



Incidence of building collapse in Nigeria: Stakeholders perspective

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Abstract

Buildings, like all structures, are designed to support and withstand certain loads without any deformity. The occurrence of building failure and collapse has become a common phenomenon and a major cause of concern in Nigeria today; the magnitudes of this incident are becoming very alarming and worrisome. Performance failure of any building can be induced by the failure of structural members, non-structural component (non-load-bearing elements) failures or components. Collapse in Buildings could be total or partial failure of one or more components of a building leading to the inability of the building to perform its principal function of safety and stability. A list comprising the causes of building failure/collapse was administered to stakeholders of whom they were expected to indicate the five (5) major factors causing of the collapse of building in their opinion. A list of 100 questionnaires was administered to each of the stakeholders. Upon analysis of the returned questionnaire supervision & poor workmanship and defective design, structure, dilapidation are the leading causes followed by substandard materials and equipment and next are incompetent contractors and illegal conversion/alterations.

Keywords: Building, Building collapse, building failure, stakeholders

Introduction

According to Fadamiro (2002) ^[5], building can be defined as “an enclosure for spaces designed for specific use, meant to control local climate, distribute services and evacuate waste”. Buildings can be defined as a structural entity capable of securing self by transmitting weights to the surrounding ground. More so, buildings are defined “as a structure for human activities, which must be safe for the occupants” (Odulami, 2002) ^[11]. Over the years these buildings have also been posing treats and dangers to people and properties either during or after construction as a result of partial or total collapse.

The place and priority of buildings to man’s existence and survival as he lives and carries out his activities within them is important. Despite this fact, maintenance of the existing housing stock in habitable condition still remains a great problem to be solved in Nigeria among other countries in the World (Olagunju, 2011 & Olagunju, 2011) ^[12, 13]. Buildings, either as temporary, permanent or monumental structures needs to be properly planned, designed, constructed and maintained to obtain the desired satisfaction, comfort and safety.

A building, once properly constructed is expected to be in use for a very long time. Although every society has its own problems and Nigeria is not an exception yet the very recent challenges of buildings collapsing in various locations have been giving the various arms of government and the people of Nigeria sleepless

nights in view of the enormous loss of huge investments in housing, properties and human life. The major challenge on the issue of building collapse is that individuals differ radically from one another on the professional to blame as the major cause of the collapse of a building.



Fig 1: Part collapse of a building (unitednigeria.com)



Fig 2: Collapsed building in Lagos (ngozigold.com)

Buildings, like all structures, are designed to support and withstand certain loads without any deformity. The loads are the weights of people and objects, the intensity of rain and the varying wind pressure. With buildings of a few floors, strength generally accompanies sufficient rigidity, and the design is mainly that of a roof that keeps the weather out while spanning large open spaces (Calvert, 2001 and Ngozi gold, 2012) ^[3, 10].

Building Failure?

The occurrence of building failure and collapse has become a major issue of concern in the development of this nation as the magnitudes of this incident are becoming very alarming.

Building failure occurs when the building loses its ability to perform its intended (design) function. Hence, building failures can be categorized into the two broad groups of physical (structural) failures (which result in the loss of certain characteristics, e.g., strength) and performance failures (which means a reduction in function below an established acceptable limit) (Rossetto, 2016) ^[17].

Structural failure corresponds to the exceedance of ultimate limit state in many of the load-carrying elements, which compromise the structural stability of the building. In practice, this corresponds to extensive damage, partial or total collapse of the building, resulting in repair costs that are high relative to the replacement value of the building.

Performance failure can be induced by the failure of structural elements (as per above), non-structural component (non-load-bearing elements or equipment) failures or components.

Building collapse, though a common phenomenon all over the world is more rampant and devastating in the developing countries. The incidence of building failures and collapses has become major issues of concern in the development of this nation as the frequencies of their occurrence and the magnitude of the losses in terms of lives and properties are now becoming very alarming. In fact, building collapse has now become a familiar occurrence, even to layman on the street in Nigeria.

Building components tend to fail depending on materials, designs, method of construction, environmental conditions and the use to which the building is put. Substandard materials and design errors are major causes of component failure (Hossian, 2009) ^[8].

Causes of building collapse

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 (Chendo & Obi, 2015) ^[4].

Collapse in Buildings could be total or partial failure of one or more components of a building leading to the inability of the building to perform its principal function of safety and stability (Research clue, 2015). Collapse of buildings is a universal problem that has eaten deeply into the fabrics of the construction industry, of which very little has been done to curb the menace. Nigeria like many other countries is witnessing building collapse at alarming rate. 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 (Ayodeji, 2011) ^[2].

Several causes of building failure had been attributed to either natural or man-made phenomena. A natural phenomenon may consist of earthquakes and typhoons while man-made phenomena consist of disasters which may be borne out of man's negligence may in areas such as soil type, building design and planning for extra ordinary loads and stress from strong winds and earthquake for tall buildings, foundation works, quality of building materials, strict monitoring of craftsmen and quality of workmanship (Olanitori, 2011) ^[14].

Structural failure in buildings, in broad terms comes in various forms and degrees of severity; the worst of which is a collapse. Deterioration or decay especially of vigour or usefulness of a building can be categorized as a failure of some sort but a total loss of bearing strength resulting in a sudden breakdown, physical depletion and/or falling apart is termed a collapse. Among these factors are greed, incompetence, corruption, poor planning, poor enforcement of building codes, inadequate public awareness and education, and limited financial and technical resources (Falobi, 2009) ^[7].

Oloyede, et al (2010) ^[15] 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. 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.

As posited by Adebayo (2000) ^[1], the skill, experience and personal ability of the workmen involved in the building construction is of utmost importance in creating value. However, this assertion can only be relied upon in a situation where the developers/contractors are capable and willing to appreciate quality and be ready to pay a commensurable reward in this regard.

Causes of Collapse from stakeholders

Building collapse is no respecter of size of the structure. From literatures consulted and referenced the following twenty three (23) causes are identified as major causes of building collapse:

1. Quality building materials
2. Project supervision/ inspection/ monitoring Building design and planning
3. Natural disaster (heavy down pour/storm)
4. Soil type
5. Non-compliance with specifications/standards by developers/ contractors
6. Substandard materials and equipments
7. Construction method
8. Economic pressures
9. Non-enforcement of existing laws
10. Bribery and corruption
11. Lack of continuing professional development
12. Standard of education
13. Illegal Conversion/Alterations/Additions to Existing Structures
14. Structural Defects
15. Incompetent Contractors
16. Construction Method
17. Dilapidating Structure
18. Poor Workmanship
19. Dilapidating Structure
20. Bad Design

22. Faulty Construction
23. Foundation Failure
24. Extraordinary Loads

Methodology

The list comprising the causes of building failure/collapse was administered to stake holders of which they were expected to indicate the five (5) major causes of building collapse in their opinion. A list of 100 questionnaires was administered to each of the following stakeholders:

1. Real Estate Professionals
2. Nigerian Public (selected people from Edo State Polytechnic, Usen)
3. Academicians (Lecturers from Edo State Polytechnic, Usen and Ambrose Alli University Ekpoma)
4. Building Professionals (Nigeria Institute of Builders-NIOB, Nigeria Society of Engineers-NSE Benin Chapter and Nigeria Institution of Survey-NIS Benin Chapter)
5. Landlords / Developers (Clients)
6. Building Contractors (Professional contractors)

Results Analysis

The summary of the five (5) major causes of building collapse in Nigeria is shown in the table below. Table 1 shows the rankings of the various stakeholders as touching their perception of the causes of building collapse in the country. The ranking is in order of the importance of the perceived cause with 1 the most significant and 5 the least significant from the lists.

Table 1: Summary of 5 major causes of collapse by stakeholders

Rank	Real Estate Professionals	Nigerian Public	Academicians	Building Professionals	Landlords / Developers	Building Contractors
1	Substandard materials and equipments	Non-compliance with specifications /standards	Non-enforcement of existing laws	Poor Workmanship	Construction Method	Dilapidating Structure
2	Incompetent contractors	Incompetent contractors	Poor Workmanship	Sub-Standard Building Materials	Incompetent Contractors	Illegal Conversion/Alterations/ Additions to Existing Structures
3	Project supervision/ inspection/ monitoring	Substandard materials and equipments	Bribery and corruption	Illegal Conversion/ Alterations/ Additions to Existing Structures	Poor Workmanship by Contractors	Substandard Building Materials
4	Building design and planning	Illegal Conversion/Alterations/ Additions to Existing Structures	Lack of continuing professional development	Structural Defects	Defective Design/ Structure	Defective Design/ Structure
5	Natural disaster	construction method	Standard of education	Project supervision/ inspection/ monitoring	Structural Defects	Project supervision/ inspection/ monitoring

Table 2: Showing the questionnaire responds to the five perceived important causes of building collapse by stakeholders

Rank	Real Estate Professionals	Nigerian Public	Academicians	Building Professionals	Landlords / Developers	Building Contractors
1	31	36	29	40	27	30
2	22	29	25	21	23	27
3	19	15	21	16	20	22
4	17	12	15	12	18	14
5	11	8	10	11	12	7
Total	100	100	100	100	100	100

Table 2 and figure 3 presents further analysis of table 1 showing the five most important factors responsible for building collapse in Nigeria by stakeholders as they view it.

The building professionals scored the highest of 40 respondents in rank number 1 followed by real estate professionals with 31 responses and the least in the pact is landlords or clients with 27. For rank 2, the Nigerian public scored 29, followed by building contractors and the least is 21 for building professionals.

For rank 3, the scores are 22, 21 and 15 for building contractors, academicians and the least Nigerian public respectively.

Landlords or developers, real estate professionals and building professionals scored 28, 17 and 12 for the least respectively for rank 4 factors and finally, landlords or developers, real estate and building professionals and building contractors scored 12, 11 and 7 for the least respectively.

It is also observed that the score of responses by each stakeholder in the construction industry gradually reduces from rank 1 to rank 5 showing the impact of the chosen factors that contribute more to the phenomenon of building collapse in Nigeria in their opinion.

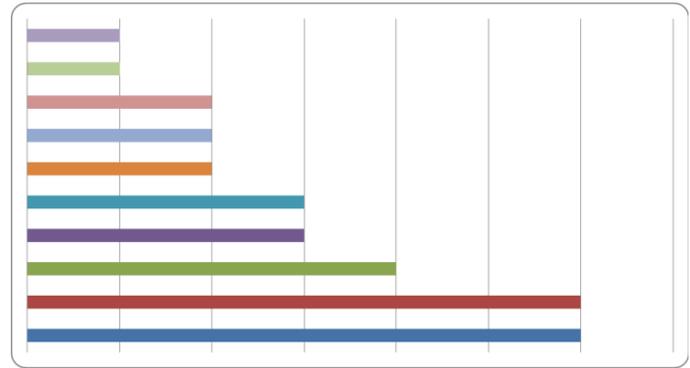


Fig 4: Showing mergers of the causes of building failure and collapse.

A total of 30 factors were listed by the different categories of the construction industry stakeholders and these were synchronized into the above ten (10) major causes of building collapse in Nigeria. Figures 4 gives the full picture of the stakeholders responses. Supervision & poor workmanship and defective design, structure, dilapidation are the leading causes followed by substandard materials and equipment and next are incompetent contractors and illegal conversion/alterations.

Conclusion

Structural failure in buildings, in broad terms comes in various forms and degrees of severity; the worst of which is a collapse. Identifying the major causes of building collapse is the main focus of this study. A number of causes were listed and respondents / stakeholders in the construction industry were asked to choose five (5) of the major factors responsible for the high incidence of collapse in buildings particularly in Nigeria.

A total of thirty (30) factors were highlighted from literatures and they were to rank these causes from 1 to 5. 1 being the most important in their opinion. The 30 factors were further grouped into 10 and from the observation Supervision & poor workmanship and defective design, structure, dilapidation are the leading causes followed by substandard materials and equipment and the least in this were natural disaster and bribery/corruption.

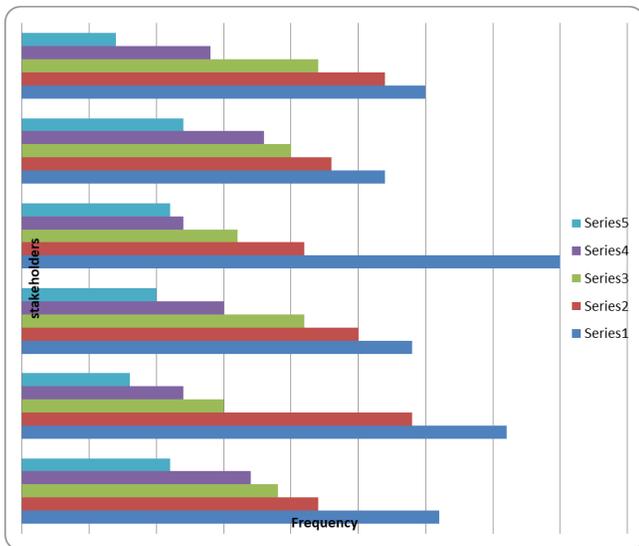


Fig 3: Showing bar chart presentation of stakeholders responds to causes of building collapse

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