**BUILDING FAILURE AND COLLAPSE IN NIGERIA: THE INFLUENCE OF THE INFORMAL SECTOR**

**ABSTRACT**

It is evident that in life, shelter remains the second basic necessity of human needs after food, and as such, many individuals act desperately to have their own personal dwelling. Therefore, the need to erect solid and functional building to avoid unexpected collapse is very essential.

Building Collapse occur as a result of the following factors, factors such as; Poor workmanship, bad design, use of sub-standard building materials, foundation failure, faulty construction, extra-ordinary loads, among other factors such as negligence, design flaws, ageing, material fatigue, extreme operational and environmental conditions, accidents, terrorist attacks and natural hazards.

Therefore, there is need to eradicate building collapse in Nigeria, most especially, the study area which is Lagos-Island as it is believed to have the highest number incidents of building collapse and require immediate attention.

In view of the aforementioned therefore, this research work shall look into the problems that result into collapse of building in Nigeria whether design or construction or other related problems. However, having identified the problems of building collapse in the country with special focus on Lagos-Island, possible solution were thereafter proffered to solving the identified problems

**CHAPTER ONE**

**1.0 INTRODUCTION**

**1.1 BACKGROUND TO THE STUDY**

The frequency of collapse of building structures on Nigeria in the past few years and recently had become very alarming and worrisome. Many lives and properties have been lost in the collapse of buildings mostly in *Port Harcourt, Abuja and Lagos* respectively. Many property owners have developed high blood pressure and some have been sent to an early grave. A visit to the collapsed scenes were as revealing as they were pathetic and one could not but wonder why such contraption could have been allowed to stand or to what extent people can go to cut corners at the expense of respect for safety and respect for lives.

Unfortunately, there are still a number of buildings of similar circumstances dotting the skyline of many cities in Nigeria. That building collapse incidence are still regularly occurring despite increasing diffusion of engineering knowledge over the years calls for some re-examination of development in building production and control process ***(Dimuna, 2010).***

Development and construction of property is very necessary to every individual in life, as such, many individuals involve themselves in construction of property for either personal uses or for investment purposes. In Lagos State, every investor will like to acquire a property due to the rapid economic development and nature of investment, while some are of prestige. No investor or property owner will be happy to see his/her building collapse. Therefore, the need to follow the required due process before embarking on development of property is important.

Building collapse is becoming a serious problem in Nigeria in general and Lagos in particular as it has a lot of effect on the economy especially the development industry. Many investors today has failed due to their ways of developing property and thus lead to waste of many lives and properties worth millions or billions of naira in some cases. Building collapse does occur as a result of greed, incompetence and corruption on the part of the contractors and developers in building industry. The regulating authorities and concerned professional bodies need collaboration to ensure adherence to building regulations in Lagos State ***(Chika, 2008).***

Research was carried out by ***(Bamidele, 2000)*** and ***(Fadamiro, 2002)*** on the causes of building collapse in Nigeria and identified the following five (5) major causes viz; *natural phenomenon, design error, procedural error, sub-standard material, poor workmanship, the lack of maintenance, the abuse of use of building* etc. Research showed that the substandard material and poor workmanship contribute **45%** to the overall causes of building collapse in Lagos State. ***(Ogunsemi, 2002)*** added that substandard materials amount to **18.4%** of the total cause of building collapse while poor workmanship amount to **19%.** Building collapse can be as a result of some defect in building which are not quickly put in place by the property owner such as;

1. Fungus stain and harmful growth
2. Erosion of mortar joints
3. Peeling paint
4. Defective plastered renderings
5. Cracking of walls and tearing walls
6. Defective rainwater goods
7. Decayed floor boards
8. Insect or termite attack
9. Roof defect
10. Dampness penetration through walls
11. Unstable foundation
12. Poor installation of air-condition units etc

All these defects in building if not properly controlled ad maintained, with time can lead to unexpected building collapse ***(Gafar, 2004).*** Building collapse have been a serious problem and concern to the government and professionals in building industry as they have been making efforts in their own ways to reduce this incessant collapse if n not totally stopped.

Therefore, this research work shows in full details the various causes of building collapse, trends of casualties of building collapse in Lagos and other states as well as its effect on the economy and individuals, efforts of the government and professionals in building industry in ameliorating building collapse in Lagos, the historic data of past incidence of building collapse, as the view of various authors on building collapse shall be discussed.

**1.2 STATEMENT OF PROBLEM**

The main purpose of any research work is to identify a particular problem(s) and give recommendation on how the problem will be solved or reduced. In the building industry today especially in Lagos, building collapse has been one of the major problem faced by both the private and public developer, whether for personal use and for investment purposes.

Lagos is a city where building collapse occur frequently and has the highest number of building collapse incidents that claimed about 64 lives between **1982-1996** ***(Dimuna, 2010).*** In the past thirty seven (37) years **(1974-2010),** Lagos State has recorded quite a number of cases of building collapse in areas like *Ebute-Metta, Lagos-Island, Mushin, Oshodi, Maryland, Ojuelegba, Ikeja, Agege, Idumota, Ketu, Central Lagos, Surulere*, etc as well as *Abuja, Port Harcourt, Ibadan, Kano* that also has the high number of building collapse cases.

This has posed a very serious challenge to those in the building industry, the government and the individuals who are into property development in the country and in Lagos State. The worrisome development and incidents throw the question that what might be the cause / causes of building collapse in the state? Several factors have been associated with this, some of which are negligence, greed, deficient foundations, inadequate steel reinforcement, hasty construction, no soil test, poor supervision and non-adherence to the building codes ***(Ede, 2010).***

As part of the problem of building collapse, some of the construction i.e. owners of building under construction derail from their approved plans relying more on imagination and fantasy. Secondly, the approving authorities are also known to fail to monitor compliance with approved plans. Thirdly, some building owners shun professionals in order to cut costs. Fourthly, the high cost of building materials has led greedy contractors with eyes on profit, to patronise substandard materials. These shortcut measures have contributed immensely to the occurrence of failed buildings in the country ***(Adeniya, 2002).*** Before independence, building erected in Nigeria were in compliance with the global standards, but surprisingly from oil boom of 1970 till now, all manner of illicit activities that unwholesome professional practices have crept in Nigeria system, all they want is just the job done caring little or nothing about professionalism.

All the aforementioned problems and question is when will developers in Nigeria begin to follow the appropriate channel before embarking on development, and when will the building regulation be standardize by government for every development can take place, if all these are put in order, the problems of building collapse would be reduced to the barest minimum.

**1.3 AIM AND OBJECTIVES OF THE STUDY**

The aim of this research work is to examine the problems associated with building collapse in Lagos with special focus on Lagos Island as case study. In order to achieve this aim, the following objectives are pursued;

1. To identify the causes and effects of building collapse on Lagos
2. To examine the problems associated with building collapse in the study area
3. To trace the past incidence of building collapse in Lagos and Nigeria at large
4. To examine the efforts of government, professionals and all other stakeholders in eradicating building collapse in Nigeria
5. To proffer suitable solution to the problems associated with building collapse in the study area

**1.4 RESEARCH QUESTIONS**

Based on the problems stated, the following are the questions for the study which will serve as guide as the study is meant to solve the problem stated above.

1. What are the causes of building collapse?
2. Does design/construction problem leads to building collapse?
3. Does building collapse have any effect on the economy or property investment?
4. What are the problems of building collapse?
5. What are the major problems of the past building collapse in Lagos?
6. How frequent does building collapse in Lagos?
7. Has government and professionals made any effort to curb the collapse of building in Nigeria?
8. Does the developers have their own faults in collapse of building?

**1.5 FORMULATION OF RESEARCH HYPOTHESIS**

Hypothesis is a tentative answer to a research problem. It is a proposition which can be put to test in order to determine its validity, also hypothesis is very brief, clear definite statement which are empirically verifiable, it may be positive **(H1)** or negative **(H0).**

Therefore, the hypotheses for this research study is stated as follows;

**1. H0 –** Building collapse does not have any effect and problems on the economy as well as property investment

**H1 –** Building collapse has effect and problems on the economy as well as property investment

**2. H0 –** Government and professionals have made efforts to eradicate building collapse in Lagos State

**H1 –** Government and professionals have made no efforts to eradicate building collapse in Lagos State

**1.6 SIGNIFICANCE OF THE STUDY**

Every good research work must have an element of importance to some particular set of people, so as to make the purpose of the research work meaningful. Therefore, this research work is of great importance to the following group of people;

*The developers* will benefit from this research work as it will show their past mistakes that have led to collapse of buildings and how to improve on it, also it will enable them to know and identify the various causes of building collapse, the defect, effect and problems of building collapse and how it can be solved, they will also have an understanding on the importance of following the building code and the professionals that are involve in property development, so as to give their job to the right ones.

*The building professionals* will be able to improve on their lapses by giving the builder the orientation on the types of material to be use for construction and stop the use of sub-standard materials, that will eventually lead to building collapse, also they will improve their efforts to site supervision so as to know the quacks on site and the types and quality of materials that are used on sites. *The government* will definitely benefit greatly from this research if recommendations given thereafter is put in place, in terms of regulating the cost of materials both local and international and implement their rule and laws guiding constructing industry. Also, *researchers and students* writing on related topics or field of works can use this as their reference.

Finally, the *tenants and individuals* planning to embark on building construction will be able to know the sub-standard building materials if they go through this research work. They shall be able to identify building with defect and avoid such building for living in order not to waste their lives and property. Therefore, this research work is of great importance to the society as a whole.

**1.7 SCOPE OF THE STUDY**

This study will focus on the *examination of the problems associated with building collapse in Lagos*. Hence, the scope is therefore narrowed to Lagos-Island due to the record of building collapse in the area. As the study will focus on building collapse problems caused by design, construction, other causes, as well as its effect on property investment. Research questions will be administered through questionnaires to the professional team in the building industry, government parastatals and the real estate developers in with a view to examining its effects in Lagos-Island area of Lagos State.

**1.8 DEFINITION OF TERMS**

Below are the terms used in the course of the research work, they are defines as follows;

**1.9.1 *BUILDING COLLAPSE:*** This is an irreversible aspect of failure in which fails as a result of the development. It is the failure in building that leads to the breakdown of the building structures due to old age, design error, faulty construction, foundation failure, overloading, inadequate steel reinforcement, poor building material, lack of maintenance etc. Excessive rainfalls and poor drainage systems pose a serious problem to structures along the Nigerian coastlines. It is a common sight to see sinking old building around Lagos and within the coastal areas due to water related problems and deficient foundations, this is also applicable to many new structures as they manifest the same problem while under construction ***(Ede, 2010).***

**1.9.2 *BUILDING:*** A building is a structural property such as house or school that consist of wall, door, window, foundation, roof etc. These are words for structure such as a house, office block, factory that has all the building components.

**1.9.3 *SUB-STANDARD MATERIALS*:** These are the type of materials that are below the prescribed standard or required standard. These are non-standard materials or less quality materials that are used for construction of building that can lead to failure of the building or collapse of such building. Materials that are used that are not adequately enough to the building standard to sustain the capacity of the building after construction, that leads to building collapse.

**1.9.4 *BUILDING DEFECT:*** These are failures occurring on a building or structure, it is also known as a structural factor as a result of mistakes in design of specification that can lead to the collapse of a building e.g. peeling paint, defect in plaster, rendering and cracking walls, termite attacks, unstable foundation, poor insulation etc.

**1.9.5 *PROFESSIONAL TEAM IN THE BUILDING INDUSTRY:*** These are various professionals that are involve in the process of property development from inception to the delivery stage. Examples are; *Architects, Builders, Land Surveyors, Estimators, Quantity Surveyors, Town Planners, Engineers, Estate Surveyors and Valuers*. They are trained and have become specialists in their various fields.

**1.9 LIMITATION OF THE STUDY**

In the course of this research work, few problems surfaced and they are as follows;

1. ***Time Factor:*** The research work was combine with school activities and as such, slowed down the study a bit since the study area (Lagos) happens to be a bit far from the school environment.
2. ***Non-Challant attitude of Respondents****:* Some respondents took time before they can fill the questionnaire not considering the distance between the school environment and Lagos.

**CHAPTER TWO**

**LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

**2.1 INTRODUCTION**

One fundamental principle of building design is that a building should be designed and constructed to meet its owner’s requirements and also satisfy public health, welfare and safety requirement. No part of such building should pose a hazard to its occupants ***(Fredrick et al 1989).*** Simply put, the purpose of structural design is the provision of a structure satisfying the client’s and user’s requirements. It must be economical, safe, serviceable and aesthetically adequate. Fundamentally, the design process consists of findings and detailing the most economical structure consistent with the safety and serviceability requirements. This should be the basic design concepts of any architect and structural engineer.

***Mosley et al (1985)***, posited that the design of an engineering structure must ensure that:

1. Under the worst loading the structure is safe
2. During normal working conditions the deformation of the members does not detract from the appearance, durability or performance of the structure.

Despite the difficulty in assessing the precise loading and variations in the strength of the concrete steel these requirements have to be met. Three basic methods using factors of safety to achieve safe, workable structures have been developed for engineering designs.

***Mosley et al (1985)*** identified them as: The Permissible stress method in which ultimate strengths of materials are divided by a factor of safety to provide design stresses which are usually within the elastic range. When a structure is rendered ‘unfit for use’, it is said to have attained a limit state. The code listed the limit states as;

**a. ULTIMATE LIMIT STATE – COLLAPSE**

This requires that the structure must be able to withstand, with an adequate factor of safety against collapse, the loads for which it is designed. The possibility of building of overturning must be taken into account, as must the possibility of accidental damage as caused, for example by an internal explosion.

**b. SERVICEABILITY LIMIT STATE – DEFLECTION, CRACKING AND VIBRATION**

* ***Deflection*** – the appearance or efficiency of any part of the structure must not be adversely affected by deflections.
* ***Cracking*** – local damage due to cracking and spalling must not affect the appearance, efficiency or durability of the structure.

*Other limit states that may be reached include;*

* ***Durability*** – This must be considered in terms of the proposed life of the structure an its conditions of exposure.
* ***Excessive Vibration*** – this may cause discomfort or alarm as well as damage
* ***Fatigue*** – must be considered if cyclic loading is likely
* ***Fire Resistance*** – this must be considered in terms or resistance to collapse, flame penetration and heat transfer
* ***Special Circumstance*** – any special requirement of the structure which is not covered by any of the more common limit state, such as earthquake, resistance must be taken into account.

A structure will become unfit for use if parts or all of it collapsed, but also become unfit if it deflects too much, if large cracks forms or if the vibration is so great that discomforts and fear is caused to the occupants, or the operation of machinery is interfered with. This state is technically referred to as failure; when structure ceases to be fit for human habitation and occurs when the limit state is reached. This state is reached when deflection exceeds **L250,** where **L** is the span of the element and cracks width exceeds **0.3mm**, ***(Obiechina, 2005).***

The structural design should therefore, ensure that the structure will not, during its lifespan, become unfit for use i.e. reaches a limit state. Each limit state must therefore, be considered in design and suitable margin of safety used; ***(Mosley et al, 1985; Obiechina, 2005; Singha (2002).***

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 collapse 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 ***(Fagbenle and Olawunmi, 2010).***

***Bamidele (2006) and Fadamiro (2002)*** expressed the opinion that the cases of building collapse in Nigeria are classified viz: *natural phenomenon, design error, poor workmanship, sub-standard building materials, procedural error, poor maintenance and abuse of use of building*. They said sub-standard materials and workmanship contribute about **45%** of the overall causes of building collapse in Nigeria. The cost of building failures in terms of human lives and enormous economic waster, loss of investments, job, income, etc cannot be over emphasized. Both the environmental impact and the disgrace it brings to the professionals involved in the building industry must not be overlooked also.

Every structural system is designed to meet some needs and be safe to avoid loss of life, property and damage to the environment. In a normal set up, failures are not expected within the projected lifespan of structures. But due to the imperfection in the actions of human beings and the existence of so many other external factors that influence the safety of structures, failures do occur ***(Ede, 2010).*** In 2007, for instance, a building that collapsed in Lagos State during construction was attributed to the use of sub-standard materials. Before any materials should be introduced or incorporated into building works, there is need to ascertain its quality through **Quality Control (QC), Quality Assurance (QA), and Quality Level (QL)** system. Materials that are primarily used n site for construction are cement, sand, aggregate (*of various grades*), iron rods, water and timber (*hard or softwood*), these are referred to as stair materials ***(Odunlami, 2002).***

***Hindu (2006)*** added that building materials no matter how of good quality they may be (*whether primary of secondary*) can be seriously vulnerable if not properly handled and stored. The quality, cost and timely delivery of products in the construction industry very much depends on workmanship. The skill, experience and personal ability of the workmen, go a long way in determining the quality of the workmen, which is a measure of their effectiveness and efficiency. Workmanship is skill on profession ***(Adetayo, 1995).***

***Ogunnoiki (2005)*** defined Workmen as ‘*the most important factor of production since it is the only factor that create value and sets the general level of productivity’*. Labour was further defines as ‘*contractor men comprising of all operation on the site executing the project*’. The labourers include the craftsmen, apprentice of various trends under qualified tradesmen and labourers performing all kinds of labour work that does requiring training. If the craftsman and apprentice are not up to doing it may lead to building collapse. Cases of building collapse are not restricted by climatology or level of urbanization as they cut across cultural and ethnical barriers. Many cases of building collapse have been reported in Nigeria. For instance, ***Folagbade (2001)*** and ***Chinwokwo (2000)*** enumerated forty-two (42) cases of building collapse as occurring between 1980 and 1999 in Nigeria while ***Makinde (2007)*** listed fifty-four (54) cases occurring between January 2000 and June 2007 alone. Building collapse has also been observed to cut across the different categories of building – private, corporate or public. ***Folagbade (2001)*** showed that of the twenty-five (25) reported cases of building collapse between 1980 and 1999 in Lagos State, private **(76%),** corporate **(12%)** and government or public buildings **(12%)** accounted for these proportions.

Also, building collapse is no respecter of the size of the structure. ***Amusan (1991)*** reported that ***Barnawa flat disaster*** in 1977 was a three-storey building, a public (secondary school) which collapsed in March 1988 in Ibadan was a two-storey building, the collapsed show-room for cars in Lagos in 1987 was just a storey building while that of the primary school ***Illoabuchi, Rivers State*** in July 1991 was a bungalow.

***Folagbade (2001)*** also reports that Abuja building which collapsed in March, 1993 and one at Ojuelegba in 1999 were both multi-storey buildings. The memory of the incidents of two separate building collapses that occurred at Ebute-Metta area of Lagos State and Kano State which killed several people in 2007 still lingers on. Also reported was the fence of a Nursery and Primary school that collapsed at Olomi area, Ibadan, in March, 2008, thereby killing thirteen (13) pupils of the school. The death of over 50 students of Saque Comprehensive College, Port Harcourt in 1990 was as a result of the owner attempting to construct additional floors on structurally unsafe walling.

Similar trends conversion were observed in a collapsed Mosque building in Mushin area, Lagos in 2001 and multi-storey commercial/residential building in Ebute-Metta also in Lagos State in which several people were killed. Some of the cases of building collapse are also as a result of ignorance on the part of developers and unauthorized conversion of buildings. ***Amusan (1991)*** asserts that the 1988 building collapse at Mushin, Lagos occurred when an attempt was made to raise the existing building by another floor. Also, operational conversion caused the collapsed school building at PortHarcourt.

As posited by ***Adebayo (2000),*** 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. ***Ademoroti (1991)*** identifies three types of Acts in the country as; Public Health Act; The Town and Country Planning Act; and the Building Regulation Act. According to the author, the Public Health Act deals with all aspects of health sanitation and environment as relating to the inhabitants of buildings. The Town and Country Planning Act deals with the general location and planning in the town and country aspect such as spatial distribution of buildings, highways/roads, schools, hospitals, sewage and drainage systems as well as other physical infrastructures. The Building Regulation Act represents laws that relate specifically to the control of the construction of buildings. It was further stressed that an existing regulation is meaningless without carrying with it a mechanism to ensure compliance because the average citizen does not obey a law that is not enforced.

**2.2 CAUSES OF BUILDING COLLAPSE IN NIGERIA**

Many causes of building collapse have been identified by difficult scholars. Collapse according to the Dictionary of Architecture and Construction refers to mechanical failure.

According to ***Dimuna (2010),*** collapse is a state of complete failure, when the structure has literally given way and most members have caved-in, crumbled or buckled; the building can no longer stand as originally built. It can be seen therefore, that collapse is very extreme state of failure. The causes of building collapse can be categorized as;

1. That caused by the influence of man
2. That due to natural forces (*force majeur*)

This research work gives attention to that caused by the influence of man either due to his negligence or incompetence. In a communiqué issued at the end of a two-day seminar on structural failure and building collapse in August 1996; professionals in the building industry summarized the major causes of building collapse to include the following: the attitude of the public, professional bodies and governments. The absence of soil test before construction, structural designs and details are sometimes defective, lack of proper planning, absence of co-ordination between professional bodies and town planning authorities, lack of adherence to specifications by contractors, use of unqualified and unskilled personnel, poor or bad construction practices, use of sub-standard building materials, inadequate enforcement of existing laws. Causes of building collapse as highlighted by ***Dimuna (2010)*** are as follows;

**2.2.1 DEFICIENT STRUCTURAL DRAWING**

Building collapse when structural drawings are based on false assumptions of soil strength, they can also collapse as a result of faulty structural details. ***Oyewale (1992)*** identified design faults accounting for 50% of collapse of engineering facilities in Nigeria.

**2.2.2 ABSENCE OF PROPER SUPERVISION**

Even where a structural design is not deficient, absence of proper supervision on the site by qualified personnel can lead to building failure.

**2.2.3 ALTERATION OF APPROVED DRAWINGS**

During construction, many contractors either on the directive of the client or in a bid to cut corners and maximize profit, alter approved building plans without corresponding amendment to structural drawings to the detriment of the structure.

**2.2.4 BUILDING WITHOUT APPROVED BUILDING DRAWINGS**

Building without approved drawings and in some cases no drawings at all, ca result in the collapse of the building more so when the drawings were not vetted by qualified professionals or relevant authorities before the buildings are erected. Without drawings, all construction is based on guess work.

**2.2.5 APPROVAL OF TECHNICALLY DEFICIENT DRAWINGS**

Town Planning authorities at times approve technically deficient drawings. This may be as a result of ignorance on the part of Town Planning personnel who vet and approved these drawings or as a result of outright corruption on their part. Money may at times change hands resulting in the approval of such drawings.

**2.2.6 ILLEGAL ALTERATION TO EXISTING BUILDINGS**

Client at times, on their own, alter existing structures (buildings) beyond and above the original design without any drawings, and relevant Town Planning approval. In some instances, existing bungalows have been converted to either a storey building or two or three-storey structures without any drawings and supervision by qualified personnel. The result can be anybody’s guess.

**2.2.7 ABSENCE OF TOWN PLANNING INSPECTION OR MONITORING OF**

**SITES**

In some cases, Town Planning Authority staff seldom visit sites to inspect or monitor progress of approved work in sites, the result of which is documented in their forms. Unfortunately, in many cases, this inspection sis non-existent. What this means is that buildings are put up without the Authority knowing anything about details of the construction. Unfortunately, these details are only known when such buildings collapse and their element get exposed for all to see. By that time lives probably may have been lost.

**2.2.8 CLIENTS PENCHANT TO CUT CORNERS**

A study of collapsed buildings shows that most of them are residential buildings and owned by individuals. What this meant is that one person takes all the decisions concerning the construction; due process is not followed. Nigerian client (*mostly individuals*) have a penchant for cutting corners by not employing qualified personnel to produce the contract documents and supervise the building while under construction, as they want to spend minimum (*not optimum*) amount of money on the construction ***(Madu, 2005).***

Even where qualified professionals are employed for design and supervision, most clients insist on having the final say on what goes on in the site to detriment of proper execution of the contract. Unfortunately, if there is any mishap on site, the client blames the consultants and the contractor. It is therefore obvious that client’s penchant to cut corners is one of the problems in the building production process.

**2.2.9 USE OF SUBSTANDARD MATERIALS**

Substandard material especially reinforcement rods, steel sections and cement can contribute immensely to failure of buildings. Other substandard materials can also contribute to failure of buildings. ***Hall (1984)*** posited that use of low quality materials is one of the major causes of structural failure. ***Aniekwu and Orie (2006)*** in their study, also identified low quality materials as the most important cause of failure of engineering facilities in Nigeria.

**2.2.10 INEFFICIENT WORKIMANSHIP (LABOUR)**

Inefficient and fraudulent labour input can also contribute to failure of buildings. When a contractor cannot read drawings, or where he refuses to listen to the instruction of the consultant, anything can happen. ***Oyewande (1992)*** posited that faults on construction sites accounts for **(40%)** of collapse of structures.

**2.2.11 USE OF ACIDIC AND SALTY WATER**

Use of acidic and salty water, as sources from oceans and seas in cities like Lagos and PortHarcourt can affect the strength of concrete when used to effect the mix of cement, and sand and rods.

**2.2.12 THE ACTIVITIES OF QUACKS**

A cursory look at the building industry in Nigeria today reveals a preponderance of individuals who are ill-equipped to carry out functions associated with construction. The industry has had more than its fair share of the activities of quacks and have nothing at stake whenever problems arise. The unsuspecting public is also at a loss differentiating the real professionals from the quacks until the real harm has been done. Today, it is not strange to find staff of Town Planning offices who are mainly Town Planners and Site Inspectors, even some Land Surveyors and Builders taking architectural commissions, and masquerading as architects and deceiving the unsuspecting public. Masons have overnight transformed to engineers and builders. This is a major problem of the building industry.

**2.2.13 CLIENTS’ OVER RELIANCE ON CONTRACTORS FOR DECISION**

**MAKING ON SITE**

Most client rely on contractors than consultants on site. This is because most contractors are either their friends, relations of the clients, or are recommended by friends or relations. The result of this relationship is that client rely more on the contractors for decision making than on the consultants. What the clients fails to realize however, is that profit is the prime motive of most contractors and not because the contractor is saving them some cost. Then end up reducing the thickness of floor slabs and foundation and even foundation depth; sizes of reinforcement rods, head room (height) of structures, all in attempt to maximise profit to the detriment of the construction, and because most clients cannot read drawings, they are ‘taken for a ride’ by most contractors. It is only when building falls that these facts come to the surface. Even for big projects owned by corporate bodies and governments etc, the contractors seem to have special relationship with agents of the clients, some desperate contractors use blackmail and intimidation to scare away and discourage consultants from project sites.

Usually, a combination of factors are implicated in the collapse of building as list above; but the timing of the recent happenings in Lagos and PortHarcourt indicates that the nature of soil is very central to the main culprit in the collapse, as these are happening especially now in the rainy season. More attention should therefore be given to geotechnical investigation for high rise structures in areas with soil that are very suspect and the water table is high. Onitsha town is an instance of where such high rise buildings are the norm, but so far no building collapse has been reported. The reason is that the soil bearing capacity is very high in most areas of the town. Also ***Divid (2009)*** identified the following; as causes of building collapse, they are as follows;

**2.2.14 BAD DESIGN:** This does not mean only errors of computation, but a failure to take into account the loads the structure will carry, erroneous theories, reliance on inaccurate data, ignorance of the effect of repeated impulsive stresses, and improper choice of material or understanding of their properties. The engineer is responsible for these failures, which are created at the drawing board.

**2.2.15 FAULTY CONSTRUCTION:** This has been the most important cause of structural failures, the engineer is also at fault. Here, if inspection has been lax (*i.e. not strict, severe or careful enough about work, rules or standard of behaviour*). This includes the use of salty sand to make concrete, the substitution of inferior steel for specified one; bad riveting or even improper lightening torque of nuts, excessive use of the drift pin to make holes line up, bad welds, and other practices well known to the construction worker.

**2.2.16 FAULTY OR FAILING FOUNDATION:** Even an excellently designed and constructed structure will not stand on a bad foundation. Although the structure will carry its loads, but the earth beneath may not. The living Tower of Pisa is a famous example of bad foundations, but there are many others. The St. Paul, Minnesota, sink to feet or more into soft clay, but did not collapse. The displacements due to bad foundation may alter stress distribution significantly. This was such a problem with railway bridges in America that statically determine trusses were greatly preferred, since they are not subject to this danger.

**2.2.17 EXTRAORDINARY LOADS:** These are often natural such as repeated heavy snowfalls, or the shaking of an earthquake or the winds of a hurricane. A building that is intended to stand for some years should be able to meet these challenges. A flimsy flexible structure may void destruction in an earthquake, while a solid masonry building would be destroyed. Earthquake may cause foundation problems when moist filled land liquefies which can cause building failure.

**2.2.18 UNEXPECTED FAILURE MODES:** These are most complex of the reasons of collapse, and we have recently has a good example. Any new type of structure is subjected to unexpected failure, until its properties are well understood. Suspension bridges seemed the answer to bridging large gaps. Everything was supported by a strong cable in tension, a reliable and understood member. However, sad experience shared that bridge deck was capable of galloping and twisting without restraint from the supporting cables. Ellet’s Bridge at Wheeling collapsed in the 1840s and the Tacoma Narrows Bridge in the 1940s from this cause.

**2.2.19 INCOMPETENCE OF CONTRACTORS OR CRAFTSMEN:** This is a serious issue that can lead to building collapse even before the completion of such structure, if those in charge of the project are not capable or able to do the right thing at the right time on site, it may lead to building failure e.g. improper columns, poor erections, poor settings, poor mixing etc and as well as lack of professionalism.

**2.2.20 UNAPPROVED PLAN OR SELF-HELP METHOD:** Many property owner and developer deviate from plan approval in order to reduce cost of construction. And by so doing, they may not take the proper design structurally or in a wrong location, and so will not meet the standard of building code and build for their personal satisfactions which leads to collapse.

**2.2.21 CORRUPTION AND GREED:** Many contractors, professionals in building industry and even the government are corrupt and selfish, the contractor will minimise cost to barest minimum by buying substandard materials, so as to keep some money in their personal pocket, even though they have collected their contractor fee for the job. Some Engineers and Architects will emerge in for more contract by this, will not be able to supervise the job properly. Also the government agent that is sent to site to inspect the material that are used are also collecting bribe for their selfish interest and will not see anything wrong on site of construction.

**2.2.22 NATURAL DISASTERS:** Examples are earthquakes, floods, fire hazards, bomb blasts, traditional charm by enemies etc. These natural disasters cannot be stop or prevented since they are unaware and natural.

**2.2.23 HIGH COST OF BUILDING MATERIALS:** This is a serious issue due to poverty on the part of many developers who want to have shelter, may not be able to buy the quality material due to the high cost and persistent increase day-to-day, and by this, they will go for less quality which is harmful and leads to building failure.

**2.2.24 LACK OF MAINTENANCE:** Many property owners build and are careless about the maintenance of the property, they cannot maintain the building and by these it will reduce the lifespan of the property, example are building with breaking walls, broken louvers, cracks ion walls, leakage in roof etc. All these little by little will reduce the strength of the building as one faults leads to another and at the end leads to collapse.  
**2.2.25 SPIRITUAL ATTACK:** In the Nigerian context, research also shown that charm and spiritual attack can lead to building collapse, even if the building is free from any structural defect. If there is an existing problem on land issue or people fighting on a piece of land, some may go extra mile by using charm or placing charm on the site of development or while developing the building before completion, it will collapse, and no structural fault will be trace to it.

**2.3 EFFECTS OF BUILDING COLLAPSE IN NIGERIA**

It can be rightly said that any pursuit of human endeavour has its cost, but the cost being paid in the Nigerian building industry cannot be justified. Each collapse carries along with it tremendous effects that cannot be easily forgotten by any of its victims. The consequences are usually in form of economic and social implications. These includes *loss of human lives, injuries, economic waste in terms of loss of properties, investments, jobs, incomes, loss of trust, dignity and exasperation of crises among the stakeholders and environmental disaster* ***(Ede, 2010).***

The quantification of the complete effects of any collapse is extremely difficult as there are so many factors involved, and these including emotional and subjective factors. Apart from the number of deaths that can often be truly identified, the rest of the effects are surrounded by so many uncertainties which make the analysis only approximate. Leaving aside the grossly quantifiable economic sums, the stress, trauma and shocks may have some far-reaching effects upon the building owner and/or employees, occupant, and others involved in one way or the other with the structure. The negative impact of such failures on the social-economic development of our economy is obvious. As many previous lives are lost, the nation looses the contribution that could have come from these victims towards the socio-economic growth of the nation. More so, this increasing rate of death from building collapse in Nigeria runs against the United Nations MDGs (*Millennium Development Goals*) programmes aimed at reducing the mortality rate and improving safety and life expectancy of the world population. For this, incidence of deaths during the collapse is deeply analysed in the remaining parts of this research work as to proffering solutions towards reducing it.

**2.4 BUILDING FAILURE**

Failure is an unacceptable difference between expected and observed performance. A failure can be considered as occurring in a component when that component can no longer be relied upon to fulfil its principal functions. Limited deflection in a floor which causes a certain amount of cracking/distortion in partitions could reasonably be considered as defect but not a failure, whereas excessive deflection resulting in serious damage to partitions, ceilings and floor finishes could be classed as a failure ***(Roddis, 1993).*** Those who investigate and report on failures of engineered facilities are in a good position to identify trends leading to structural safety problems and to suggest topic for critical research to mitigate this trend ***(Chapman, 2000).*** Frequently, consultants in the office, when they visit sites, see the same mistakes being made time and time again. Many of these are indicators of lack of knowledge on the part of the people undertaking the construction. It is strange to see well-fitted houses that have associated poor construction details that results in large subsequent repair bills.

Unfortunately, many of the explanation given for these poor practices are that they are common trade practices. This leads to repetition to bad practices resulting in construction failure ***(Philips, 2002).*** Failure in buildings could be of two types namely; cosmetic failure that occurs when something has been added to or subtracted from the building, thus affecting the structures’ outlook and structural stability of the building.

In Nigeria, building failures have been attributed to the following causes: design faults **(50%),** faults on construction site **(40%)** and product failure **(10%)** ***(Oyewande, 1992). Hall (1984)*** ascribed faulty design, faulty execution of work and use of faulty materials as major causes of structural failures. ***Fredrick and James (1989)*** suggested that the overturning of structures due to heavy wind loads, sliding of structures due to high wind, roof uplift or sliding, and building sway due to lateral loads are major types of failures of buildings. On the other hand, ***Akinpelu (2002)*** categorized the following as major causes of structural failures; environmental changes, natural and manmade hazards, improper presentation and interpretation in the design. ***Richard (2002)*** opined that deterioration of reinforced concrete could occur as a result of: corrosion of the reinforcement caused by overloading, subsidence or basic design faults, and construction defects.

***Seeley (1993)*** recognized three major types of maintenance in building in order to restore its defective element to an acceptable standard namely; day-to-day, cyclic, and planned maintenance.

**2.6 CAUSES OF BUILDING DEFECT AND REMEDIES**

In any building defect, there is a cause of such defect, and as such, does have remedies. ***Olowoake (2006)*** asserted that defects are failures occurring on a mortar and they are structural failures in building. Defects are caused either as a result of mistake in design and poor supervision on site.

**2.6.1 CAUSES OF DEFECT IN FOUNDATION OF A BUILDING**

The defect in foundation of building are caused as a result of the following;

1. Mistake in design or specification
2. Low quality workmanship
3. Poor supervision
4. Wear and tear
5. Applied forces (*ground environment*)
6. Vibration, presence of magnesium, aluminium sulphates in the soil
7. Gases or liquids (*causing dampness, chemical attacks*)
8. Biological agent (*root, mould and fungi*)
9. Climate or temperature
10. Fire

Having identified the causes of defect in foundation of building, the remedies have been suggested below;

Proper attention should be devoted into knowing the nature of the soil where the structure is to be built, right from the design stage. This will determine the type and depth of the foundation, thickness of the foundation concrete, and the types, size of the concrete materials to be used. Soil test should be carried to determine the presence and extent of magnesium and aluminium sulphates and this will dictate the type of special cement and other treatment to be used. At the design stage, special consideration should be given to the depth of the foundation located near heavy trolley traffic.

**2.6.2 CAUSES OF CRACKING OF WALL AND REMEDIES**

The identified cause of cracking of wall in building are as follows;

1. Movement of foundation and failures
2. Subsoil movement (*including change in water*)
3. Crack leaking on blocked guttering on outlet behind parapet
4. Gutter full of frozen snow which blocks down pipe flow than those in gutter and overflows
5. Big trees beside the building
6. Too much of imposed road

Below are the remedies to the aforementioned caused of cracking of wall in a building;

1. Take down and rebuild the parapet in order to add or replace a damp-proof courses if the damp-proof already check that water running off it does not run into the wall.
2. Repairs of defective parapet roof function
3. Provide additional installation
4. Repairs or clean outlet
5. Fit bigger flushing and improvement of overlap into the gutter
6. Proper design and effective supervision

**2.7 THE EFFECTS AND PROBLEMS CAUSED BY BUILDING COLLAPSE** Building collapse has many effect on the economy of nations as a whole (lives and properties) and as a result, the following have been identified as the effect of building collapse;

**2.7.1 WASTE OF LIVES**

Collapse of building affect many individual lives that occupy such property at the moment, collapse of building occur in such building without any notice, therefore, individuals in the building may lose their lives if there is no quick response/intervention and attention from the people around. Also, it causes injuries on people like; broken legs, hands, waste etc that may last forever.

**2.7.2 WASTE OF PROPERTIES**

Property worth millions of Naira has been wasted in Nigeria most especially in Lagos due to building collapse. People invest for the purpose of making profit and/or personal uses and when it collapses, it discourage investors for further investment in property. The collapsed property most time cannot be regain except such property has been insured., which most developers hardly do these days.

**2.7.3 DISCOURAGEMENT OF PROPERTY DEVELOPMENT**

Persistent collapse has discourage many developers to invest in property development, most especially those who are new in the system. As a result of this, they may move into other investments e.g. stock and shares.

**2.7.4 SCARCITY OF PROPERTY**

Continuous collapse of property may lead to scarcity of property in a particular area as the demand for property may go higher. Also as it discourages investors or property developers, the units of dwelling will also reduce, and this will lead to scarcity of property.

**2.12 CONSEQUENCES OF BUILDING COLLAPSE**

The incidents of building collapse witnessed in the country in the recent years has resulted in the loss of many lives and the destruction of properties worth several millions of naira. Many families have been traumatized and many developers have lost their life investments ***(Dimuna, 2010).*** From table 1, it can be inferred that between 1975 to 1995, about 26 incidents; which claimed about 226 lives were recorded in Nigeria. Table 2 reveals that between 1982-1996, Lagos State alone recorded about 14 incidents and about 64 dead. While in a period of two years **(2004-2006)** as reflected in table 3 about 10 incidents were reported which claimed the lives of about 243 people. In all the cases, many people were injured and some permanently disabled.

**TABLE 1**

**A LIST OF AVAILABLE RECORDS OF COLLAPSED BUILDINGS WITHIN THE LAST TWO DECADES IN NIGERIA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DATES OF INCIDENT** | **STATES** | **TYPES OF BUILDING** | **NO OF LIVES LOST/INJURED** | **REMOTE CAUSES** |
| Dec, 1976 | Ondo | 1 Storey | 8 Died | Sub-standard building material |
| May, 1977 | Oyo | 2 Storey | 10 Died | Substandard structure |
| June, 1977 | Kaduna | School Building | 16 Died (several injured) | Poor workmanship by contractors |
| Oct, 1977 | Borno | 4 Storey | 10 Died | Poor performance by contractor |
| March, 1978 | Rivers | 4 Storey | 16 Died | Lack of concrete services to hold foundation |
| June, 1982 | Ondo | 2 Storey | 7 Died | Heavy down pour/structural defect |
| Sept, 1983 | Lagos | 2 Storey | 8 Died | Structural defect |
| Dec, 1983 | Lagos | 4 Blocks of Flats | 6 Died | Heavy downpour/structural defects |
| July, 1985 | Lagos | 3 Storey | 9 Died | Structural defects |
| May, 1987 | Lagos | 2 Storey | 4 Died | Structural defect/poor building materials |
| Sept, 1987 | Lagos | 3 Storey | 8 Died | Sub-standard building materials |
| Nov, 1988 | Lagos | School Building | 1 Died (others injured) | Defective structural design |
| June, 1990 | Rivers | School Building | 50 Died (several injured) | Substandard building materials |
| July, 1991 | Kano | 1 Storey | 3 Died | Heavy downpour/structural defects |
| July, 1991 | Sokoto | 1 Storey | 4 Died | Poor workmanship/structural defect |
| August, 1991 | Lagos | 2 Storey | 10 Died | Structural defect |
| March, 1992 | Lagos | 3 Storey | 10 Died | Defective structural design |
| June, 1992 | Lagos | Hotel Building | 2 Died (several injured) | Dilapidated structures |
| Oct, 1993 | Kano | 1 Storey | 5 Died | Structural defect |
| March, 1994 | Oyo | 2 Storey | 4 Died (11 injured) | Substandard building materials |
| June, 1994 | Lagos | 3 Storey | 17 injured | Structural defects/substandard materials |
| Aug, 1994 | Kwara | 1 Storey | 2 Died (6 injured ) | Structural defects/poor building materials |
| Aug, 1994 | Oyo | 2 Storey | 10 Died (74 injured) | Structural defects |
| June, 1994 | Lagos | 4 Storey | 4 Died (several injured) | Structural defect/substandard materials |
| Aug, 1994 | Ondo | 1 Storey | 1 Died (several injured) |  |
| Jan, 1995 | Lagos | 6 Storey | 1 Died |  |

**Source: Boye Ajai – Factors Responsible for Collapsed Building p.19. Tell Magazine No.3 January 16th 1995 Culled from S.O. Izomoh (1997) the Provision of Housing and Management in Nigeria P.20 and Dimuna (2010) Incessant Incidents of Building Collapse in Nigeria: A Challenge to Stakeholders p.91**

**Table 2**

**AVAILABLE STATISTICS OF COLLAPSED BUILDING IN LAGOS STATE (1982-1996)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **MONTH** | **YEAR** | **TYPES OF BUILDING** | **LIVES SAVES** | **LIVES LOST** | **POSSIBLE CAUSES** |
| 1 | March | 1982 | Three Storey | No record | 10 | Weak foundation |
| 2 | June | 1982 | Two Storey | ” | 7 | ” |
| 3 | Sept | 1983 | Two Storey | ” | 8 | ” |
| 4 | May | 1985 | - | ” | 9 | Faulty Foundation and bad workmanship |
| 5 | June | 1985 | Two Storey | ” | 5 | Weak foundation |
| 6 | July | 1985 | Three Storey | ” | 9 | ” |
| 7 | Nov | 1986 | - | ” | 1 | Faulty foundation and bad workmanship |
| 8 | May | 1987 | Two Storey | Many people escaped | 4 | Faulty foundation and bad workmanship |
| 9 | Sept |  | - | Many people escaped before arrival of F/S | 7 | Structural defect |
| 10 | Nov | 1988 | School Building | - | - |  |
| 11 | Feb | 1989 | - | It is believed that many people escaped | - | Faulty foundation and bad workmanship |
| 12 | May |  | Uncompleted Hospital Building | - | - | - |
| 13 | June | 1994 | Uncompleted 4 Storey Building | It is believed that many people escaped | 1 | Removal of form work before curing of concrete decking |
| 14 | May | 1996 | Uncompleted Church Building | Many people escaped | 3 | Bad workmanship |

**Source: Federal Fire Service, Lagos and Lagos State Fire Service – Ikeja**

**TABLE 3**

**RECENT BUILDING COLLAPSES 2004-2006**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DATES OF INCIDENT** | **STATES** | **TYPES OF BUILDING** | **NO OF LIVES LOST/INJURED** | **REMOTE CAUSES** |
| Oct, 2004 | Umuahia | 3 Storey Building | 4 dead, many injured | Unknown |
| May, 2005 | Ilugun, Ogun State | 4 Storey Building | 10 died, many injured | Unknown |
| June, 2005 | Aba | 4 Storey Building | 25 dead, many injured | Unknown |
| June, 2005 | Lagos | 3 Storey Building | 20 dead, many injured | Unknown |
| July, 2005 | Port-Harcourt | 4 Storey Building | 25 dead, many injured | Defective Foundation |
| July, 2005 | Lagos | 3 Storey | 30 dead, many injured | Defective Foundation |
| July, 2005 | Port-Harcourt | 5 Storey Office Building | 30 dead, many injured | Deviation from Approved Plan/Addition of Floors |
| August, 2005 | Adamawa | Collapse of Bridge | 45 dead, many injured | Defective Foundation |
| August, 2006 | Oworonshoki, Lagos | 2 Storey Building | 4 dead, many injured | Defective Foundation |
| August, 2006 | Lagos | 4 Storey Building | 50 dead, many injured | Deviation from Approved Plan |

**Source: Dimuna (2010) – Compilation from National Dailies 2004-2006**

**2.15 PROCESSES AND STAGES IN PROPERTY DEVELOPMENT**

Following are the process and stages of property development;

1. ***CONCEPTION OF IDEA:*** This involves the intention to go into development of the property or project by the client with an advice by the professionals
2. ***LAND ASSEMBLY/ACQUISITION:*** The process of looking for a suitable land for the proposed development, such land must be free from any form of encumbrances or any dispute or legal constraints. This is normally done by the Estate Surveyors and Valuers.
3. ***PLAN APPROVAL:*** The plan of the proposed project must be approved by the Town Planners before further steps for the development, the plan will be forwarded to the Ministry, for proper approval of the design to see if it is okay for development of not.
4. ***TECHNICAL REPORT:*** This involve the various report that is given about the project by different professionals example of this report are EIA (Environmental Impact Assessment) report, mechanical report, Architectural report, electrical report, plumbing report, Bills of Quantities, structural drawing etc by various concerned professional. This report will determine if the project is technically sound or not.
5. ***FEASIBILITY AND VIABILITY:*** This is being carried out in order to know if the project can be done or not and if it can be done, is it going to be profitable. The Estate Surveyors and Valuer usually assist in respect of this.
6. ***SOURCING FOR FUND:*** The most important aspect of the project is the capital, the capital needed for the project will be sourced either through personal saving (equity) or through bank in form of loan.
7. ***PREPARATION OF DEVELOPMENT PROGRAMME:*** This involves the schedule of work and schedule of construction and finishing of work. The schedule of work involve the main construction while the schedule of finishing involve the rendering, painting, furniture and fitting etc, to put the building in its best condition.
8. ***NEGOTIATION AND TENDERING:*** This is the process of determining the right/best contractors for the project at an agreed condition. This can be open or selected tendering.
9. ***CONSTRUCTION:*** This involves the actual construction work to be carried out on sites, this involves the erection of building or the roof i.e. the use of material mostly done by the builder.
10. ***COMMISSIONING/HANDING OVER OF KEYS:*** This time, the contractors have finished his own part of the job. He will then hand over the keys to the client who will decide if for investment or personal uses.
11. ***MARKETING:*** This is the final stage, when the client have decided if it is for sale, lease or for his personal uses. If it is for investment, the Estate Surveyor and Valuer will be charged with the responsibility of marketing and management of the property.

**2.16.1 THE MOST RECENT INCIDENTS OF BUILDING COLLAPSE IN LAGOS**

According to ***African Press Agency (2011);*** No fewer than six people were killed on Tuesday night of **6th July, 2011** when a four-storey building located on *4, Mogaji Street, Idumota Lagos Island.* The six bodies were removed from the rubble on Wednesday while 30 people were rescued alive by officials of the National and Lagos State Emergency Management Agencies. Saturday Punch gathered from an official of the Lagos State Traffic Management Authority that the death toll was actually about 25. The official, who simply identified himself as Gbenga, told Saturday Punch said he was sure the death toll was about 25 bodies, if not more. He said “*The incident happened on Tuesday night at about 11pm. The four-storey building just came down like that. There are unspecified amount of bodies remaining in the debris but about 25 bodies have been recovered. I have been here since the incident happened”. It was also gathered from a resident, Ahmed Onisemo, that a couple who had spent their first night in that house was part of the people who lost their lives. He said “there was a couple, Taofik and his young wife, Sekinat, who lost their lives in the collapsed building. That was their first night there. They had rented the apartment about two months ago. They came to look at it again but could not leave because of the rain. They decide to spend the night and the house collapsed that nigh*t”.

Residents of Idumota told Saturday Punch that deaths from collapsed building could be avoided if the government does something about land developers because they are always in hurry when building houses and they also use inferior building materials. Also, a resident, Sulaimon Bello said “*this loss of properties and deaths can be avoided. The collapsed buildings are the fault of the developers. The houses I grew up to know in the are still standing firm. I know one that is over sixty years and it is standing strong. These houses are less than 6 years and they are collapsing, killing innocent people. The government should screen developers they are giving contract to and award to only credible ones. This will help reduce the cases of this collapsed building*”.

More so, another building collapsed in Lagos leaving about 2 people dead. Others were rescued alive from the debris of a building that collapsed at *20, Doyin Omoluyi Street, Alapere, in Agboyi-Ketu Local Council Development Area of Lagos State*, on Friday. According to eyewitnesses, the latest incident occurred at about 6:30pm, on Friday when, suddenly the building caved in, trapping its occupants. The collapsed building, it was learnt, was, originally a storey building before the “owner” decided to raise it to a three-storey but, apparently, due to a major defect, the building finally came down on the occupants. Lagos State Emergency Management Agency **(LASEMA)** officials, State Mobile Ambulance Personnel, Fire Servicemen, and the Police, among others rescue team raced to the scene immediately, and recovered two dead bodies from the debris as well as some trapped victims alive but with various degrees of injuries. According to the General Manager of LASEMA, Dr. Oluwafemi Osanyintolu said “*the seven injured victims rescued alive have all been taken to hospital for medical treatment. We made some that all the people believed to have been trapped were rescued and taken care of immediately*”. He, however, said the licence of the developers would be revoked while the state government might confiscate the landed property according to the Law of the State.

Meanwhile, **Governor Babatunde Raji Fashola** commiserated with the families of the dead victims of the collapsed building even as he said his administration would visit the full wrath of the Law on people who violate the State’s Town Planning Laws.

**2.17 BUILDING COLLAPSE IN NIGERIA**

Over the past the decades, massive investment was made by various arms of government (*local, state and federal*) in the country to provide building as part of the national, social and economic infrastructure. These assets include hospitals, administrative building, schools and as well as residential building in public ownership. In the current unfavourable economic climate, the federal government is finding it increasingly difficult to allot substantial financial resources for fixed capital formation, particularly for construction of building to add to the existing ones and replace old structures (renewal), let alone of replacing collapsed building.

The consequent loss of lives and investments associated with building collapse in face of the current unfavourable climate leaves much to be desire ***(Dave, 2002).*** Building collapse occurs, with or without warning from design and or construction faults and this incidence has become a familiar occurrence, even to the layman on the street of Nigeria major cities. It is usually a disastrous occurrences frowned at and viewed by responsible governments in the world over, with a great concern. A heavy downpour, may for instance, imply that one or two uncompleted buildings somewhere would carve in and this in turn would mean that scores of possible taking shelter under the building would fall victim ***(Adebayo, 2000).***

Building collapse, though a common phenomenon in the world over is more rampant and devastating in the developing countries ***(Sodare and Usman, 2006).*** Many cases of building collapse have been recorded in Nigeria and been observed to0 cut across all categories (*private, corporate and public*). ***Chinwokwu (1999)*** cited in ***Fadamiro (2002)*** shows that of the twenty-three (23) cases of building collapse between 1980 and 1999 in Lagos State, 76%, 12% and 12% were respectively private, corporate and government or public buildings. This shows that private building are more prone to building collapse according to ***Bamidele (2002)*** as cited in ***Ogunsemi (2000)*** is classified below;

1. ***Participant Collapse:*** This is when part of building is affected and small fractions of building fails.
2. ***Progressive Collapse:*** In this type of collapse, there will be signs of weakness noticeable either by seeing cracks which become widened with time.
3. ***Total or Sudden Collapse:*** This occurs in a situation where the building falls down suddenly without giving any sign.

**2.18 THE ROLE AND EFFORTS OF GOVERNMENT AND PROFESSIONALS IN ERADICATING BUILDING COLLAPSE**

The incessant collapse of building in the country most especially in Lagos has become a serious issue which the government and the professionals are putting all efforts to eradicate it totally from the country in order to stop the waste of properties and human lives that are dieing everyday in the country due to the occurrence of building collapse. In that note, the government of Lagos under the administration of Governor Babatunde Raji Fashola, has carried our investigation of structures in three Local Government which are Lagos-Island, Ajeromi Ifelodun and Somolu Kosofe. In Lagos-Island, the investigation shows that out of 5,000 building, 100 of them are pending collapse. As part of the efforts, it was recommended that over 400 should be subjected to further test and investigation to determine their structural stability. In Somolu and Kosofe, investigation shows that out of over 18,000 structures, 200 of them should be demolished without further delay, more building have been recommended for further test.

The State Commissioner for Housing, Mr. Dele Onabokun said the government was determined to tackle the problem of building collapse in the state. According to him, the state government has established a material testing laboratory to ensure that sub-standard materials are not used for construction in the state. The laboratory will certify, monitor and control the standard of building materials in the state. The government has reformed the planning approval/development control and monitoring process, to ensure that developers maintain appropriate standards. A registered builder now has to certify that a building has been professionally completed and is safe for human habitation. The professionals has been working hard to make sure that they work together with the government to ensure that the developers follow the appropriate Law **(Building Code).**

The Nigerian Institute of Building in this regard has been liaising with the Association of Concrete Workers on the campaign against poor workmanship. It is also importance to examine the quality of material being used to produce concrete. It is in the basis of this that they have decided to convene a meeting of all stakeholder in the building industry to look into the concrete standard recommended by Standard Organisation of Nigeria (SON) vis-à-vis mix proportion obtainable at sites. Other professionals in building industry in their own ways has been organising and making research on the causes of building collapse and their recommendations and suggestions on how it will be solve are always given so as to enlighten the developers. However, as part of the efforts of government, the government are seriously working the consistent rise of building materials and also are developing affordable housing for the people to buy at an affordable price with good quality.

Therefore, since the government and the professionals have been putting all efforts to eradicate the incidence of building collapse in the country and in Lagos especially. The developers should try to correspond with the rules of construction most especially the Building Code and approval of plan before development on site, as it is the developers that will face the greater sides of the consequences of building collapse, with the loss of properties and lives of their family or tenants occupying such property.

**2.19 STRATEGIES TO OVERCOME BUILDING COLLAPSE**

It is obvious that the problem of building collapse can be addressed first from the client or prime consultant relationship. The calibre of prime consultant engaged by the client goes a long way to determine the quality of finished work. The prime consultant should ensure that the right things are done by all other professionals involved in the project. The prime consultant knows his limitations and allows all other professionals to discharge their responsibilities to the best of their abilities. Second part has to do with the approving bodies. Such organisations shall be staffed with people with expertise and integrity. If the expertise to approve certain designs are not within the organisation they shall seek for assistance from the relevant professional body or consulting firms, albeit at a fee. A situation where the following approval authorities constitute of only Town Planning to the exclusion of architects and structural engineers is not healthy.

As a matter of urgency, government should put in place approving procedures that are not cumbersome a one-stop shop that will reduce time required for the approval of building plans. A time frame shall be set and given wide publicity. This will re-assure intending developers that the process is not open-ended. The third is in the areas of execution and supervision of the approved drawings. The quality of the executing contractor is very critical and crucial. The integrity and competence of the contractor holds the key to a successful competition of the project. The contractor must possess the following attributes; play by the books, possess expertise to do things the right way and notice defective designs, have a name to protect. Contractors shall meet some criteria to qualify to execute certain categories of projects, of which buildings that are three floors and above fall into. There shall be on the staff of the contractor a registered building officer, civil or building engineer, who must take responsibility for the integrity of the structure. Supervision is also very important because it ensures that the contractor follows the drawings, keep to specifications and ensures that the quality of materials used are of required standard. It is concerned with total quality management.

Good examples include ensuring that the reinforcements are of right sizes, strengths and concrete grade specified are used at all times, adequate curing of concrete, enough time allowed for concrete to gain strength before proceeding to the next stage of work etc. Also, in the area of supervision, government can through the TPA (*Town Planning Authority*) play a commanding role to ensure that collapse do not occur. In the case of buildings of three floors and above, the TPA shall demand that registered engineers be engaged by the developers to supervise the project like is done in Lagos State. This shall be take a step further, the engineer shall be made to visit the head office of the Town Planning Authority **(TPA)** where he shall undergo an interview and properly documented including taking his photograph by a professional colleague of the rank of a director, before ratification of his engagement. Once engaged, the registered engineers **(RE)** will sign of completion. In case he ceases to supervise, he shall inform the director in writing to forestall impersonation and forgery. The TPA through the **DCU** (*Development Control Unit*) shall be proactive, more robust and decisive in the performance of their functions. They shall be empowered to stop illegal developments and those that do not conform to all laid down conditionality, either by persuasion or force, if need be, with assistance of Law enforcement agents. They shall also be empowered to demolish offending structures before they constitute danger to the society.

The Federal Government through the Standard Organisation of Nigeria (SON) must ensure that the construction materials in the market meet required standard. Like the cases of steel reinforcement, high yield steel must be seen to have the strength stipulated, so also is materials like cement. A monitoring team should be set up under the leadership of the commissioner of housing comprising all the professionals in the industry to visit construction sites and carryout on the spot check of the activities of the contractors and the supervising engineers. This is with the view of having first hand information on how they operate and discharge their functions. The report of the team shall be used in advising the local planning authority on what necessary action to take against the contractors and supervisors (*consultants*).

Zoning methods can be used to limit the number of floors to be developed in areas where the soil bearing capacity is very low. Even the type of foundation to be used in such areas can also be specified. There must be the resolve to ensure that the law is not violated or breached. The general public including civil society organisations must report any development (*new building and restructuring of old ones*) in their neighbourhood to the TPA and follow it up to ensure proper approvals were obtained before the commencement of such developments. The NGOs shall go to a step further by the contractors by regularly monitoring these developments. Penalties and sanctions shall be put in place for all parties involved in the actualization of the building project to the extent of their involvement, violations and contraventions.

A developer of a collapsed building shall be made to forfeit the plot to the government and in addition face criminal charges for poor quality works and be sanctioned by his professional body (ies), so also are other professional bodies and charged to court where criminal negligence is established. Developers shall be informed of these penalties and sanctions at the time they obtain the building plan approval. It shall be stated clearly in the approval letter. Regulatory professional bodies and their corresponding societies or association shall regularly run workshops or seminars for their members to update their knowledge and highlight the dangers and penalties associated with collapsed or failed buildings. They shall monitor activities of their members and penalise them then necessary.

Developers and professionals shall be educated on the need to enter into proper contracts before the commencement of any project. Now, most developers feel reluctant to enter into properly executed contract rather they prefer the informal approach. The need for proper contract cannot be overemphasised as the document defines the duties and obligations of the parties concerned. Some completed buildings initially may appear suitable for human habitation, but with the passage of time, mostly in weak soils, the buildings begin to settle, materials begin to suffer fatigue and corrosion begin to reduce the strength of materials used. All these combine to affect the continued satisfactory performance of the building. Government as a matter of policy should periodically inspect existing building which may be over five or ten years to ascertain whether the buildings are behaving in the manner expected of them. Those with excessive cracks, deflections and settlements shall be subjected to more close examinations to ascertain their continued suitability for human habitation. The reason for this recommendation is not far fetched. Now, there are existing buildings that have in engineering terms failed, though they are still standing but have developed cracks, deflections and settlement of unacceptable proportion and are tilting. They pose great threats to lives and properties and are disasters waiting to happen. It is pertinent therefore to state that building collapse cannot completely be eliminated as some aspects of soil investigation and even structural analysis and design are not fully understood and predictable since they are both science and art.

Secondly, some factors incorporated in the design are based on probabilities and therefore some degrees of uncertainty are inherent. Thirdly, the soil that carries all the structures varies widely in all directions.

Finally, the performance of most materials over time especially fatigue, elasticity, dynamic and cyclical loading etc are not fully understood and predictable. If all things are done accordingly, the chances of collapse occurring are very minimal and rather the few case of collapses will afford the opportunity to study and understand the phenomenon better. The recent approval of a national building code for the building industry is seen by all professionals in the construction industry as a welcome development that will help sanitize the industry.

**CHAPTER THREE**

**3.0 RESEARCH METHODOLOGY AND THE STUDY AREA**

**3.2 STUDY POPULATION**

The study which focus on the problems associated with building collapse whether design or construction with more emphasis on Lagos-Island as the case study shall focus on the Real Estate Developers (*both private and public*), the Professional in building industry like Architects, Builders, Land Surveyors, Quantity Surveyors, Town Planners, Estate Surveyors and Valuers and Engineers that are practising within the study area, also the state Ministry of Housing shall be the population of the study.

**3.3 DATA REQUIREMENT**

The primary data to be used would be information collected from the Real Estate Developers, Professional Team in the Building Industry within the study area, even the government ministry through questionnaire administering, personal interview, personal observation and field survey. The secondary data will include information collected from published and unpublished material, the textbooks, periodic journals, magazines, seminar papers, internet and daily newspapers.

**3.4 SAMPLE FRAME**

Sample frame is the complete list of all unit of element from which the sample is selected. The list of members of the population from which samples are to be selected. Hence, the sample frame for this dissertation is the list of Developers, Professionals and Government Parastatals in the study area, Lagos.

It will cover both the private and public developers while the professionals will include the entire building team in the study area.

**3.5 SAMPLE SIZE**

Sample size is the selected number pick at random from the list unit of the sampling frame. The sampling size will not cover the entire sample frame due to the time stipulated for this study. Therefore, the sampling size for the research dissertation will be fourty **(40)** for Private Real Estate Developers, thirty **(30)** for Professional Team in the building industry, and thirty **(30)** for government agency concerned with building construction. As questionnaire will be designed separately for each groups, and it will be sum total of One Hundred **(100)** questionnaires for the study.

**3.6 SAMPLING TECHNIQUES**

Having chosen a suitable sampling frame and established the actual sample size, selecting the appropriate sampling techniques will be considered in order to obtain accurate information from the respondents, there are various types of sampling techniques and these include; random sampling, stratified sampling, systematic sampling, double sampling, purposive sampling, cluster sampling and multi-stage sampling.

All these are the various techniques of sampling but for this research work, combination of stratified sampling and random sampling were adopted in order to avoid bias.

**3.7 DATA COLLECTION**

Data collection method refers to the method adopted by the researcher in collecting and gathering of information based on the research study. Source of data can be classified into two viz: primary and secondary sources.

For the purpose of this research work, both the primary and secondary sources were adopted. All data gathered though secondary sources have been reviewed in the previous chapter while the data collected through the means of administration of questionnaire and field survey shall be analysed and presented.

**3.8 DATA COLLECTION INSTRUMENT**

There are different instruments which can be used in collection of data such as personal interview, personal observation, postal questionnaire, administration of questionnaire, telephone interview, direct observation and consulting relevant publication. Therefore, the following will be adopted for the collection of data for this research study;

**3.8.1 ADMINISTRATION OF QUESTIONNAIRE:** Questionnaires were designed based on the research question for the developers, professions and government agency. The questionnaire was streamlined to the topic of the research work.

**3.8.2 PERSONAL INTERVIEW:** Some respondents were found to be helpful in terms of providing additional information relating to the research, due to the questions asked on the research findings.

**3.8.3 PERSONAL OBSERVATION:** The research was able to observe some fact in the process of carrying out the research.

**3.8.4 RELEVANT PUBLICATION:** In order to do justice to the research work, published and unpublished materials were consulted such as textbooks, journals, conference papers, internet, magazines, newspaper publications etc.

**3.9 QUESTIONNAIRE DESIGN**

In the course of collecting information for this study, three types of questionnaires were designed and administered. The questionnaires were designed for real estate developers, government agencies and professional team in the building industry. The information include their personal data and questions on the research topic and shall be both close and open ended questions.

**3.10 DATA ANALYSIS**

Data analysis is concerned mainly with the analysis of data collected in view of the research study and to specify the findings as well as the data collection were the response of respondents through the use of questionnaire. It is important to indicate that questionnaires were distributed to the government parastatals, developers and professionals in the building industry and not all questionnaires administered were filled completely and returned. Out of the **(100)** questionnaires administered, **(73)** were filled and returned. However, it should be recalled that three (3) types of questionnaire was designed and administered were for the government parastatals, real estate developers and for professionals in the building industry.

Therefore, it should be mentioned that out of the 30 questionnaires that was administered to government parastatals**, (24)** were filled and returned, **(23)** questionnaires were filled and returned out 40 by the real estate developers, while only **(26)** questionnaires were returned out of 30 by the professionals. The total questionnaires received is **(73)** in all representing **82%.**

There are basically two types of statistical analysis; descriptive and inferential statistics. Descriptive statistics help to summarise, describe and organise mass row of data while inferential is to be made about population from sample. It also includes frequency distribution tables, simple statistical mode such as pie charts and bar charts.

These methods were adopted because they will provide the basic distribution characteristics of the variables or data employed. For instance, in frequency report, one can arrange the different values from the highest to the lowest in terms of occurrence or in terms of Mean, Median and Mode frequently appearing variable or attributes can be slow. It shows the number of responses of each of the study. All these will be used to analyse and present the data collected.

**CHAPTER FOUR**

**4.0 DATA COLLECTION, ANALYSIS, PRESENTATION AND INTERPRETATION**

**4.2.0 ANALYSIS OF RESPONSES OF REAL ESTATE DEVELOPERS**

Efforts have been made in collecting data, and all data gathered through questionnaires shall be presented and analysed as follows;

**4.2.1 DISTRIBUTION ON GENDER OF THE RESPONDENTS**

The study reveals that 13 respondents (56.5%) of the total sample population are Male, while 10 respondents (43.5%) of the total sample population are Female.

The implication of this is that there are more Male than Female developers in Lagos as shown in Table 1 below.

**TABLE 1 GENDER DISTRIBUTION OF THE RESPONDENTS**

|  |  |  |
| --- | --- | --- |
| **GENDER** | **FREQUENCY** | **PERCENTAGE** |
| Female | 13 | 56.5 |
| Male | 10 | 43.5 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.2 LITERACY STATUS OF THE RESPONDENTS**

The study reveals that 23 respondents (100%) of the total sample population has gone through tertiary education. The implication of this is that the entire real estate developers in the study are educated and knowledgeable enough to give reliable information as shown in table 2 below.

**TABLE 2 LITERACY STATUS OF RESPONDENTS**

|  |  |  |
| --- | --- | --- |
| **LITERACY STATUS** | **FREQUENCY** | **PERCENTAGE** |
| No Basic Education | - | - |
| Primary/Secondary | - | - |
| Tertiary Education | 23 | 100 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.3 PURPOSE OF DEVELOPING PROPERTIES**

The study reveals that 5 respondents (21.7%) of the total sample population develop properties for personal use, meanwhile, 18 respondents (78.3%) of the total sample population develop properties for investment. The implication of this is that majority of real estate developers’ motive for development is profit oriented as shown in table 3 below.

**TABLE 3 PURPOSE OF DEVELOPING PROPERTIES**

|  |  |  |
| --- | --- | --- |
| **PURPOSE** | **FREQUENCY** | **PERCENTAGE** |
| Personal Use | 5 | 21.7 |
| Investment | 18 | 78.3 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.4 EXPERIENCE IN PROPERTY DEVELOPMENT**

The study reveals that 6 respondents (26.1%) of the total sample population has below 5 years experience in property development, 16 respondents (69.5%) of the total sample population has been in developing for 6-10 years, while 1 respondent (4.4%) of the total sample population has above 11 years experience in property development. The implication of this is that real estate developers in Lagos has been 6-10 years experience in property development as shown in table 4 below.

**TABLE 4 EXPERIENCE IN PROPERTY DEVELOPMENT**

|  |  |  |
| --- | --- | --- |
| **EXPERIENCE** | **FREQUENCY** | **PERCENTAGE** |
| Below 5 years | 6 | 26.1 |
| 6-10 years | 16 | 69.5 |
| Above 11 years | 1 | 4.4 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.5 AWARENESS OF BUUILDING COLLAPSE**

The study reveals that 23 respondents (100%) of the total sample population are aware of building collapse in Nigeria. The implication of this is that all real estate developers are aware of the incidents of building collapse in Nigeria as shown in table 5 below.

**TABLE 5 AWARENESS OF BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 23 | 100 |
| No | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.6 FREQUENCY OF BUILDING COLLAPSE IN LAGOS**

The study reveals that 13 respondents (56.5%) of the total sample population says building collapse is very common in Lagos, 7 respondents (30.4%) says it is common, while 3 respondents (13.1%) of the total sample population says building collapse is not common in Lagos. The implication of this is that building collapse in Lagos is Very Common as shown in table 6 below.

**TABLE 6 FREQUENCY OF BUILDING COLLAPSE IN LAGOS**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Very Common | 13 | 56.5 |
| Common | 7 | 30.4 |
| Not Common | 3 | 13.1 |
| Undecided | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.7 THE MAJOR CAUSES OF BUILDING COLLAPSE**

The study reveals that 3 respondents (13.0%) of the total sample population says it is bad design, 17 respondents (73.9%) says it is through the use of sub-standard materials, while 3 respondents (13.0%) of the total sample population says it is faulty foundation. The implication of this is that the use of sub-standard materials serves as the major cause of building collapse as shown in table 7 below.

**TABLE 4.7 THE MAJOR CAUSES OF BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **CAUSES** | **FREQUENCY** | **PERCENTAGE** |
| Deviation from Approved Plan | - | - |
| Bad Design | 3 | 13.0 |
| Sub-Standard Materials | 17 | 73.9 |
| Poor Workmanship | - | - |
| Lack of Maintenance | - | - |
| Faulty Foundation | 3 | 13.0 |
| Structural Foundation | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.8 DEFECT IN BUILDING LEADS TO BUILDING COLLAPSE**

The study reveals that 23 respondents (100%) of the total sample population are of the view that defect in building leads to building collapse. The implication of this is that defect in building leads to building collapse as shown in table 8 below.

**TABLE 8 DEFECT IN BUILDING LEADS TO BUILDNG COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 23 | 100 |
| No | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.9 THE MOST COMMON DEFECT IN BUILDING**

The study reveals that 20 respondents (86.9%) of the total sample population says cracks in walls is the most common defect in building, 3 respondents (13.1%) of the total sample population are of the view that unstable foundation is the most common defect in building. The implication of this is that the most common building defect which leads to building collapse is through cracks in walls as shown in table 9 below.

**TABLE 9 THE MOST COMMON DEFECT IN BUILDING**

|  |  |  |
| --- | --- | --- |
| **DEFECTS** | **FREQUENCY** | **PERCENTAGE** |
| Cracks in Walls | 20 | 86.9 |
| Poor Installation | - | - |
| Fungi Decay | - | - |
| Dampness | - | - |
| Unstable Foundation | 3 | 13.1 |
| Defect in Building | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.10 TYPE OF PROPERTY THAT COLLAPSE MOSTLY**

The study reveals that 18 respondents (78.3%) of the total sample population pick residential as property that collapse mostly, while 5 respondents (21.7%) of the total sample population pick commercial property as that which collapse mostly. The implication of this is that residential properties are more prone to collapse as shown in table 10 below.

**TABLE 10 TYPE OF PROPERTY THAT COLLAPSE MOSTLY**

|  |  |  |
| --- | --- | --- |
| **PROPERTIES** | **FREQUENCY** | **PERCENTAGE** |
| Residential | 18 | 78.3 |
| Commercial | 5 | 21.7 |
| Recreational | - | - |
| Agricultural | - | - |
| Institutional | - | - |
| Industrial | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.11 DOES BUILDING COLLAPSE HAS ANY EFFECTS AND PROBLEMS**

The study reveals that 13 respondents (56.5%) of the total sample population are of the view that building collapse has effects and problems, while 10 respondents (43.5%) says otherwise.

The implication of this is that building collapse brings along with it both effects and problems on affected people as shown in table 112 below.

**TABLE 11 DOES BUILDING COLLAPSE HAS ANY EFFECTS AND** **PROBLEMS?**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 13 | 56.5 |
| No | 10 | 43.5 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.12 THE RATE OF EFFECTS OF BUILDING COLLAPSE ON HUMAN LIVES**

The study reveals that 21 respondents (91.3%) of the total sample population rates effect of building collapse on human lives as Very High, while 2 respondents (8.7%) of the total sample population rate its effect as High. The implication of this is that the effects of building collapse on human lives is Very High as shown in table 12 below.

**TABLE 12 THE RATE OF EFFECTS OF BUILDING COLLAPSE ON HUMAN LIVES**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 21 | 91.3 |
| High | 2 | 8.7 |
| Fair | - | - |
| Undecided | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.13 THE RATE OF EFFECTS OF BUILDING COLLAPSE ON PROPERTIES**

The study reveals that 23 respondents (100%) of the total sample population rate the effects of building collapse on property as Very High. The implication of this is that the effects of building collapse on properties is Very High as shown in table 13 below as shown in table 13 below.

**TABLE 13 THE RATE OF EFFECTS OF BUILDING COLLAPSE ON PROPERTIES**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 23 | 100 |
| High | - | - |
| Fair | - | - |
| Undecided | - | - |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.14 THE RATE OF EFFECT OF BUILDING COLLAPSE ON THE ECONOMY**

The study reveals that 11 respondents (47.8%) of the total sample population rate the effects as Very High, 9 respondents (39.1%) of the total sample population rate it as High, 1 respondent (4.4%) rate it as Fair, while 2 respondents (8.7%) of the total sample population were undecided.

The implication of this is that the effects of building collapse on the economy is Very High as shown in table 14 below.

**TABLE 14 THE RATE OF EFFECT OF BUILDING COLLAPSE ON THE ECONOMY**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 11 | 47.8 |
| High | 9 | 39.1 |
| Fair | 1 | 4.4 |
| Undecided | 2 | 8.7 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.15 THE EFFECT OF BUILDING COLLAPSE ON HOUSING DEVELOPMENT**

The study reveals that 13 respondents (56.5%) of the total sample population rate effects of building collapse on housing development as Very High, 6 respondents (26.1%) rate it as High, while 4 respondents (17.4%) of the total sample population were undecided. The implication of this is that there is a relationship between building collapse and housing development as shown in table 15 below.

**TABLE 15 THE EFFECT OF BUILDING COLLAPSE ON HOUSING DEVELOPMENT**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 13 | 56.5 |
| High | 6 | 26.1 |
| Fair | - | - |
| Undecided | 4 | 17.4 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.16 DOES DEVELOPERS CONTRIBUTE TO BUILDING COLLAPSE**

The study reveals that 20 respondents (86.9%) of the total sample population were of the view that developers contribute to building collapse, while 3 respondents (13.1%) of the total sample population views otherwise as shown in table 16 below. The implication of this is that developers contribute to building collapse as shown in table 16 below.

**TABLE 16 DOES DEVELOPERS CONTRIBUTE TO BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 20 | 86.9 |
| No | 3 | 13.1 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.17 THE WAYS MOST DEVELOPERS CONTRIBUTE TO BUILDING COLLAPSE**

The study reveals that 2 respondents (8.7%) of the total sample population says it is personal greed, 5 respondents (21.7%) says it is lack of maintenance, 3 respondents (13.1%) says it is lack of funds, 10 respondents (43.7%) says it is dealing with quacks, while 3 respondents (13.1%) of the total sample population says it is deviation of approved plan. The implication of this is that there is variation in contribution of developers to the causes of building collapse, as dealing with quacks is most common as shown in table 17 below.

**TABLE 17 THE WAYS MOST DEVELOPERS CONTRIBUTE TO BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **WAYS** | **FREQUENCY** | **PERCENTAGE** |
| Personal Greed | 2 | 8.7 |
| Lack of Maintenance | 5 | 21.7 |
| Lack of Funds | 3 | 13.1 |
| Dealing with Quacks | 10 | 43.7 |
| Deviation from Approved Plan | 3 | 13.1 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.2.18 DEVELOPERS’EFFORTS TO ERADICATE BUILDING COLLAPSE**

The study reveals that 20 respondents (86.9%) of the total sample population says efforts have been made, while 3 respondents (13.1%) of the total sample population says efforts have not been made to eradicate building collapse. The implication of this is that developers have made efforts to eradicate building collapse in Nigeria at large and Lagos in particular as shown in table 18 below.

**TABLE 18 DEVELOPERS’EFFORTS TO ERADICATE BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 20 | 86.9 |
| No | 3 | 13.1 |
| **TOTAL** | **23** | **100** |

**Source: Field Survey, September, 2011**

**4.3.0 ANALYSIS OF RESPONSES OF GOVERNMENT PARASTATAL**

**4.3.1 DISTRIBUTION ON GENDER OF GOVERNMENT PARASTATALS**

The study reveals that 17 respondents (7.08%) of the total sample population are Male, while 7 respondents (29.2%) of the total sample population are Female. This implies that majority of government parastatals are more of Male than Female as shown in table 19 below.

**TABLE 19 GENDER DISTRIBUTION OF RESPONDENTS**

|  |  |  |
| --- | --- | --- |
| **GENDER** | **FREQUENCY** | **PERCENTAGE** |
| Male | 17 | 7.08 |
| Female | 7 | 29.2 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.2 DISTRIBUTION ON ACADEMIC QUALIFICATION OF RESPONDENTS**

The study reveals that 8 respondents (33.4%) of the total sample population has ND, 11 respondents (45.8%) has HND/B.Sc, while 5 respondents (20.8%) of the total sample population has M.Sc as qualification. The implication of this that the respondents are knowledgeable to attend to the questions and give reliable information as shown in table 20 below

**TABLE 20 ACADEMIC QUALIFICATION OF RESPONDENTS**

|  |  |  |
| --- | --- | --- |
| **QUALIFICATION** | **FREQUENCY** | **PERCENTAGE** |
| NCE | - | - |
| ND | 8 | 33.4 |
| HND/B.Sc | 11 | 45.8 |
| M.Sc | 5 | 20.8 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.3 DISTRIBUTION ON DURATION IN THE MINISTRY**

The study reveals that 11 respondents (45.8%) of the total sample population has been in the ministry below 3 years, 5 respondents (20.8%) of the total sample population has 4-8 years experience, while 8 respondents (33.4%) of the total sample population has above 9 years experience of working in the ministry. The implication of this is that all the respondents are experienced in their field of expertise at the ministry of housing as shown in table 21 below.

**TABLE 21 DURATION OF RESPONDENTS IN THE MINISTRY**

|  |  |  |
| --- | --- | --- |
| **EXPERIENCE** | **FREQUENCY** | **PERCENTAGE** |
| Below 3 years | 11 | 45.8 |
| 4-8 years | 5 | 20.8 |
| Above 9 years | 8 | 33.4 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.4 WITNESSING OF BUILDING COLLAPSE**

The study reveals that 15 respondents (62.5%) of the total sample population has witnessed building collapse, while 9 respondents (37.5%) of the total sample population has not witnessed building collapse. The implication of this is that majority of the respondents in the Ministry of Housing has witnessed one incident of building collapse or the other in Lagos as shown in table 22 below.

**TABLE 22 WITNESSING OF BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 15 | 62.5 |
| No | 9 | 37.5 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.5 FREQUENCY OF BUILDING COLLAPSE IN LAGOS**

The study reveals that 4 respondents (16.8%) of the total sample population says it is very common, 10 respondents (41.7%) says it is common, 5 respondents (20.8%) of the total sample population says it is not common, while 5 respondents (20.8%) were undecided. The implication of this is that building collapse occurs on regular basis as shown in table 23 below.

**TABLE 23 FREQUENCY OF BUILDING COLLAPSE IN LAGOS**

|  |  |  |
| --- | --- | --- |
| **FREQUENCY** | **FREQUENCY** | **PERCENTAGE** |
| Very Common | 4 | 16.7 |
| Common | 10 | 41.7 |
| Not Common | 5 | 20.8 |
| Undecided | 5 | 20.8 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.6 CAUSES OF BUILDING COLLAPSE**

The study reveals that 3 respondents (12.5%) of the total sample population says deviation from approved plan, 1 respondent (4.1%) says bad design, 9 respondents (37.5%) went for sub-standard materials, 10 respondents (41.8%) of the total sample population went for poor workmanship, while 1 respondent (4.1%) says it is lack of maintenance. The implication of this is that the use of sub-standard materials and poor workmanship are the major cause of building collapse as shown in table 24 below.

**TABLE 24 CAUSES OF BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **CAUSES** | **FREQUENCY** | **PERCENTAGE** |
| Deviation from Approved Plan | 3 | 12.5 |
| Bad Design | 1 | 4.1 |
| Sub-standard Materials | 9 | 37.5 |
| Poor Workmanship | 10 | 41.8 |
| Lack of Maintenance | 1 | 4.1 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.7 GOVERNMENT MADE ANY EFFORTS TO ERADICATE BUILDING COLLAPSE**

The study reveals that 19 respondents (79.2%) of the total sample population states that government has made efforts to eradicate building collapse in Lagos, 5 respondents (20.8%) of the total sample population states otherwise. The implication of this is that efforts have been made by Lagos State government to eradicate building collapse as shown in table 25 below.

**TABLE 25 GOVERNMENTS MADE ANY EFFORTS TO ERADICATE BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 19 | 79.2 |
| No | 5 | 20.8 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.8 RATE GOVERNMENT EFFORTS IN ERADICATING BUILDING COLLAPSE**

The study reveals that 4 respondents (16.7%) of the total sample population rate it as very good, 10 respondents (41.7%) of the total sample population rate it as good, 9 respondents (37.5%) rate it as fair, 1 respondent (4.1%) of the total sample population rate government efforts as poor.

The implication of this is that government efforts in eradicating building collapse is quite commendable as there is still more to be done as shown in table 26 below.

**TABLE 26 RATE GOVERNMENT EFFORTS IN ERADICATING BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very Good | 4 | 16.7 |
| Good | 10 | 41.7 |
| Fair | 9 | 37.5 |
| Poor | 1 | 4.1 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.9 PRESENT EFFORTS OF GOVERNMENT**

The study reveals that 21 respondents (87.5%) of the total sample population says government has made efforts presently, while 3 respondents (12.5%) of the total sample population says otherwise. The implication of this is that the present administration of Governor Babatunde Raji Fashola has taken drastic step to curb the menace of building collapse in Lagos State as shown in table 27 below.

**TABLE 27 PRESENT EFFORTS OF GOVERNMENT**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 21 | 87.5 |
| No | 3 | 12.5 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.10 THE EFFECTS OF BUILDING COLLAPSE IN LAGOS**

The study reveals that 15 respondents (62.5%) of the total sample population went for human lives, 5 respondents (20.8%) went for property, meanwhile, 4 respondents (16.7%) of the total sample population went for individual. The implication of this is that human lives are mostly affected during building collapse in Lagos as shown in table 28 below.

**TABLE 28 THE EFFECTS OF BUILDING COLLAPSE IN LAGOS**

|  |  |  |
| --- | --- | --- |
| **EFFECTS ON** | **FREQUENCY** | **PERCENTAGE** |
| Human Lives | 15 | 62.5 |
| Property | 5 | 20.8 |
| Economy of Lagos | - | - |
| Individual | 4 | 16.7 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.11 SECTOR MOSTLY AFFECTED BY BUILDING COLLAPSE**

The study reveals that 9 respondents (37.5%) of the total sample population says public sector, while 15 respondents (62.5%) of the total sample population says it is the private sector that is mostly affected. The implication of this is that privately owned properties collapse more than property built by the public sector as shown in table 29 below.

**TABLE 29 SECTOR MOSTLY AFFECTED BY BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **SECTOR** | **FREQUENCY** | **PERCENTAGE** |
| Public | 9 | 37.5 |
| Private | 15 | 62.5 |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.3.12 TYPE OF PROPERTY THAT COLLAPSE MOSTLY IN LAGOS**

The study reveals that 21 respondents (87.5%) of the total sample population went for Residential, while 3 respondents (12.5%) of the total sample population went for Commercial properties. The implication of this is that residential properties mostly collapse than other types of property in Lagos State as shown in table 30 below.

**TABLE 30 TYPE OF PROPERTY THAT COLLAPSE MOSTLY**

|  |  |  |
| --- | --- | --- |
| **TYPES** | **FREQUENCY** | **PERCENTAGE** |
| Residential | 21 | 87.5 |
| Commercial | 3 | 12.5 |
| Institutional | - | - |
| Agricultural | - | - |
| Recreational | - | - |
| **TOTAL** | **24** | **100** |

**Source: Field Survey, September, 2011**

**4.4.0 ANALYSIS OF RESPONSES OF PROFESSIONAL TEAM IN THE BUILDING INDUSTRY**

**4.4.1 DISTRIBUTION ON GENDER OF THE RESPONDENTS**

The study reveals that 16 respondents (61.5%) of the total sample population are Male, while 10 respondents (38.5%) of the total sample population are Female. The implication of this is that majority of the respondents are Male which make the information given more reliable as shown in table 31 below.

**TABLE 31 GENDER DISTRIBUTIONS OF RESPONDENTS**

|  |  |  |
| --- | --- | --- |
| **GENDER** | **FREQUENCY** | **PERCENTAGE** |
| Male | 16 | 61.5 |
| Female | 10 | 38.5 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.2 DISTRIBUTION ON ACADEMIC QUALIFICATION OF REPONDENTS**

The study reveals that 2 respondents (7.7%) of the total sample population has ND as qualification, while 24 respondents (92.3%) of the total sample population has HND/B.Sc.

The implication of this is that majority of the respondents are literate with HND/B.Sc as qualification which makes the information given to be very reliable as shown in table 32 below.

**TABLE 32 ACADEMIC QUALIFICATION OF RESPONDENTS**

|  |  |  |
| --- | --- | --- |
| **QUALIFICATION** | **FREQUENCY** | **PERCENTAGE** |
| NCE | - | - |
| ND | 2 | 7.7 |
| HND/B.Sc | 24 | 92.3 |
| M.Sc | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.3 DISTRIBUTION ON RESPONDENTS’FIELD OF EXPERTISE**

The study reveals that 3 respondents (11.5%) of the total sample population are experts in Architecture, 7 respondents (26.9%) are experts in Building, 3 respondents (11.5%) are expert in Engineering, while 11 respondents (42.3%) are Professional Estate Surveyors and Valuers.

The implication of this is that Estate Surveyors and Valuers form the majority of respondents which makes the information given more reliable as shown in table 33 below.

**TABLE 33 FIELD OF EXPERTISE**

|  |  |  |
| --- | --- | --- |
| **FIELD** | **FREQUENCY** | **PERCENTAGE** |
| Architecture | 3 | 11.5 |
| Building | 7 | 26.9 |
| Quantity Surveying | - | - |
| Engineering | 3 | 11.5 |
| Land Surveying | 2 | 7.8 |
| Estate Surveying and Valuation | 11 | 42.3 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.4 EXPERIENCE OF PROFESSIONALS**

The study reveals that 10 respondents (38.4%) of the total sample population has below 5 years experience, 11 respondents (42.3%) has 6-10 years experience, 3 respondents (11.5%) has 11-15 years experience, while 2 respondents (7.8%) of the total sample population has 16-20 years experience. The implication of this is that majority of the respondents has up to 6-10 years in their field which simply means that they has both knowledge of incidents of building collapse as shown in table 34 below.

**TABLE 34 EXPERIENCE OF PROFESSIONALS**

|  |  |  |
| --- | --- | --- |
| **EXPERIENCE** | **FREQUENCY** | **PERCENTAGE** |
| Below 5 years | 10 | 38.4 |
| 6-10 years | 11 | 42.3 |
| 11-15 years | 3 | 11.5 |
| 16-20 years | 2 | 7.8 |
| Above 20 years | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.5 HAVE YOU WITNESSED BUILDING COLLAPSE?**

The study reveals that 20 respondents (76.9%) of the total sample population has witnessed building collapse, while 6 respondents (23.1%) of the total sample population has not witnessed building collapse. The implication of this is that majority of the respondents have witnessed building collapse and are very well experienced as to what the causes are which make the information given to be very reliable as shown in table 35 below.

**TABLE 35 HAVE YOU WITNESSED BUILDING COLLAPSE?**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 20 | 76.9 |
| No | 6 | 23.1 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.6 THE CAUSES OF BUILDING COLLAPSE**

The study reveals that 1 respondent (3.8%) of the total sample population went for Bad Design, 14 respondents (53.8%) went for Sub-Standard material, 6 respondents (23.0%) went for Poor Workmanship, 1 respondent (3.8%) went for Deviation from Approved Plan, 2 respondents (7.8%) of the total sample population went for Lack of Maintenance, while 2 respondents (7.8%) of the total sample population says it Faulty Foundation. The implication of this is that the use of sub-standard material and poor workmanship are the major causes of building collapse as shown in table 36 below.

**TABLE 36 THE CAUSES OF BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **CAUSES** | **FREQUENCY** | **PERCENTAGE** |
| Bad Design | 1 | 3.8 |
| Sub-standard Materials | 14 | 53.8 |
| Poor Workmanship | 6 | 23.0 |
| Deviation from Approved Plan | 1 | 3.8 |
| Lack of Maintenance | 2 | 7.8 |
| Faulty Foundation | 2 | 7.8 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.7 DOES DEFECT IN BUILDING LEADS TO BUILDING COLLAPSE?**

The study reveals that 26 respondents (100%) of the total sample population says defect in building leads to building collapse. The implication of this that defect in building leads to building collapse as shown in table 37 below.

**TABLE 37 DOES DEFECT IN BUILDING LEADS TO BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **OPTIOON** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 26 | 100 |
| No | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.8 DEFECTS THAT COMMONLY LEADS TO BUILDING COLLAPSE**

The study reveals that 21 respondents (80.7%) of the total sample population went for cracks in walls, 3 respondents (11.5%) went for dampness, while 2 respondents (7.8%) of the total sample population went for unstable foundation. The implication of this is that cracks in walls of a building commonly leads to building collapse as shown in table 38 below.

**TABLE 38 DEFECTS THAT COMMONLY LEADS TO BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **DEFECTS** | **FREQUENCY** | **PERCENTAGE** |
| Cracks in walls | 21 | 80.7 |
| Poor Insulation | - | - |
| Defect in Plastering | - | - |
| Decayed floor Board | - | - |
| Dampness | 3 | 11.5 |
| Unstable Foundation | 2 | 7.8 |
| Fungi Decay | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.9 TYPE OF PROPERTY THAT COLLAPSE MOSTLY**

The study reveals that 22 respondents (84.7%) of the total sample population went for residential property, while 4 respondents (15.3%) went for commercial property.

The implication of this is that residential properties are more prone to collapse while commercial properties are not left out as shown in table 39 below.

**TABLE 39 TYPE OF PROPERTY THAT COLLAPSE MOSTLY**

|  |  |  |
| --- | --- | --- |
| **PROPERTIES** | **FREQUENCY** | **PERCENTAGE** |
| Residential Property | 22 | 84.7 |
| Commercial Property | 4 | 15.3 |
| Recreational Property | - | - |
| Institutional Property | - | - |
| Agricultural Property | - | - |
| Industrial Property | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.10 LIFE CYCLE OF THE COLLAPSED PROPERTY**

The study reveals that 14 respondents (53.9%) of the total sample population went for newly developed, 5 respondents (19.2%) went for middle age, 6 respondents representing (23.1%) says it is old age, while 1 respondent (3.8%) of the total sample population says it is total obsolescence. The implication of this is that newly developed, middle age and old age properties mostly collapse in Lagos as shown in table 40 below.

**TABLE 40 LIFE CYCLE OF THE COLLAPSED PROPERTY**

|  |  |  |
| --- | --- | --- |
| **LIFE CYCLE** | **FREQUENCY** | **PERCENTAGE** |
| Newly Developed | 14 | 53.9 |
| Middle Age | 5 | 19.2 |
| Old Age | 6 | 23.1 |
| Total Obsolescence | 1 | 3.8 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.11 BUILDING COLLAPSE HAS EFFECT IN LAGOS**

The study reveals that 26 respondents (100%) of the total sample population agreed with the fact that building collapse has effect and problem in Lagos. The implication of this is that building collapse has effect and problem in Lagos as shown in table 41 below.

**TABLE 41 BUILDING COLLAPSE HAS EFFECT IN LAGOS**

|  |  |  |
| --- | --- | --- |
| **OPTION** | **FREQUENCY** | **PERCENTAGE** |
| Yes | 26 | 100 |
| No | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.12 EFFECTS OF BUILDING COLLAPSE ON HUMAN LIVES**

The study reveals that 14 respondents (53.9%) of the total sample population says the effect is very high, 11 respondents (42.3%) says it is high, while 1 respondent representing (3.8%) of the total respondent is undecided. The implication of this is that building collapse has very high effects on human lives as shown in table 42 below.

**TABLE 42 EFFECTS OF BUILDING COLLAPSE ON HUMAN LIVES**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 14 | 53.9 |
| High | 11 | 42.3 |
| Fair | - | - |
| Undecided | 1 | 3.8 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.13 EFFECTS OF BUILDING COLLAPSE ON HOUSING DEVELOPMENT**

The study reveals that 9 respondents (34.6%) of the total sample population rate is as very high, 12 respondents (46.2%) rate it as high, while 5 respondents representing (19.2%) of the total sample population rate it as fair. The implication of this is that the effect of building collapse on housing development is high as shown in table 43 below.

**TABLE 43 EFFECTS OF BUILDING COLLAPSE ON HOUSING DEVELOPMENT**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 9 | 34.6 |
| High | 12 | 46.2 |
| Fair | 5 | 19.2 |
| Undecided | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.14 EFFECTS OF BUILDING COLLAPSE ON THE ECONOMY**

The study reveals that 11 respondents (42.3%) of the total sample population rate it as very high, 7 respondents (26.9%) rate it as high, 4 respondents (15.4%) rate it as fair, while 4 respondents (15.4%) of the total sample population were undecided. The implication of this is that the effect of building collapse on the economy of Lagos is very high as shown in table 44 below.

**TABLE 44 EFFECTS OF BUILDING COLLAPSE ON THE ECONOMY**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 11 | 42.3 |
| High | 7 | 26.9 |
| Fair | 4 | 15.4 |
| Undecided | 4 | 15.4 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.15 EFFECTS OF BUILDING COLLAPSE ON PROPERTIES**

The study reveals that 26 respondent representing (100%) of the total sample population says its effect is very high on properties. The implication of this is that building collapse has a very high effect on properties as shown in table 45 below.

**TABLE 45 EFFECTS OF BUILDING COLLAPSE ON PROPERTIES**

|  |  |  |
| --- | --- | --- |
| **RATE** | **FREQUENCY** | **PERCENTAGE** |
| Very High | 26 | 100 |
| High | - | - |
| Fair | - | - |
| Undecided | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.16 RAMPANCY OF BUILDING COLLAPSE IN LAGOS**

The study reveals that 6 respondents (23.0%) of the total sample population says it is very rampant, 14 respondents (53.9%) says it is rampant, 4 respondents (15.3%) of the total sample population says it is not rampant, while 2 respondents (7.8%) of the total sample population say it is fair. The implication of this is that building collapse is still rampant in Lagos as shown in table 46 below.

**TABLE 46 RAMPANCY OF BUILDING COLLAPSE IN LAGOS**

|  |  |  |
| --- | --- | --- |
| **RAMPANCY** | **FREQUENCY** | **PERCENTAGE** |
| Very Rampant | 6 | 23.0 |
| Rampant | 14 | 53.9 |
| Not Rampant | 4 | 15.3 |
| Fair | 2 | 7.8 |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.4.17 EFFORTS OF PROFESSIONALS IN ERADICATING BUILDING COLLAPSE**

The study reveals that 4 respondents (15.3%) of the total sample population says it is through public enlightenment, 2 respondents (7.8%) of the total sample population says it is through building code regulation, while 20 respondents (76.9%) of the total sample population says it is through proper site supervision. The implication of this is that professionals concerned in the building industry are making efforts to eradicate building collapse through public enlightenment and proper site supervision as shown in table 47 below

**TABLE 47 EFFORTS OF PROFESSIONALS IN ERADICATING BUILDING COLLAPSE**

|  |  |  |
| --- | --- | --- |
| **EFFORTS** | **FREQUENCY** | **PERCENTAGE** |
| Public Enlightenment | 4 | 15.3 |
| Regulating Building Code | 2 | 7.8 |
| Proper Site Supervision | 20 | 76.9 |
| Using Experienced Craftsmen | - | - |
| **TOTAL** | **26** | **100** |

**Source: Field Survey, September, 2011**

**4.5 TESTING OF HYPOTHESIS**

In this section, two main hypothesis shall be tested which will be tested based on the level of agreement and disagreement on each questions asked. Hence, *Chi-Square* will be used in testing the hypothesis.

The formula is

***x2* = ∑ = Summation**

**O1 = Observed Frequency**

**E1 = Expected Frequency**

**Rt × Ct**

**GT**

*Where*

**Rt = Row total**

**Ct = Column total**

**Gt = Grand Total**

*x*2 cal = Chi-Square calculated

*x*2 tab = Critical Value form

**CHI-SQUARE TABLE**

The level of significance for accepting the Null and Alternative Hypothesis will be **5% (0.05)** respectively. The Null hypothesis **(Ho)** will be accepted if the chi-square calculated (*x*2 cal) is lesser than the Critical Value from chi-square table (*x*2 tab) i.e. *x*2 cal <*x*2 tab while the alternative hypothesis will be rejected. Alternative hypothesis **(H1)** will be accepted if the Critical Value from the chi-square table is lesser than the chi-square value i.e. *x*2 tab <*x*2 cal.

Accept H1 and reject Ho the Null Hypothesis

Degree of Freedom *df* = (r – 1) (c – 1)

Where r = row, c = column

**4.5.1 DATA ANALYSIS OF HYPOTHESIS**

***HYPOTHESIS ONE***

**Ho –** Building collapse does not have effect and problems on the economy and property investment

**H1 –** Building collapse has effects and problems on the economy and property investment.

|  |  |
| --- | --- |
| **OPINION** | **NO. OF RESPODENTS** |
| Yes | 13 |
| No | 10 |
| **TOTAL** | **23** |

**Degree of Freedom = k – 1, k = 2, 2 – 1 = 1**

***df* = 1**

**Expected Frequency – np**

**n = total number of respondent = 23**

**p = ½ = 0.5**

**E = np = 23 × 1/2 = 11.5**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **O** | **E** | **O – E** | **(O – E)2** | **(O - E)2**  **E** |
| 13 | 11.5 | 1.5 | 2.25 | 0.1957 |
| 10 | 11.5 | -1.5 | 2.25 | 0.1957 |
|  |  |  |  | **0.3914** |

***x*2 cal = ∑ (O – E)2 = 0.3914**

**∑**

***x*2 tab at 5% (0.05) level of significance**

***x*2 tab = *x*2 *df*, α = *=x*21, 1-0.05 = *x*21, 0.95**

***x*2 tab = *x*21, 0.95 = 3.84**

**DECISION:** If the chi-square calculated i.e. *x*2 cal is greater than chi-square tabulated i.e. *x*2 then we reject the Null hypothesis **(Ho)** and accept Alternative hypothesis **(H1)** otherwise we accept Ho.

**Conclusion:** Since chi-square calculated is less than the chi-square tabulated i.e. **0.3914 < 3.84,** then we accept the null hypothesis that says Building Collapse does not have effect and problems on the economy.

***HYPOTHESIS TWO***

**Ho –** Efforts have not been made by developers to stop building collapse in Lagos State

**H1 –** Efforts have been made by developers to stop building collapse in Lagos State

**Degree of Freedom (d.f.) = (k – 1) = 2 – 1 = 1**

***df* = 1**

**Expected Frequency = np**

**n = 23, p = ½ = 0.05**

**E = np = 23 × 0.5 = 11.5**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **O** | **E** | **O – E** | **(O – E)2** | **(O - E)2**  **E** |
| 20 | 11.5 | 8.5 | 72.25 | 6.2826 |
| 3 | 11.5 | -8.5 | 72.25 | 6.2826 |
|  |  |  |  | **12.5652** |

***x*2 cal = ∑ (O – E)2 = 12.5652**

**∑**

***x*2 tab at 5% (0.05) level of significance**

**α = 0.05**

***x*2 tab = *x*2 *df*, α = *=x*21, 0.05 = *x*21, 1 - 0.05 = *x*21,0.95**

***x*2 tab = *x*21, 0.95 = 3.84**

**DECISION:** If the chi-square calculated i.e. *x*2 cal is greater than chi-square tabulated i.e. *x*2 then we reject the Null hypothesis **(Ho)** and accept Alternative hypothesis **(H1)** otherwise we accept Ho.

**Conclusion:** Since chi-square calculated i.e. *x*2 cal **(12.57)** is greater than chi-square tabulated i.e. *x*2 tab **(3.84)** at 5% level of significance then we reject the Null hypothesis and accept the alternative hypothesis that efforts have been made by developers to stop building collapse in Lagos State.

**4.6 INTERPRETATION OF DATA**

The following are the interpretation of the above analysed data of government parastatals, real estate developers and professional team in the building industry. The interpretation are as follows;

1. The analysed data shows that majority are Male and they are all educated and are found to be knowledgeable due to their experience in their various fields.
2. Larger proportion of the respondents is aware of the incidents of building collapse and has witnessed building collapse and majority of them agreed that building collapse is Frequent in Lagos State.
3. The three categories of respondents agreed that the major causes of building collapse are the use of sub-standard materials and poor workmanship. Also, they agreed that defects in building leads to building collapse.
4. It was discovered that Residential and Commercial properties are prone to building collapse and most of them are privately-owned and contribute more to building collapse.
5. A lot of problems has been caused by building collapse in Lagos which also affects lives and properties of those affected, meanwhile the life cycle of properties that collapse mostly are newly developed and old-aged properties.
6. Both the government, developers and professionals are contributing in one way or the other to the causes of building collapse in Lagos, and making efforts to eradicate occurrence of building collapse in Lagos due to its rampancy.
7. Dealing with quacks and lack of funds are the contributing factor by private developers to building collapse. The professionals and the government are making efforts to stop this problems through public enlightenment and proper site supervision.

**CHAPTER FIVE**

**SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION**

**5.1 SUMMARY OF FINDINGS**

After a detailed analysis of data gathered from the three categories of respondents such as the Lagos State Ministry of Housing, Real Estate Developers and Professional team in the building industry, which follows by interpretation, the following are the summary of findings;

1. The analysis revealed that the majority of the respondents are male and have witnessed and also aware of incidents of building collapse in Lagos.
2. The respondents also agreed to the fact that the degree of effect of building collapse is Very High and as such, have caused a lot of problem to the government as well as professionals concerned. Also, it was agreed that the rampancy of building collapse in Lagos is high in nature and the government and professionals are making effort to eradicate it through public enlightenment and proper site supervision.
3. The three categories of respondents i.e. government ministry of housing, real estate developers and professional team in the built environment identified the following as causes of building collapse; structural defect, faulty foundation, lack of maintenance, poor workmanship, sub-standard materials, design error, natural hazards, inexperienced professionals, hasty construction, greed, non-adherence to building codes, overloading, tendency to cheat, corruption, inadequate steel reinforcement, no soil test etc.

**5.2 RECOMMENDATIONS**

Having carried out due analysis and interpretation of data gathered from both primary and secondary sources, the following were recommended;

1. The developers should not be in a hurry and also keep enough funds for development and deal directly with professionals with good track records and credibility.
2. Adequate and proper test should be carried out for property that have reached old age and if defects were numerous, occupants should be advised in their best interest to vacate the building premises.
3. Building professionals should ensure to carryout proper and efficient supervision of works on site as well as thorough inspect of materials to be used for the construction from sub-structure to superstructure.
4. The government and professional team involve in building construction ought to enlighten each other on how to embrace good and quality professional practice as well as enlightening the general public from time to time on the best professional to approach whenever the decision to go into development is made. Also, to warn them that if the right channel is not pass or using the right people, the end result could be disastrous.
5. The professionals such as the Architects, Builders, Engineers, Town Planners, Estate Surveyors and Valuers as Project Manager, Quantity Surveyors, Estimators need to come together periodically to discuss the problems facing the industry and suggest way forward.
6. To save Nigeria from further agony and trauma, building approval should be in phases, design and site of the building should be approved by the concerned ministry and the government agencies should take the task very serious without bribe collection from client
7. Government should enact a Law that will aim to curbing the use of sub-standard materials and making sure that high quality material prices are subsidised so that all income level can afford it. Hence, if all these recommendations can be taken seriously, it would provide a lasting situation to the menace of collapsed building and the psychological traumas it causes on its victims.
8. There should be issuance of Certificate of Commencement of construction work, issuance for stages of construction works base on application by builders in charge on site. Government should also apply strict development control.
9. Government should ensure that before any work commence on site, the materials to be used must be stamped by various professionals working on the site.
10. The menace of building collapse is one that requires all stakeholders’ urgent attention. To this end, both government and private individuals make conscientious efforts to make sure that they only approved plans are strictly followed.
11. Government officials in the Housing and Environmental Ministries must constantly inspect construction sites to ensure that only the approved plan are followed.
12. Proper supervision and monitoring team should periodically inspect building materials to ensure building materials to ensure that sub-standard goods are not used.
13. The only way through which this problem can be solved is by engaging the service of a qualified building, civil engineer and an Estate Surveyor and Valuer for construction and proper supervision of the project.
14. The building professionals should enlighten the populace of the importance of their profession and the need for ordinary man to contact a certified builder for a new development. Also, government institutions in charge of buildings and development should ensure that the building codes are followed in the course of a new development.
15. Foundation of building should be taken into consideration before putting load on i.e. this would determine the number of floors. Approved plan of the building should be strictly adhered to. Avoid using building that is meant for Residential use as Commercial. As we understand that Residential building cannot withstand intensive use and human traffic.

**5.3 CONCLUSION**

The aim of every developer is to develop properties and enjoy the investment wither through personal use or by generating income from it, and not to claim the lives of loved ones and properties. Research has shown that building collapse have very high effect on human lives and property and as a result of personal greed of many developers, corrupt government agencies on site and professionals who are contractors and project managers in the building industry are adding more to the problems. Most property developers patronise quacks due to lack of funds for development and are desperate to have shelter; the government agencies collect bribe and are unable to do the thorough supervision of plan approval and project, the contractors and project managers failed to use quality materials for building projects.

These are becoming the habits in Lagos. People loses their lives and properties very often in various crannies in Lagos and Nigeria at large due to some peoples’ fault, corruption and greediness. The incidents of building collapse therefore calls for the sites works and also to investigate the quality of materials, craftsmen and the nature of contractors involve in the construction on sites. This will justify the need to carryout research work on building collapse in Lagos with a view of examining its design and construction problem.

Therefore, recommendations given by the researcher and respondents should be taken with serious attention and it will proffer lasting solution to the problems of design and construction of building which results in to collapse in Lagos and Nigeria at large.

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