary loads, Faulty design, Escape route.

1.0 INTRODUCTION

Occurrences of collapse buildings in Nigeria are posing serious challenges to all the stakeholders in the building industry, building consultants, governments, developers, landlords and users. Typical examples of collapsed buildings are listed in Tables 1, 2, 3.

Others include collapse of Four-Storey Building in Ita- Faji, Lagos Island, Lagos State (2019) that claims 20 lives and 40 casualties where 3rd and 4th floor was using by a private School while ground and 2nd floors were for residential , 2 Storey Building in Ali Street Mile 12 Lagos (2016) that claimed 5 lives and number of casualties were uncertained. Building under construction at Benjamin Opara Street, Port Harcourt, Rivers State, (2006) and many others. (Olagunji et al, 2013). On the Night of November, 2012, an uncompleted, a 4 storey building under construction collapsed in Agbama Estate in Umuahia killing undisclosed number of people squatters under the floors. Investigation revealed that building regulations permit a maximum of 2 floors in the area. On 5th September, 2013, a 4 storey building under construction, collapsed at 24 Obanye Street in Onitsha, during a heavy downpour to mention but a few.

Table 1. List of some Collapsed Buildings in Nigeria.

Year	Source	Structure	Location	Type	Lost lifes	Causes
25th March2019	SAHARA REPORTERS		Kakawa Street, Lagos Island Lagos state	-	-	-
18th March2019	SAHARA REPORTERS		57 Egerton Square, Oke Arin, Lagos		none	-
13th March2019	SAHARA REPORTERS	Four-storey building in Ita-Faji Lagos Island	Ita-Faji Lagos Island Lagos State	Residential and Commercial (School)	20	-
2018	PUNCH	Two-storey	Port Harcourt River State	-	5	-
19th March 2016	www.nairaland.com	Two Storey Building	9 Ali Close, behind mile 12 Garage, Lagos		1	Structural Defects
,,	The Guardian. ISSN 0261-3077. https://en.m.w	Five Storey Building	Lekki District Lagos	Under construction	34	Heavy rainfall and foundation failure
21st October 2015	The Guardian. ISSN 0261-3077. https://en.m.w	3 – Storey	Swamp Street, Odunfa, Lagos Island	Residential Building	-	Structural defects
15th Jul 2015	-	3 – Storey	Ebute Meta Lagos	Residential Building		Structural defects
30th Sept., 2014	http://nigeriatell.com/news/many-trapped -in-abuja-building-collapse	club house which is undergoing make over from a bungalow to a		Commercial	Nil	
30th	http://reportingni	Liberty Power	Benin			Structural

Sept, 2014	geria.com/2014/09/ another-church-building-collapses-benin	Bible Church				failure; Use of substandard material
Sept 2014	www.punch.com/10-tragic-building-collapse-in - nigeria	Abu Naimi school building collapsed in Bukuru, Jos South LGA	Jos	School (Commercial)	10 pupils	Structural defect, illegal conversion
Sept 25th 2014	http://theadvocatengr.com/new/three-storey-building-collapses-in-anambra-one-dead-scores-injured/	Three-storey building	Eziora village, Adazi-Ani in Anaocha local council area of Anambra State		1	Structural failure
19th Sept 2014		Christ Chosen Church of God	No 22, First Uzama Street, Off Oliha Quarters in Edo State Nigeria		4	Demolition process
12th Sept., 2014	http://businessdayonline.com/2014/10 /synagogue-building-collapse-coroners-inquest-to-commence-sitting-october-13/#.VDUXJFM1jIU	Guesthouse	Synagogue Church of All Nations in Lagos		116	Illegal conversion, Structural failure, Non-compliance to regulatory authorities
19th August 2014	http://www.thegazellenews.com/2014/08/	one-storey building	Osogbo, capital of Osun state,			heavy downpour

Table 2: List of Selected Collapsed Buildings in Nigeria.

Year	Structure	Location	Type	Casualties	Causes
2012	Three storey Building at 16 Nnobi str. Enugu	Enugu, Enugu State Nigeria	Block of flats	Not Available	Structural Failure
2012	An uncompleted One-storey Building at Awka	Awka, Anambra State, Nigeria	Residential	Not Available	Deffective material
2012	Uncompleted three-storey Building at Water logged area	Owerri, Imo State, Nigeria	Block of Flats	Not Available	Flooding

	of Owerri.				
2012	Four-storey Building under construction at Agbama Estate, Unuahia	Umuahia, Abia State, Nigeria	Block of flats	Undisclosed number of squatters on the ground floor perished	Non-adherence to building Regulation that permits only 2 floors in the area.
2013	Four-storey Building collapsed at Abanye Str. Onitsha during a downpour	Onitsha, Anambra State Nigeria	Commercial Building	Not Available	Heavy Rainfall flooding

Source: Author's Secondary Data (2013)

Table 3: List of Selected Collapsed Buildings across the Globe.

Year	Structure	Location	Type	Casualties
226 BC	colossus of Rhodes	city of Rhodes, island of Rhodes	Statue	0
27 AD	Fidenae amphitheatre collapse	Fidenae, Italia, roman empire	Amphitheatre	20,000+
140	upper tier collapse of the circus maximus	Rome, Italia, roman empire	Amphitheatre	- 13,000
558	dome of hagia Sophia	Constantinople, Byzantine empire	Church	0
1284	choir of beauvais cathedral	beauvais, France	Church	0
1382	Bell tower of st. Mary's church, straslsund	Stralsund, hanseatic league (now in Germany)	Church	0
1444	Riatlo bridge	Venice, republic of Venice	Bridge	0
1500	Malmesbury abbey	Malmesbury, England	Church	0
1549	Lincoln cathedral	Lincoln, England	Church	
1573	Tower of beauvais cathedral	Beauvais, France	Church	
1647	Tower of St. marine-kriche	Stalsund, duchy of pomerania (now in germany)	Church	
1666	St. peters church, Riga	Riga, Sweden (now in Latvia), Canada	Church	
1845	Yarmouth bridge	Yarmouth, UK	bridge	
1887	Bussey bridge disaster	Boston, USA	bridge	
1908	Gorlitz City Hall	Gorlitz,Germany	hall	79
1916	Quebec Bridge	Quebec, City, Canada	bridge	24-30
1968	Ronan Point collpse	London, UK	High rise	
I977	Granville Railway bridge	Sydney, Australia	bridge	11
1981	Hyatt Regency walkway collapse	Kansas, City Missouri, US	Walkway	4

1993	Highland Towers collapse (Block1)	Kualar Lumpur, Malaysia	Residential Tower	83
1995	Sampoog Department store collapse	Seoul, South Korea	Commercial building	114
1998	Palace 11 collapse	Rio de Jenairo,Brazil	Residential tower	48
1998	Knick-Ei	Halstenbek,Germany	Sports Hall	502
2001	Hintze Ribeiro bridge	Castelo de Paiva, Portugal	bridge	8
2001	Collapse of the World Trade Center	New York City,USA	Skyscrapers	0
2006	Katowice Trade Hall roof collapse	Katowice, Poland	Roof	59
2010	Hubert h Humphrey Metrodome roof collapse	Minneapolis,USA	Stadium Roof	2,606 in Towers 1 and 2
2012	Algo Center Mall	Elliot Lake,Ontario,Canada	Shoping mall	65
2013	Building under construction	Sao Paulo, Brazil	Building	0

Source. Wikepedia

1.10 AIMS AND OBJECTIVE OF THE STUDY

1.1.1 Aim of Study

The aim of this study is to acknowledge the major causes of building collapse in Nigeria and its implication to the stakeholders of the building process and the general public.

1.1.2 Objective of Study

- To identify the major causes of building collapses in Nigerian cities.
- To evaluate the rate of building collapses in the country and its effects on the stakeholders in the building industry.
- To come out with escape route to the problems

2.0 LITERATURE REVIEW

Madu, 2005, identified causes of building failure as due to natural occurrences such as earthquakes, tornadoes, flood, etc. Other causes according to him include factors such as omission, carelessness, leading to use of deficient structural drawings, absence of proper supervision of projects, alteration of approved drawings, use of substandard materials, corruption in the Nigerian system, building without approved drawings and translocation of building plans to different sites.

Oloyede, et al (2010) attributed causes of building collapse as due to man's negligence in some vital areas in construction such as soil investigation, incorporating design for extra loads, stress from winds, earthquakes, uneven terrain, use of substandard building materials, poor monitoring and overall poor workmanship.

Tyagler et al, (2007) traced the causes of building failures to defects or deficiencies at design and construction stages.

Ukpata, (2006), opined that the spate of building collapse in the country can always be traced to unsafe actions of parties involved in building process starting from clients to building consultants, contractors and users

Adebayo, (2006), opined that building collapse incidences can be controlled or minimized if the client is ready to pay for high quality materials and for expert professional services.

Ayinuola et al, (2004), pointed accusing finger to all parties in the building industry, clients, architects, engineers, town planners in the local authorities and contractors stating that they have contributed to building failures in various dimensions.

Adebayo, (2000), opined that efficiency in skill and experience is important in creating valuable workmanship in building construction.

2.1 Conceptual Framework

Collapse of building either total or partial collapse of some of its components leads to the failure of building to perform its intended function such as protection, safety or stability (Olagunyi, et al, 2013).

According to Ikpo, (1998), the degree of building failure can be related to the degree of deviation of the building from its "as built" state which in most cases represents the acceptable standard within the neighborhood, locality, state or country

3.0 DISCUSSION

3.1 Identified Some Causes of Building Collapse.

Through personal experience and through investigations and media reports, identified causes of building collapse in the country can be summarized as follows:

3.1.1 Faulty/Defective Design: Defective Architectural and Structural drawing once architects fail to do feasibility studies, soil and site investigation which are the bases for design of adequate architectural and structural drawings. Others include poor design details, low quality materials and works specifications. Engineers (structure and civil) may contribute if they fail to insist on carrying out essential soil test, foundation design. Errors, omissions and inaccurate of data from professionals may lead to problems if not detected on time.

3.1.2 Bad Construction: This arises when contractors fail to carry out the works in accordance with architects and engineers' specifications. They do this in order to attain maximize profit. Sometimes specified materials are substituted for substandard ones. Others areas of concern include poor concrete mixes, premature removal of formworks and general poor workmanship.

3.1.3 Use of Substandard Materials: The use of local reinforcements where foreign or imported reinforcements ought to be used in a structural design, Use of substandard blocks from block factories. Investigation revealed that 1 bag of cement is used to mold 40-45 numbers of 225mm (9ins.) blocks. Without adequate supervision, contractors can engage in sharp practices. Cement-Sand ratio is better obtained in weight and not in volume. It is necessary that steel reinforcement bars undergo tensile strength tests to determine its standard strength. The country and the higher institutions cannot boast of adequate number of laboratories to carry out these tests including concrete cube tests for concrete and water quality. The use of substandard materials and untested construction methods is a major contributor to structural failures of buildings.

3.1.4 Absence of Building or Planning Permit: It is illegal to commence construction works without approved drawings from the appropriate authorities. The 3 tiers of government- the Commission (for Federal Lands), the Board (for State lands), and the Authority (for Local Governments lands), are vested with the duties of granting approval to prospective developers. Sometimes defective drawings are used for construction without approval from the approving authorities. Some are done out of ignorance.

3.1.5 Corruption: Sometimes drawings are not read by officers of the approving authority to detect defects. They sometimes engage in corrupt practices by granting illegal approvals. They sometimes refused to seal buildings that are without approval once money have been given.

3.1.6 Non-Adherence to approved building plans: This comes in form of illegal alteration to approved drawings. Sometimes, a building originally specified to undergo in-situ concreting is changed to pre-cast methods because the expatriate contractor tends to

prefabricate the components overseas and ship to Nigeria. This practice if not properly controlled could spell danger years after the buildings are in use.

3.1.7 Absence of proper site and soil investigation: The avoidance of this is to determine suitability of the terrain and soil's bearing capacity, which influences foundation type spells danger. Many builders ignored soil testing and based or depend on the related information on existing structures around and decided to make use of any type of foundation preferably one with less cost, without considering the consequences.

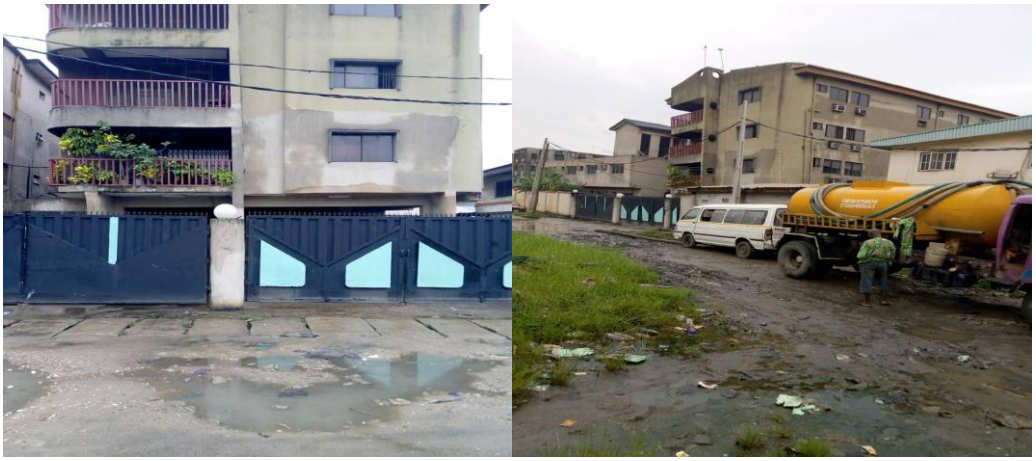
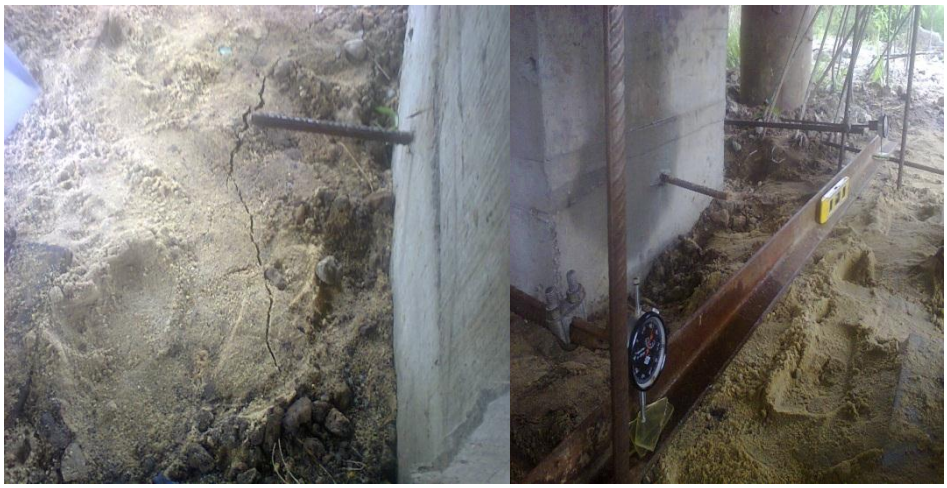


Fig. 1: Examples of tilted or Bend building in Lagos Island.



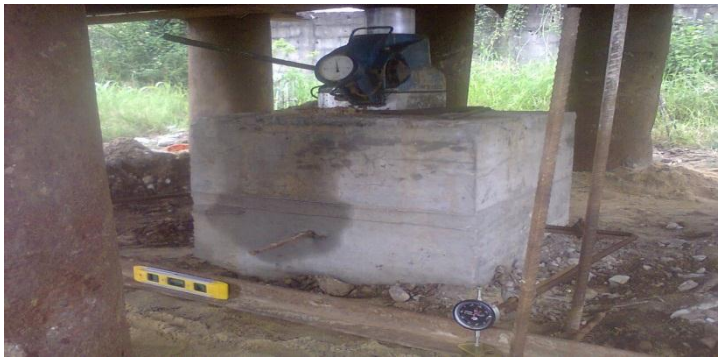


Fig. 2: Failed pile after carrying out testing in Lagos Island.

Fig. 3: Example of a Pile load train.

3.1.8 Engagement of inexperienced personnel to take charge of construction works: Sometimes firms resort to use unqualified staff to act as principals on construction sites in order to save cost. The consequence of this practice is that the unqualified staff may not be competent enough to detect fraudulent practices of smart contractors. This may lead to covering up of shoddy or defective works.

3.1.9 Engagement of ill-equipped, incompetent contractors

In Nigeria, it is common that most contracts are first awarded to businessmen who front for politicians. The practice is that the businessman gets the contract and sells it to incompetent contractors known to them without following the normal contract procedures and without investigating the competency of the contractor. The result is shoddy performance which can lead to building collapse.

3.1.10 Lack of proper inspection, supervision, and monitoring of construction works

Building professionals both in practice and in government agencies often guilty of this practice either due to negligence or they are not paid to do so. Many buildings were

supervised by unprofessional laborers when so called professionals may visit a site once in every week or more, no wonder the failed piles in the fig 2 above could not reached the designed depth of 40M.

3.1.11 Illegal conversion, alteration, and additions to existing structures. Imposing additional floors beyond original design provision is a common practice in Nigeria. For examples, a storey building changing to 2-storey thereby imposing more loads on the suspended floor with resultant load on foundation. Creating additional rooms on suspended floors, changing the use of building, for example, converting residential to mini-factory whereby heavy duty equipment are placed on suspended floors. Also creating vibrations on suspended floors, by breaking of slabs, beams, or exposing old foundation to flood and erosion may lead to structural failure.

3.1.12 Undue Interference of client on building works

Sometimes the client makes serious changes and variations at advanced stage of construction with the contractor without seeking building consultants' advice for profit and the likes.

3.1.13 Foundation failures: A building structure can collapse if founded on poor sub-soil, or if the building is not uniformly loaded or if suitable foundation was not specified according to soil nature or due to soil erosion or earth movement under the foundation. Even when reinforcements of both Raft and Pile were not properly covered with concrete, corrosion is inevitable, hence foundation failure will follow eventually.

3.1.14 Fire Outbreak: Most materials used in building construction and finishes are flammable (Olagunju, 2002). These materials for example, gloss paints encourage fire spread. Fire weakens structural members such as reinforcement bars and steel trusses. These materials fail in the process of providing supports to components and the main structure and in the event of fire, may lead to total or partial collapse of the building.

3.1.15 Natural Occurrences. In Nigeria, the most common natural events are heavy storm, high wind, flood, thunder, lightening and earthquakes. Many reported cases of building collapse in Nigeria caused by natural disasters have been reported by Arayela and Adam (2001). An example is a 3- Storey residential building, at Iju-Ishaga, Lagos (September, 1999).

3.2 Effects of Building Collapse

- Loss of lives, properties and huge sum of capital. About 217 people lost their lives between 1974-2001 from Newspaper survey conducted by Arayela and Adam (2001).
- Loss of reputation and integrity leading to psychological trauma and if the condition is not properly managed, end loosing life.
- Loss of new commissions and contracts.
- Withdrawal of practicing licenses.
- Loss of materials and capital investments: Components and materials are damaged beyond re-use. Capital investments are not recoverable, leading to bankruptcy and high economic implications to the nation's economy.

4.0 RECOMMENDATION AND CONCLUSION

4.1 Recommendations

- Proper planning, supervision and monitoring of construction activities should be institutionalized by policy makers to ensure that all buildings are constructed according to design, specifications and planning regulations.
- Professionals in the building industry should maintain their integrity and professional ethics and work in accordance to standard practice procedures laid down by the standard form of building contracts especially when they play in the hands of ignorant clients.
- Urban or Town development agencies at various levels of government (commission, Board, Authority) should enforce control of building works in their localities as laid down in urban and regional planning decree 88, of 1992 and as in section 13 of National Building Code 2006.
- There is need to organize periodic public awareness campaign through electronic and print media to sensitize the public on advantages of using professionals as the way of realizing safe buildings.
- Standard organization of Nigeria should be vigilant to ensure that building materials imported into the country conforms to standard requirements.
- All building professionals play key roles to actualize their respective obligations during building production, using the wrong professionals at any stage of the building process put the building in danger. It is the duty of the architect as the prime consultant to direct the client to use the right professionals. This he achieves by ensuring that the structural and services drawings brought to his office are stamped and signed by professionals

registered by their respective professional bodies before proceeding to planning authority for "building permit".

- Soil investigation, material tests and environmental impact assessment (E.I.A) should be made compulsory for all institutional, industrial and commercial buildings.
- All building plans tendered by any developer for approval must comply with the Nigeria's new building code and local bye laws and regulations.
- Standard organization of Nigeria, (SON) should monitor the standard of blocks moulded in the country. There is need to empower and restructure available materials testing laboratories in the country.
- The National Assembly to make speedy passage of the bill on National Building Code.
- Government should institute a body that will fight against corruption especially in building industry.

4.2 CONCLUSION

It is a concluding fact that Nigeria has witnessed collapsed buildings in various dimensions, either those under construction or those already in existences. Causes were identified as mainly man-made but less often by forces of nature. Corruption as man-made factor manifest in greedy contractors and the tendency of clients or landlords to cheat resulting to the use of substandard materials, use of quacks and poor remuneration for building works and services. The building consultants are guilty of negligence, incompetency, poor supervision and the tendency to allow defective works intentionally for a fee or due to ignorance or inexperience. There should therefore be a review of existing building laws that should guide standard code of practice and that should cover all grey areas in order to guarantee safety of buildings.

DEDICATION

I dedicate this work to God Almighty who has enabled me to start and finish this work with sound health and mind. May His name be exalted forever.

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