

Professionals In The Built Environment And The Incidence Of Building Collapse In Nigeria

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Research paper

THE FAILURE OF BUILDINGS IS A NATIONAL PROBLEM, WHICH NOT ONLY RESULTS IN WASTE OF MATERIALS, FINANCIAL AND HUMAN RESOURCES BUT, SOMETIMES IN LOSS OF LIVES AND PROPERTIES. This occurrence has been a challenge to the professionals in the industry and as such necessitates the need for this study. The study examines the involvement of professionals in the incidence of buildings collapse in Lagos state. The research also identified and assessed the causes of building failure, evaluated the effects of such failures on construction professionals, the client, and the nation as a whole. In achieving these objectives, the study adopts a survey technique with a total of 65 questionnaires mainly for the professionals in the industry in which 50 were retrieved and used for the analysis. Random sampling technique was used in the selecting of the sample size. Data collected were analyzed using the frequency table, mean item score, one sample t test and paired sample t test. The study revealed that the building industry is full of quacks and inexperienced contractors. Their involvement in building construction has led to a lot of collapse in the past and at present. Poor management and leadership on the part of the Site Engineers and Builders have also contributed to many buildings failures. The analysis reveals that there are significant differences in the causes of building failure. The failures of buildings also have significant effects on the stakeholders. The study recommends that for all construction works being undertaken, such should be designed and supervised by qualified and registered Engineers and Builders. Also code of ethical conduct of building profession should be strongly enforced by the bodies concerned as to prevent ethical abuse by the professionals in the industry.

Keywords

Professionals, Built Environment,
Collapse, Building Failure,
and Nigeria

INTRODUCTION

Naturally, shelter in form of building is amongst the three basic needs of life universally accepted and recognized as essential for life sustenance and survival. This single reason has made the construction industry one of the oldest and fastest growing industries both in terms of demands and sophistication over the years. However, it is the desire of every human being to live a life of comfort, security, physical and mental development without hints of possible mishaps of collapse or failure associated with their place of abode. It is therefore a social responsibility of the government to ensure that the wish of the people is achieved within a limited resources and constraints. Surprisingly, building construction industry in the past years has not witnessed the spate of building collapses and failures as it did in the recent past. The past few years in Nigeria witnessed the collapse of many buildings in various stages of completion, wherein, many lives were lost and properties worth millions of naira destroyed. These enunciated development calls for serious academic study to carry out an in-depth appraisal of the reasons for failures and collapsed of these buildings, the involvement of the professionals in the built environment and recommend the ways to minimize the increase in structural failure and collapsed of building structures

Statement of Problems

A nice edifice will surely attracts people attention and bring about a quest for who is the Architect? Otherwise when there is a failure, which probably results in a collapse, the reaction becomes; who is the Builder? The failures of building have resulted to waste of materials, financial and human resources, sometimes in loss of lives and properties. This affects the economy. Building failure affects the confidence of prospective and present clients in the building industry and as well it affects the integrity of the professionals in the industry.

Building failure can be considered as occurring when a building or building components can no longer be relied upon to fulfil its principal function. Building failures are common phenomena and is no longer news in Nigeria but, become problems when they result in loss of lives and properties. They occur during and after construction. Sometimes there is a single explanation for such mishap; more often there is a combination of reasons for such structural failure (Iyagba and Odulami, 1989). Failures in buildings could be of two categories namely; cosmetic and structural failures (Ayinuuola, 2004). Cosmetic can be said to have occurred when something has been added or subtracted from the building thus affecting the structure's outlook. Structural on the other hand affects both the structural stability and outlook of the building. In Nigeria, building failures have been attributed to some causes namely design faults (50%), faults on construction sites (40%), product failure (10%) (Oyewande, 1992). Faulty design, faulty execution of works and use of faulty materials are major causes of structural failures according to Hall (1984), on the other hand, (Akinpelu, 2002) classed environmental changes, natural and man made hazards, improper presentation and interpretation as major causes of structural failures. Other reasons behind building failures include lack of supervision, non-conformance with building regulations, poor construction techniques, and bad usage, amongst others. The research is appropriate at this time because of the effect of such failures; some of which are published. Sadly others are not, but they do affect the building construction industry by claiming lives, properties and also affect the economy especially when it leads to collapse.

Aim of Study

The aim of this research work is to assess the level of involvement of professionals in the built environment on the

incidence of collapse of buildings and also evaluates the effects of such failures on construction professionals, the client, and the nation as a whole.

Objectives of the Study

In achieving the aim, the study set out the following objectives

1. To examine the causes of building failures.
2. To assess the level of involvement of building professionals in the causes of building failures.
3. To evaluate the effects of such failures on construction professionals, the client, and the nation as a whole.

Research hypothesis

None of the causes of building failure is more significant than the other.

Literature Review

Buildings are required to provide conducive and safe environment for various human activities. Naturally, one of the three basic needs of man is shelter, which is universally accepted and recognized as essential for life sustenance and survival (Adenuga, 1999). Several factors including greed, incompetence and corruption has affected the continuous existence of buildings during production and these have been associated with the recurring decimal of deadly collapse of buildings. These practice are common among some construction professionals which include Contractors/ Builders who may use specified materials or going for sub-standard material in order to cut cost for his selfish interest (Chinwokwu, 2000).

According to Iyagba (2005), doctors kill in unit while builders kill in tens. This statement has passed the test of time as a result of the increasing building collapse that has claimed many lives in our society. Buildings fail, not only because of how they are designed, but also because of how they were built and the management of a building during its life will also affect its life expectancy. A lot of measures have been taken in the

past to curb this menace. The subject of building failure came into existence during the Babylonian days. The code of Hammurabi (Circa 1950) is simple, and reproduced directly on the matter. It is interesting to note a part of it, as reproduced by (Mc Kaig, 1962) and reported in (Iyagba, 2005). It reads: If a contractor builds a house for a man, the man shall give the contractor two shekels of silver per cent (a unit of weight) as reward. If a contractor builds a house for a man, but does not build it strong enough, and the house, which he built, collapses and causes the death of the owner of the house, then the contractor shall be put to death. If it causes the death of the son of the owner, then the son of the contractor shall be put to death. If the collapse destroys property, the contractor shall replace what has been destroyed, and if the house collapses, without any loss of life or property destruction, he shall rebuild the house at his own expense. In concise the message contains in the code is a tooth for tooth or an eye for an eye. During this period, the responsibility for building failures laid basically on the contractor. Today the situation is different due to the rapid advancement in construction, technology and revolutionary changes because of the experts that are now involved.

Factors responsible for structural failures of collapsed buildings

All buildings are prone to deterioration (i.e. wear and tear) and no structure can reasonably be expected to last forever. During construction works, a good quality control checks at periodic intervals with constant and adequate maintenance care will prolong their longevity. This proneness of buildings to depreciation (and degradation) is traceable to the materials, elements as well as composites used in constructing them. They exhibit different reactions when exposed to the environment, man-made conditions and the type of use they are

subjected to. The geographical location and environmental conditions of the immediate environs of the building also have significant effect on materials specification. Other causes of structural defects according to Oloyede (1991), and Adenuga (1999) were attributed to the followings:

(a) Socio-Economic habits of Nigerians

It is often discovered that non-professionals design building and after the design by these quacks, for fear of paying appropriate fees to qualified people, the local planning authorities approve them. Again the right professionals are not appointed into the right positions in local authorities responsible for checking structural drawings.

(b) Owner Constructor Syndrome

The owner in a bid to save cost wants to build by himself using the so-called direct labour work force. The owner of the property purchase the materials by himself, buying cheap and inferior building materials without any idea of what type of materials should be bought for a particular part of a job. As reported by Warnang (1989) and Babatunde (1990), the failure of the five-storey building adjacent to 109, Western Avenue, Iponri, Lagos State that collapsed was partly attributed to the owner-contractor syndrome.

(c) Improper Supervision of Project during Construction

As reported by Akeju (1984) in his paper, Lessons from Recent Structural Failures; involvement of competent professionals to handle the planning and design of a project does not entirely guarantee its stability. The project competently created on paper must be faithfully and accurately reproduced on the site. A structure is said to be as good as its construction and not its design. An appropriate qualified professional must supervise every stage of the work.

(d) Constructional Problems

Subair (2008) reported that the use of poor materials and low standard of workmanship creep into construction as factor needed to lower the overall

cost of construction. Some developers wrongly believe that by compromising slightly on materials quality, the overall effect on the structure will be little and the monetary gain will be large. This is wrong, the gain, money wise will be small and the danger to the structure will be enormous and destructive. Good materials in the hands of experienced artisans are the best ways of saving cost. Investigations into the collapsed building at Akinanmi Street, Ojuelegba as reported by Warnang (1989) and Babatunde (1990) revealed that the same foundation used for the first building that was demolished following a fire disaster, was the very one used for the new construction not minding the increased number of floors.

(e) Failure caused by Foundational Problems

Foundational failures are never due to a single cause, but there will always be one major cause. Olateju (1991) considered that foundational failure may be due to any or combination of:

- ▶ Absence of a proper investigation of the site or wrong interpretation of the results of such investigation
- ▶ Faulty design of the foundation
- ▶ Bad workmanship in the construction of the foundation
- ▶ Poor construction materials during the construction of the foundation due to financial constraints.
- ▶ Insufficient provision in the design construction for exceptional natural phenomena such as thermal and biological conditions, rainfall and floods, greater than those hitherto recorded at the site.

(f) Site Development Error

This is often the case when construction is carried out with insufficient or non-existent geo-technical studies. Inadequate soil investigation before embarking on a new building work may result in structural failure and eventual collapsed. Studies have shown that steep slopes may be subjected to creep under heavy super imposed pressure. Sulphate in clay soil is deleterious to buried con-

crete, iron and steel. High water table, which is seasonal, produces a lower soil bearing capacity than when the soil is dry, hence rendering construction inundated soils very expensive.

(g) Design Errors

These include errors in concept, assessment of loading, calculation errors, improper elemental assemblies, inter-relationship errors, connection details errors, inability to visualize the mode of construction, maintainability, misuse of computer software and detailing errors. Design errors can result in a collapse but often times, failure due to design errors are easily traceable when not compounded by construction errors. Designers must take into consideration the mode of construction, in arriving at practicable designs.

(h) Operational Errors

These occur when alterations made to the structure are not taken into consideration during design. This usually occurs when there is an upward economic change in the value of the building location. A building, which might have been designed and constructed as residential, might be converted into a school or a supermarket requiring large free space or sometimes, more floors may be added thereby leading to overloading the existing foundation. Foundation and structural member's inadequacy are usually the causes of collapse in this regard. An example is the collapse of Sague School in Port-Harcourt claiming over 50 lives.

(i) Inadequate Maintenance

Maintenance is a stitch in time that saves nine. Generally, much attention is not paid to maintenance and the government is the most guilty as observed by Adenuga (1999). The Sacred Heart Primary School building, which collapsed in River State, suffered a total neglect, which led to the crash. Also, the house that collapsed along Shetima Avenue, Kano State in July 1991 during heavy downpour was the Climax of the consequence of the neglect of the roof leakage.

Adenuga (1999) reported in his paper titled Building Maintenance in Ni-

geria that maintenance of a structure that maintenance of a structure should start from the day the excavation is dug. For instance, if the foundation excavation shares before or after placement of concrete, it must be cleared and maintained because earth impurities impair the strength of concrete. Therefore, maintenance is a continuous exercise that ensures that defect is rectified as soon as they appear before further damage is done. This type of maintenance is called curative maintenance. An improved type of maintenance is the preventive maintenance, which of course, is more expensive. This involves checking of roof members of a building and replacing the bad ones at a specified or pre-determined period, even without any sign of leakage or sagging of the roof. The most expensive and elaborate type of maintenance is called planned maintenance. It is the most useful, most expensive but most cost effective over a long period especially in industrial or commercial buildings.

Reasons for the present trend

The reasons advanced for the present situation according to Iyagba and Odunlami (1989) can be summarized as:

- ▶ Decline in site skills
- ▶ Lack of on-site trade training
- ▶ Wide gap between designers and site operatives
- ▶ Building regulations not being applicable to certain buildings such as schools and public buildings
- ▶ Difficulty to understand bye-laws and codes of practice
- ▶ Absence of maintenance manuals or lack of understanding or maintenance
- ▶ Graft and corruption by some unscrupulous elements have given the construction industry an unenviable reputation and it is a known fact that Architects and Builders can offer favours to those who have the powers to award lucrative contracts.
- ▶ Structural failures are often determined after long investigations but usually after interest in the incident

have waned and little publicity is given to the final report. As a result, recurrence of similar accidents and failures are still very common.

- ▶ Non-recognition of the CORBON registered builders in the construction industry.

Effects of Building Failures

According to Olajumoke (2006), housing is more than mere shelter; it encompasses all ancillary service and community facilities, which are necessary for human well being. It is generally agreed that the most serious problems in the world today are in the so-called third world countries, which Nigeria is one of. The efforts made by the housing authority has yielded no fruit due to some reasons like poor implementation, party policies, illiteracy, inadequate finance, high cost of building materials, misconception etc. Failure definitely affects the building and the occupants. Generally the effects of building failure if not attended to through maintenance will automatically lead to building collapse and the results are summarized below:

- ▶ Loss of lives: Experts say not less than 200 people die every year as a result of building collapse in Nigeria alone. (News watch 1987)).
- ▶ Loss of money invested: The money invested on any building that collapses couldn't be recovered.
- ▶ Material wastage: Virtually all the materials used except the reinforcement cannot be recovered.
- ▶ Prestige of the owner: The landowner's prestige is lost in the society and in any association he belongs to as people see him as an accomplice in the loss of lives and his property.
- ▶ Reputation of the contractor: It tarnishes the reputation of the contractors and Engineer.
- ▶ Loss of the buildings aesthetic values: The disintegration of a building results in the loss of its aesthetic values and may even constitute an eye sore in a place when such situations is the other of the day.

- ▶ Increase in the cost of maintenance: Maintenance cost on buildings due to dampness, cracking, and foundation failure could be avoided if the scaling off of parts, plaster and occurrence of creaks due to plants growth are checked effectively.
- ▶ Leads to shortage of manpower: The occupants of such buildings are exposed to various diseases such as cholera, diarrhoea, malaria fever etc. These may constitute to a shortage of able bodies and minds, which may reflect in their jobs or businesses.
- ▶ A great loss to the economy: The incessant building collapse is a threat to sustainable physical development. It is imperative to state that sustainable physical development implies that development activities in physical environment take into consideration crucial issues of continuity and sustenance. Tang (2008) stated that any development process that ignores sustainability would hardly make any positive enduring impact that could stand the test of time. When a building disintegrates gradually, it loses its strength and stability amongst other things and this leads to collapse, which will amount to the loss of huge sums of money invested in its construction. This would cause a great loss to the private owner and the Federal Government because; it will affect the economy indirectly. Due to the collapse of the buildings, occupants of such building are rendered homeless suddenly or run the risk of being injured or killed if buildings are not vacated on time.

Remedies for Building Failures

Remedies for building failures include amongst many others: Use of standard materials and workmanship; Involvement of professionals in construction; Site investigation and trial holes; Good design; Prompt and adequate maintenance; Good and adequate supervision.

The Role of Professionals in Averting Building Failures:

Ochshorn (2006), states that large scale structural failure is a nightmare that hunts the construction industry. The financial lost, the demolished reputation, and the loss of life that resulted from the collapsed of buildings have troubled the state of mind of every professional Builder, Engineer, Architect, the government and sometimes the owner. The professionals have a lot of stake in averting building failures in the country. So also three tier of government (Local, State and Federal) and government regulatory organs, such as the state Town and Regional Planning Authorities and Standard Organization of Nigeria (SON). While the professionals have the duty to practice their profession in accordance with lay down rules and procedures, government and regulatory organ have the task of enforcing certain laws and policies guiding design and construction of buildings and the existence of substandard material in our market today. Similarly, the professional bodies including the Architects, Builders, Engineers, Town Planners, Estate Surveyors, Quantity Surveyors and Estate Valuers have to come together periodically to discuss the problems of the industry. Both the government and the professionals owe it as a duty to teach the public how to embrace that which is good. According to Simire (2008), who spoke on the “impact of standards in the construction industry” charge the professionals to adopt standards in the sector, which will introduce sanity in the building industry, and enable Builders to source supply of materials from different sources without compromising the outcome of their product? Olateju (1991) opined that collapse of building is often preceded by excessive deflection leading to extension crack propagation. Inexperience or lack of technical know-how may not make these sounds reasonable to the untrained, which in his quest for capital gains may further aggravate the stress and strains un-

til the collapse of building. The public at large should be informed about the fundamental requirement in building construction so as to be able to prevent them from patronising the untrained as to prevent the perpetual fatal building collapse in our society.

Research Methodology

The study adopted a survey research technique. The professionals working in different construction companies in Lagos State were chosen for the research, this is done to ensure adequate coverage of the population since larger percentage of the contractors operating in Nigeria operate from Lagos. The random sampling method was adopted for selecting this sample size using a well-structured questionnaire, which was self-administered to the respondents.

The secondary data were sought through a careful search of different texts in the libraries, journals, different magazines with subject matters related to the study. The responses were analyzed using the method of simple proportions, percentages, and frequency tables, mean item score and standard deviation.

Data Presentation and Analysis

Questionnaire Administered	65
Questionnaire Received	50
Response Rate	77%

Table 1 Response Rate of Respondents

The table above shows that 65 questionnaires were administered and 50 were recovered in which response rate calculated resulted to 77%. It is an indication of good response from the respondents.

Table 2: shows that 60% of the construction workers have less than 10 years of experience and 30% have 10 to 19 years experience, 6% have 20 to 29 years, while 4% have 30 to 39 years experience. This shows that 40 % of the construction workers have more than 10 years of experience; meaning that they possess adequate years of working experience.

Working Experience	Frequency	Percentage
Less than 10 years	30	60.0
10-19 years	15	30.0
20-29 year	3	6.0
30-39 years	2	4.0
Total	50	100.0

Table 2 Working Experience of the Professionals in the Construction Industry

Professions	Frequency	Percentage
Architect	5	10.0
Electrical Engineer	5	10.0
Builder	15	30.0
Mechanical Engineer	4	8.0
Civil Engineer	8	16.0
Quantity Surveying	13	26.0

Table 3 Profession of the Respondent

Qualification	Frequency	Percentage
OND or Equivalent	1	2.0
PhD	1	2.0
HND/B.Sc.	44	88.0
Others	4	8.0
Total	50	100.0

Table 4 Educational Qualification of the Respondent

Professionals boies	Frequency	Percentage
MNIA	4	8.0
MNIQS	9	18.0
MNIOB	12	24.0
MNSE	19	38.0
Others	6	12.0
Total	50	100.0

Table 5 Professional Qualification of the Respondents

Gender	Frequency	Percentage
Male	43	86.0
Female	7	14.0
Total	50	100.0

Table 6 Gender of respondents

Table 3: shows that 10% were Architect, 10% were Electrical Engineer, 30% were Builder, 8% were Mechanical Engineer, 16% were Civil Engineer and 26% were Quantity Surveying. This shows that the all professionals in the built environment are well represented for the study.

Table 4: reveals that 2% of the respondents were OND holders, 2% were PhD holders and 88% were HND/ B.sc holders and others are 8%. Thus the respondents are capable of providing the required information for the study, as most of the respondents are B.Sc holders.

Table 5: Shows that most of the respondents are Engineers with 38 % of them being NSE members, 24% of the respondents are members of NIOB, 18% are members of NIQS and 8% are member of NIA. This reflects the professional skills of the respondents, which are found to be crucial to the practise of the profession.

Table 6: indicated that 86% of the respondents are male, while 14% of the respondents are female. This shows that the males are the pre-dominant professionals in the construction industry.

Causes of Building Failure

In order to assess the causes of building failure from the respondents, the following ratings were used. 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - strongly Agree.

Table 7: represent the respondents ranking of the causes of building failures in the building selected for the study. The table shows that improper supervision, Poor materials and workmanship, Inadequate / Lack of maintenance, inadequate soil investigations are the main causes of building failure. Other causes are Lack of appropriate legislation against building failure, Patronage of quacks, Unethical practices of professionals, Construction problem, Engagement of unqualified builders / personnel, and Foundation Problems.

Involvement of the Professionals in the Causes of Building Failure

In assessing the professional's involvement in the incidence of building failures the following rating were used. 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree

Table 8: represent the respondents ranking of the involvement of the Architects in building failure. The table shows that Failure of the Architect to inspect /supervise architectural work to meet quality control, failure to conform to building code of practice, failure to conform to the planning and zoning laws

Causes of failures	N	Mean	Rank
Patronage of quacks	50	4.54	1
Engagement of unqualified builders/personnel	50	4.52	2
Inadequate soil investigation	50	4.46	3
Improper supervision	50	4.44	4
Poor materials and workmanship	50	4.44	5
Foundation problems	50	4.42	6
Non compliance to approved drawings	50	4.20	7
Design errors	50	4.16	8
Unethical practices of professionals	50	4.14	9
Construction problems	50	4.14	10
Inadequate/lack of maintenance	50	4.06	11
Owner contractor syndrome	50	3.94	12
Non possession of approved drawings	50	3.92	13
Lack of appropriate legislation against building failure	50	3.90	14
Inadequate funds	50	3.84	15
Mis-use of building by occupants	50	3.84	16
Unauthorized change of use	50	3.66	17
Wide gap between designers and site operatives	50	3.66	18
Site development errors	50	3.66	19
Unclear specification and contract arrangement	50	3.60	20
Inadequate knowledge about materials for construction	50	3.58	21
Lack of on-site training	50	3.52	22
Operator error	50	3.34	23

Table 7 Response to causes of building failures

Involvement of professionals	N	Mean	Rank
Failure to inspect /supervise architectural work to meet quality control	50	4.32	1
Failure to conform to the building code of practice	50	4.18	2
Failure to conform to the planning and zoning laws during design	50	4.02	3
Failure to prepare specification for all aspects of the work and consider such item as cost efficiency in operation and maintenance	50	4.02	4
Failure to convert design language to construction terms	50	3.98	5
Failure to ensure at all times that all elements of design are properly coordinated and integrated within the master programme requirement of the design and that design fully take into account the codes of practice	50	3.86	6
Improper planning	50	3.74	7
Failure to document design concept to be used by various contractors	50	4.70	8

Table 8 Contributions of the architect to building failure

Engineers involvement	N	Mean	Rank
Failure to carry out proper soil test prior to construction operation	50	4.32	1
Failure to carry out concrete cube test to determine the compressive strength of the concrete before use	50	4.28	2
Failure to provide site inspection of engineering works and quality control checks	50	4.16	3
Failure to inspect materials storage on site	50	4.04	4
Failure to carry out the feasibility studies	50	4.02	5
Failure to ensure that adequate access is provided to service installation	50	4.00	6
Failure to prepare preliminary engineering drawings and equipment specification for the purpose of planning approval and establishment of budget	50	3.98	7
Failure to consider the future maintenance and replacement of building, fabrics, finishes, and services	50	3.94	8
Failure to prepare proposals regarding conceptual, design, structural requirements, service and equipment	50	3.88	9
Failures to ensure adequate provision made for the most effective form of lighting, electrical power, air conditioning, ventilation, drainage etc	50	3.66	10

Table 9 Engineers Contributions to Building Failures

during design and failure to prepare specification for all aspects of work the work and consider such items as cost efficiency in operation and maintenance are the major contributions to building failures by the Architect.

Table 9: represent the respondents ranking of the contributions of the Engineer in building failure. The table shows that Failure to carry out proper soil test prior to construction, failure to carry out concrete cube test to determine the comprehensive strength of the concrete before use, Failure to provide site inspection of engineering works and quality control checks, failure to inspect materials storage on site and failure to carry out feasibility studies are the major contributions to building failures by the Engineer.

Table 10: represents the respondents ranking of contributions of the Builder in building failure. The table shows that failure to assess the workmanship of craftsmen, Failure to suggest solution to technical problems, failure to ensure construction methodology and Failure to ensure maintainability analysis of production information are the major contributions of the Builders to building failure.

Table 11: represent the respondents ranking of the contributions of the Quantity surveyor to building failure. The table shows that Failure to study life cycle and cost in use, failure to identify client objectives and priorities, failure to advice on financial plans and procurement, failure to arrange for work to be measured, valued, and certified regularly and Failure to study feasibility of capital project are the main contributions of Quantity Surveyors to building failure.

Table 12: represents the respondents ranking of the contributions of the town planners to building failure. The table shows that failure to ensure building control measure, ethical abuse, failure to regulate land use by controlling type of occupancy, building heights, density, and activity of the population in specified area and failure to monitor building design during construction stage are the main contributions of the Town Planners to buildings failure.

Effects of Building Failure

In assessing the effects of building failure on the stakeholders from the respondents, the following ratings were used. 1- Strongly Disagree, 2- Disagree,

3 - Neutral, 4 - Agree, 5 - Strongly Agree.

Table 13: represents the respondents ranking of the effects of building failures on construction professional. The table shows that Loss of reputation, waste of resources time and labour; and loss of lives are the predominant effect of building failures on the professionals.

Table 14: represents the respondents ranking of the effects of building failures on the client. The table shows that waste of resources time and labour, loss investment, increase cost of maintenance, loss of strength of the building, degrading environment and loss of lives are the pre-dominant effects on the clients.

Table 15: represents the respondents ranking of the effects of building failures on the nation. The table shows that degrading environment, waste of resources time and labour, increments of sick citizens and loss of reputation were the predominant effects of building failures on the nation.

Remedies to Building Failures

In assessing the remedies to building failure from respondents, the following ratings were used.

Engineers involvement	N	Mean	Rank
Failure to assess the workmanship of craftsmen	50	4.18	1
Failure to suggest solution to technical problems	50	4.16	2
Failure to ensure construction methodology	50	4.12	3
Failure to ensure maintainability analysis of production information	50	4.04	4
Failure to study production information	50	3.98	5
Failure to provide Building production document	50	3.88	6
Failure to write report on the builders documents	50	3.76	7
Failure to manage the construction process	50	3.70	8
Failure to be in charge of building and maintainability	50	3.54	9
Failure to prepare programme of work	50	3.54	10

Table 10 Builders Contributions to Building Failure

Quantity surveyors involvement	N	Mean	Rank
Failure to study life cycle and cost in use	50	3.92	1
Failure to identify client objective and priorities	50	3.84	2
Failure to advise on financial plans and procurement	50	3.78	3
Failure to arrange for the work to be measured, valued, and certified regularly	50	3.76	4
Failure to study feasibility of capital project	50	3.76	5
Failure to advise on capital investment	50	3.74	6
Failure to establish system of continuously monitoring actual costs against the budget to provide the control instrument required by the client	50	3.72	7
Failure to monitor capital project	50	3.66	8
Failure to prepare a budget for the project	50	3.66	9
Failure to establish procedures regarding the measuring of variation and their costing and feedback into the overall cost budget position	50	3.62	10
Failure to supply final cost to feedback information	50	3.60	11
Failure to produce and update cash flow requirement	50	3.44	12

Table 11 Quantity Surveyors Contributions to Building Failure

Town planners involvement	N	Mean	Rank
Failure to ensure building control measures	50	4.24	1
Ethical abuse	50	4.22	2
Failure to regulate land use by controlling type of occupancy, building heights, density, and activity of the population in a specified area	50	4.10	3
Failure to approve layout for building construction	50	4.00	4
Failure to monitor building design during construction stage	50	3.96	5

Table 12 Contributions of Town Planners to Building Failure

Quantity surveyors involvement	N	Mean	Rank
Loss of reputation	50	4.54	1
Waste of resources time and labour	50	4.22	2
Loss of lives	50	4.16	3
Loss of strength of the building	50	4.06	4
Degrading Environment	50	3.98	5
Loss of Aesthetic value	50	3.90	6
Shortage of manpower	50	3.90	7
Increase cost of maintenance	50	3.80	8
Loss of investment	50	3.80	9
Increment of sick citizens	50	3.60	10

Table 13 Effect of building failure on the professionals

Effects of failures	N	Mean	Rank
Waste of resources time and labour	50	4.64	1
Loss of investment	50	4.34	2
Increase cost of maintenance	50	4.28	3
Loss of strength of the building	50	4.14	4
Degrading Enviroment	50	4.12	5
Loss of lives	50	4.08	6
Loss of Aesthetic value	50	4.00	7
Loss of reputation	50	3.78	8
Increment of sick citizens	50	3.68	9
Shortage of manpower	50	3.42	10

Table 14 Effects of Building Failure on the Clients

1- Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree

Table 16: represents the respondents ranking of the remedies to building failure. The table shows that good and adequate supervision, use of standard materials, involvement of professional to ensure good and adequate supervision, soil investigation discipline of professional if proven that they are involved in misconducts, promulgation of appropriate legislation against building failure, proper check of detailing by builder and designer and compliance to approved drawings are the predominant remedies to building failures.

Hypothesis Testing

Hypothesis: None of the causes of building failure is more significant than the other.

The result for one sample t test is presented in the table 17.

The value of t tabulated at the significant level of 0.05 is 2.021 and comparing the value with the various t calculated, it was observed that the t tabulated is lesser to the t calculated. As such the null hypothesis is rejected and the alternative hypothesis, which says causes of building failure, is more significant than the other is accepted.

Summary of Findings

The study revealed that:

- ▶ More men are found to be dominating the construction industry.
- ▶ The patronage of quacks, engagement of unqualified builders / personnel, inadequate soil investigation, improper supervision, improper supervision and lack of appropriate legislation against building failures are the main causes of building failure.
- ▶ Degrading environment and waste of resources time and labour are the major effects of building failures.
- ▶ Building professionals are found to be contributing to building failures especially when they fail to perform the roles as stated in their professionals practise.

Effects of failures	N	Mean	Rank
Degrading Environment	50	4.40	1
Waste of resources time and labour	50	4.38	2
Increment of sick citizens	50	4.30	3
Loss of reputation	50	4.26	4
Shortage of manpower	50	4.16	5
Increase cost of maintenance	50	4.04	6
Loss of strength of the building	50	3.94	7
Loss of investment	50	3.92	8
Loss of Aesthetic value	50	3.90	9
Loss of lives	50	1.76	10

Table 15 Effects of Building Failure on the Nation

Remedies of failures	N	Mean	Rank
Good and adequate supervision	50	4.62	1
Use of standard materials	50	4.58	2
Involvement of professional builders in the construction process	50	4.56	3
Soil Investigation	50	4.50	4
Discipline of professionals, if proven that they are involved in failures	50	4.46	5
Promulgation of appropriate legislation against building failure	50	4.44	6
Proper check of detailing by builder and designer	50	4.42	7
Compliance to approved drawings	50	4.42	8
Provision of a detailed design	50	4.38	9
Involvement of professional Builders in the composition if building regulation	50	4.38	10
Adequate and firm inspections	50	4.36	11
Strict compliance to data available and geotechnical properties of the soil	50	4.36	12
Prompt and necessary measure towards deterioration & defect	50	4.30	13
Proper site investigation and development	50	4.30	14
Enforcement of Insurance of buildings against failures	50	4.18	15
Correct use and installation of fittings	50	4.16	16
Adequate and planned maintenance	50	4.14	17
Education of the occupiers of the building	50	4.06	18
Publicity of the consequences of illegal buildings	50	4.02	19

Table 16 Remedies to building failure by the respondents

- ▶ Clients need to be educated on the need to snub quacks; it is a principal crime for non-professionals to handle any construction project.
- ▶ Building professionals should be prepared to flush out quacks without delay.
- ▶ An appropriate legislation should be promulgated against building failure.
- ▶ The involvement of construction professionals in the design and construction of buildings is the most effective way of reducing building failures.

Causes of building failure	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Improper supervision	58.076	49	.000	4.440	4.29	4.59
Poor materials and workmanship	48.753	49	.000	4.440	4.26	4.62
Inadequate soil investigation	46.623	49	.000	4.460	4.27	4.65
Inadequate/lack of maintenance	29.369	49	.000	4.060	3.78	4.34
Owner contractor syndrome	33.049	49	.000	3.940	3.70	4.18
Design errors	35.997	49	.000	4.160	3.93	4.39
Patronage of quacks	42.153	49	.000	4.540	4.32	4.76
Foundation problems	35.407	49	.000	4.420	4.17	4.67
Construction problems	37.401	49	.000	4.140	3.92	4.36
Non possession of approved drawings	28.708	49	.000	3.920	3.65	4.19
Non compliance to approved drawings	39.287	49	.000	4.200	3.99	4.41
Engagement of unqualified builders/personnel	58.795	49	.000	4.520	4.37	4.67
Site development errors	27.556	49	.000	3.660	3.39	3.93
Operator error	25.147	49	.000	3.340	3.07	3.61
Lack of appropriate legislation against building failure	26.149	49	.000	3.900	3.60	4.20
Mis-use of building by occupants	29.080	49	.000	3.840	3.57	4.11
Unethical practices of professionals	28.974	49	.000	4.140	3.85	4.43
Wide gap between designers and site operatives	29.694	49	.000	3.660	3.41	3.91
Lack of on-site training	24.523	49	.000	3.520	3.23	3.81
Inadequate knowledge about materials for construction	26.076	49	.000	3.580	3.30	3.86
Unauthorized change of use	26.940	49	.000	3.660	3.39	3.93
Unclear specification and contract arrangement	21.609	49	.000	3.600	3.27	3.93
Inadequate funds	29.786	49	.000	3.840	3.58	4.10

Table 17 One Sample T Test for Significant Level of Causes of Building Failures

- ▶ Other major ways of reducing building failures are the use of standard materials, adequate supervision, and adequate and regular maintenance.
- ▶ The test of the hypotheses is revealed that the causes of building are more significant than the other.
- ▶ The test of another hypothesis also revealed that building failure has significant effect on the stakeholders (i.e. client and construction professionals).

Conclusions

From the study carried out, it is evident that building failure is not caused by a

single factor but multiple factors, most of which are human factors. The building industry today is full of quacks and inexperienced contractors, who enrich their purses and consequently produce substandard buildings, which is hazardous to the owners and occupants. The major reason for building failure stems from the patronage of quacks, which invariably results in inadequate design and poor supervision. This has continued for ages despite the calls made over the years for the patronage of building professionals and the integration of design and construction process.

Furthermore, the use of inferior building materials, which does not conform to the British standard and specification, is one of the factors affecting the construction of sound buildings. Most clients construct their buildings using just one quack, who serves as Architect, Builder, Quantity surveyor and Engineer. Poor management and leadership on the part of site Engineers and Builders has also caused a lot of building failures. Lastly, there is the absence of an effective planning approval authority, also where approval is obtained; it is not adhered to.

Recommendations

Based on the findings, it is pertinent to make recommendations on ways to reduce, if not eliminate the causes of building failures and to prevent the re-occurrence of the ugly situations that follows such failures such as social and economic results. The recommendations are as follows:

- ▶ A qualified and professional designer must always be allowed to undertake designs of buildings.
- ▶ Only professional and qualified builders, engineers and architects should take control of the supervision of buildings.
- ▶ Building contractors should be monitored to guarantee the use of high quality materials.
- ▶ The local planning authorities in charge of approving building plans should be properly organized, in order to enforce all building laws and regulations and establish a building control unit.
- ▶ Registered builders should be employed by local planning authorities to enforce the necessary building regulations.
- ▶ Prior to any design work, adequate investigation must be carried out as to enable the design of a suitable foundation..
- ▶ Cost of building materials, should be reduced by the government, in order to reduce the temptation to use sub-standard materials.
- ▶ All materials used in the building industry should strictly comply with the British standard. The authorities of the Nigerian Institute of Building should enforce this.
- ▶ Appropriate construction methods should be adopted.
- ▶ A better maintenance culture should be developed.
- ▶ Code of ethical conduct of building profession should be strongly enforced by the bodies concern as to prevent ethical abuse by the professionals in the industry.

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