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AUTHENTICATION OF PHYSICAL PLANNING AUTHORITY AND BUILDING COLLAPSE: CONTEMPORARY CHALLENGES IN NIGERIA.

BY

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Abstract:

The control of physical developments, and proper coordination of present and future requirements, in addition to creating an enabling environment for living and working, is the major priority attached to planning organisations. Planning is beyond paperwork and approval, it's the responsibility of designing authority to regulate development activities for the aim of supporting, enclosing, and protecting building structures likewise as inspecting buildings on sites after approval from the foundation level to the final. This study is to look into the authenticity of physical planning activities and building regulations in order to keep structures from collapsing. The study focuses on two objectives. Firstly, examine the procedural basis for physical planning regulations. Secondly, assess the structure physical planning system on contentious causes of building collapse. The study emphasizes two areas: Abuja, Federal Capital Territory, and Lagos City. A quantitative research method was included in the study. A total of 66 questionnaires were distributed. The Federal Capital Development Authority (FCDA) Abuja and the Lagos State Urban Development Board were among the forty-four (66) respondents surveyed for the study (LSUDB). On the working site, 20 workers were interviewed orally with the help of ad hoc staff. To identify the relationship and correlation coefficients between the physical planning authentication and structural failure. The study adopted a linear regression. The study found strong evidence of poor planning and coordination, particularly building plan interpretation, building plan approvals, and enforcement orders; poor building materials; and a low standard mixed ratio as a factor in building collapses. This research will help decision-makers, stakeholders, and site developers follow planning laws and building standards in order to minimize the rate of building collapse in Nigeria.

Keywords: *Authentication; Physical planning regulation; Building collapse; Contemporary challenges; Safeguarding.*

1. Introduction

Building collapse becomes regular news in Nigeria. Between 2005 and 2020, more than 152 buildings collapsed in Lagos alone. More than three blocks were residential properties with high storeys. Other multiple buildings of about six storeys claimed 116 lives during a church service in 2014. The control of physical developments, proper coordination of present and future requirements, as well as the creation of an environment for living and working, are the major priorities attached to the planning organisation.

Planning is beyond paperwork and approval. It is the responsibility of the planning authority to control development activities, and inspect the buildings on sites after approval from the foundation level to the finished levels. Planning regulations need to be enforced to address the incidence of building collapse which has attended an alarming rate at which records had escalated beyond boundaries on a daily (Mrabure & Awhefeada, 2021). The design of buildings should be done by professionals within the construction industry, with safety and economy as the principal design criteria to be critically checked by the planning authority to meet the basic needs of man. Its main intent is to avoid damage to life, property, and the environment. A building collapse is the failure of a building or part of it due to poor construction materials or natural coursed.

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In Indonesia, between 2017 and 2020, construction accidents and building failures caused about 8 to 15 cases of collapse and 1 to 4 deaths were confirmed. Building collapse has become a subject of academic discussion, yet nothing reasonable has been improved. Quite a few cases of building collapse have been reported, and the problem persists in recent times (Hamma-Adama et al., 2020). For a decade, approximately 77 percent of buildings in Nigeria's urban areas collapsed, despite inadequate measures being put in place to overcome the challenges (Qurix & Doshu, 2020).

In the process of determining the root causes of building collapse, the researchers identified specific areas in which interested parties in the construction industry and the community are affected (Prof et al., 2015). As a result of the building collapses, the construction safety committee was formed and charged with the responsibility of monitoring and evaluating major construction risks, conducting construction accident investigations, providing advice and considerations, and recommending risk mitigation in order to achieve construction safety (Manik et al., 2021). The inability of construction firms does not receive any form of supervision on construction sites from monitoring authorities, and the construction firms themselves have weaknesses in the areas of staff training, education and skills, objective measurement, feedback, and use of total quality tools and techniques (Conference & Universi, 2019).

The causes of building collapses can be grouped into five: design, construction, material, administrative, and maintenance deficiencies (Manik et al., 2021). Building collapse occurs due to a building's inability to withstand the weight and pressure placed on its own position. (Hamma-Adama et al., 2020). Researchers highlighted the reasons for constructing collapses in Nigeria, such as failure to control immoderate deflection and cracking; weakening of additives past repairable limits; shaking of the pillars (Awoyera et al., 2021). The researchers investigate current issues in construction accidents and the implementation of appropriate recommendations to support the advancement of Nigeria's essential development industry (Emekoma, 2019).

The building collapse comes about as a result of weak structural components, which inevitably leads to its failure (Obodoh et al., 2019). Building collapses in Nigeria have increased unprecedentedly recently (Prof et al., 2015). Out of 139 confirmed cases between 1978 and 2013, Lagos recorded 19.85% of building collapse, while over 100 lives were lost after the collapse of a religious building in 2014, which was mostly caused by structural deficiencies (Layi & Ademola, 2016). Building defects, flaw imperfection, deficiency, weakness shortcomings, mistakes, errors, kink, bugs, and faults in building components that make up the structure are reflected in building failure and collapse (Okagbue, 2018). Building collapses in Nigeria are caused by structural defects, poor materials, construction defects, poor concrete procedures and technology, structural problems caused by debris in the soils, geological reasons, low-quality reinforced steel bars, substandard concrete, and concrete blocks (Okagbue, 2018).

The building collapse in Kumasi, Ghana was caused by the failure of developers to comply with Ghana's building regulations (Asante & Sasu, 2018). There is associated the problems of building collapse have ranged from faulty design, negligence, incompetence, faulty construction, foundation failures, extraordinary loads, and corruption. They also identified the forces of nature to be part of the cause of building collapse. The quality and strength of a building is the ability of its soundness to withstand its intended load-bearing capacity without failing as a result of broken and cracked, deformation fatigue. The researchers used engineering and density control in planning to produce high-standard buildings and accommodate specific building densities; and function for a long period.

The causes of building failure and collapse in Nigeria are related to poor materials, natural courses, structural defects, failure to manage construction processes efficiently, construction defects, corruption or acute practices, and non-compliance (Okagbue, 2018). The aim of the study was to examine building physics planning activities and planning laws to address building collapse. Over a decade, the building of interest and land disputes, and environmental disasters (Ede, 2010). The frequent occurrence of building collapses in Nigeria required the skill and effectiveness of the on-site builders in the quality, durability, performance, and components of the material used in the competition, and the building collapses claimed human lives, devastating property, and jobs, lost income, loss of trust and dignity among builders and engineers, conflicts effectiveness of the on-site builders in the quality, durability, performance, and components of the material in the construction industry (Ayodeji, 2011).

2. Material and Methods

Building collapse is the sudden structural failure of a building, which threatens human life and health, as the internal load-bearing structural elements fail, a building collapses in on itself, and external walls are pulled into the failing structure. The study investigated the intellectual causes of building collapse in Nigeria and identified the main causes that shaped future government policies(Hamma-Adama et al., 2020). The research looks at the effects of building collapse risk on stakeholders in Nigeria's built environment (Obodoh et al., 2019). he Yamane analysis was used to measure data in the study, which included descriptive statistics and weighted mean. Inability to comply with the planning regulations has the potential to cause construction accidents, especially in developments with an overall design concept that has been reached long before the construction process (Publication, n.d.).

Poor workmanship, substandard construction materials, unsuitable sites, and poor architectural designs are among the factors that cause building collapse, according to the researchers (Conference & Universi, 2019). The study attributes the building collapse to developer corruption and greed, which has a negative impact on the quality of the buildings and has also resulted in the employment of unqualified artisans (Oyedele, 2018). The underlying causes

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of building collapse can be identified and evaluated as a preventive measure, which can significantly reduce the number of collapsed structures throughout Nigeria's construction industry (Essien & Ajayi, 2017). The study determined the causes and preventive measures for building collapses in Nigeria's construction industry.

The researchers used scholarly articles to investigate the causes of building collapses in Nigeria in order to shape future government policies (Hamma-Adama et al., 2020). he researchers discovered scholars' hypotheses, relevant laws such as the Nigerian Urban and Regional Planning Law Act 1992, the Urban and Regional Planning and Development of Lagos State 2010, and other regulatory bodies such as the Town Planning Registration Council (TOPREC) that enforce professional values and practice (Mrabure & Awhefeada, 2021). According to the researchers, the causes of building collapse include poor design and material specification detected by an unqualified supervisor or incompetent professional; construction errors; client undue interference; commercial dishonesty; natural causes; man-made reasons; and wear and tear (Qurix & Doshu, 2020).

The study investigates the role of local planning authorities in the increasing cases of collapsed buildings in Enugu, Nigeria(Okeke et al., 2020). The researchers categorised the causes of building collapse into design-related causes of building collapse and construction-related causes of building collapse (Imafidon & Ogbu, 2020). The study analysed the supervisory role and challenges of building inspectors in Kumasi to minimise the incidence of building collapse(Asante & Sasu, 2018). The study employed stratified sampling techniques to select 27 out of 35 building inspectors for the Kumasi Metropolitan Assembly (KMA) (Hummel, 2020). The study employed cross-section lag-mediated multiple regression to show that population and housing density have statistically significant indirect effects on income in a sample of more than 300 metropolitan areas in the United States(Okagbue, 2018).

Bamigboye et al., (2019) examine the factors contributing to incessant building failure and collapse in Nigeria. The trend and pattern of building collapse in Nigeria followed a consistently recorded case of residential high-rise building collapses that necessitated professional input from the building industry, developers, and decision-makers(Layi & Ademola, 2016). The problem of building collapses in Nigeria emanates from poor policy and a lack of professional input to combat the rising cases. The researcher (Ede, 2010); (Ede et al., 2021). The researchers investigate the effects of poor-quality building materials and workmanship on building collapses in Nigeria and their consequences (Ayodeji, 2011).

2.1 Theoretical Framework

The Nigerian government has enacted regulations at various times to guide building development in order to reduce the threat and risks associated with building collapse. The Nigerian Urban and Regional Planning Act No. 88 of 1992 was enforced by the government in 1992 to facilitate the preparation and implementation of development plans and planning schemes to create a better environment for living, working, and recreation.

The Act was also intended to increase the seriousness of development control, among other specific goals. Professionals, technical planners, and engineers have justified the contractors and supervisors on the construction site at every stage of development as specified in Nigeria's urban and regional development plans to prevent future incidents of structural failures and collapses. Of course, this technical justification should take into account the design and calculations, as well as consult with architects, engineers, and clients.

Building collapse risk includes economic and financial risk, socio-political risk, human-related risk, physical risk, environmental risk, and legal risk (Obodoh et al., 2019). The data was obtained from the Scopus website, and 35 documents were displayed (Okagbue, 2018).

Hamma-Adama et al., (2020)used systemic thinking to create a causal loop diagram of the interrelationships between differential settlement, structural failure, and structural issue. The researchers discovered that building materials such as reinforcement steel, construction materials, and concrete were major contributing factors, accounting for 10-25 percent of building collapses in Nigeria (Bamigboye et al., 2019). Professionals and the general public were unable to exonerate because most developers lacked building codes, development control tools, and adequate building materials in order to reduce construction costs (Layi & Ademola, 2016). Conference & Universi, (2019) investigate how quality management practises on construction sites affect the threat of building collapse in Nigeria. The Development Control Department was in charge of approving development on any land under its control and judging any drawing plan made to be built in line with building codes (Mrabure & Awhefeada, 2021).

Table 1. Global building collapse and casualtie

Year	Structural collapse	Location	Building Type	Casualties
2020	Kep building collapse	Kep, Cambodia	Tourist guesthouse	36 dead 26 injured
2020	Xinjia Express Hotel	Quanzhou, Fujian, China	Hotel	29 dead
2020	Caprigliola bridge	Caprgliola	Bridge	2 injured
2020	Lecheng Bridge	Sanxi, Jingde County, Anhui, China	Bridge	No dead or injured
2020	Zhenhai Bridge	Hungshan City, Anhui Chna	Bridge	No dead or

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				injured
2020	Junxian Restaurant	Linfen City, Shanxi China	Building	29 dead, 28 injured
2020	Nest on Wonderland	London Ontario, Canada	Apartment	2 dead, 4 injured
2020	Arcibo Telescope	Arecibo, Puerto Rico	Telescope	No dead or injured
2021	Brindisi warehouse	San Michele Salentino, Apulia, Italy	Warehouse	1 dead, 4 injured
2021	Cairo apartment	Gesr El-Suez, Cairo, Egypt	Apartment	25dead, 25 injured
2021	Bangkok residence	Kritsadanakhon 31 Village, Bangkok, Thailand	Residential	4 dead, 79 injured
2021	Mexico City Metro overpass	Tlauac, Mexico City, Mexico	Overpass	26 dead, 79 injured
2021	Gwangju building	Gwangju, South Korea	Collapse onto the bus during demolition	9 dead, 8 injured
2021	Antwerp building	Jos Smolderenstraat, Antwerp Belgium	Primary school	5 dead, 20 injured
2021	Destruction of al-Jalaa	Gaza City	Building	No casualties
2021	Rucheng residential building	Rucheng County, Hunan, China	Residential	5 dead, 7 injured
2021	Surfside condominium	Surfside, Florida, US	Condominium tower	98 dead, 11 injured
2021	Sangam Bridge	Arunachal Pradesh, Indian	Bridge	3 missing
2021	Zuzhou hotel collapse	Zuzhou, Jiangsu Province, China	Hotel annex	17 dead, 5 injured
2021	Kelowna crane collapse	Kelewna, British Columbia, Canada	Construction crane	5 dead
2021	Font Nova residential unit	Peniscola, Valencia Community, Spain	Residential	2 dead
2021	Haltern am See Nordex N-149 wind turbine collapse	Halterm am See North Rhine-Westphalia, Germany	Wind turbine	No records
2021	Bryn Mawr 'L' Stop crane	Chicago (Edgewater Beach), Illinois, United States	CTA Red Line station	No injured, car crushed
2021	AdventHealth Orlando parking garage crane	Orlando, Florida, United States	Parking garage	1 injured
2021	Lagos high-rise	Ikoyi, Lagos, Nigeria	Apartment under construction	15

Source: Adapted from https://en.wikipedia.org/w/index.php? December; 2021.

Table 2. Building collapse and its effect on human lives in Nigeria between 2006-2019

Year	Building collapse	Location	Building Type	Casualties
2006	Lagos building	Lagos, Nigeria	1 Residential, 1 Commercial, under construction	28 dead,86 injured
2006	Eziama Bridge	Imo, Nigeria	Bridge	No record
2010	Ikeja City Mall	Lagos, Nigeria	Mall	5injured
2014	Synagogue Church	Lagos, Nigeria	Building	115 dead
2016	Lagos building	Lagos, Nigeria	Building under construction	No record

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2016	Uyo Church	Uyo, Nigeria	Church	60 dead
2019	Lagos School	Lagos Nigeria	Residential	20 dead, 60 injured

Source: Author's Review, 2021

Table 3. Building collapse in Nigeria between 2010 – 2021

Year	Building collapse	Location	Building Type	Casualties
2012	33 buildings	Lagos	Mixed	Not recorded
2012	22 buildings	Abuja	Mixed	Not recorded
2013	17 building	Lagos	Mixed	Not recorded
2013	20 buildings	Abuja	Mixed	Not recorded
2014	13 buildings	Lagos	Mixed	Not recorded
2014	2 buildings	Abuja	Mixed	Not recorded
2017	54 buildings	Across Nigeria	Mixed	Not recorded

Source: Author's Review, 2021

Table 4. Building collapse and their causes in Lagos and Abuja between 2010 – 2021

Year	Building	Location	Causes of collapse	Casualties
2010	Residential under construction	Isopakodowo street Cairo, Lagos.	Substandard material	4
2010	Residential under construction	Onuru Estate. Victoria Island, Lagos	Substandard material	1
2010	2 storeys under construction	Nkwerre street Garkin Abuja	Below standards	1
2010	Commercial (6 storeys)	Plot 702 Garki Abuja	Substandard material	11
2010	Wall fence	Aghaji crescent Garki Abuja	Poor drainage	1
2010	Uncompleted 4 story	Ikole street, Abuja	Substandard material	23
2010	4 storeys	28 Tinibu street Lagos	High loadbearing	3
2010	5 storeys	Aderibigbe Maryland, Lagos	Not available	None
2011	2 storeys	Nyanya, Abuja	Large pan slab	4
2011	Structural collapse	Abuja, Nigeria	Overloading/materials	100
2011	3 storeys	Oloto street Ebutte meta-area Lagos	Below standards	10
2011	3 storeys	Orosanye street Lagos	Poor supervision	None
2012	2 storeys	Gwarinpa Housing Estate, Abuja	Defection/demolition	3
2012	Commercial (2 stores)	Apo mechanic village	Distortion/master plan	14
2012	2 storeys Under construction	3 Ademola Awosike Kubwa, Abuja	Poor aggregate/control	3
2012	Structural collapse	Abuja, Nigeria	Unsupervised/weak	2
2012	Mixed uses	Jakande estate Oke-Ake Isolo Lagos	Poor maintenance	3
2013	Twin 4 storeys duplex	Victoria Island, Lagos	Not confirmed yet	4
2013	3 storey building	Ebute meta-area Lagos	Poor aggregate	7

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2014	Synagogue Church of all Nation	Ikotun-Egbe area of Lagos, Nigeria	Structural failures	116
2015	4 storeys	6 Mogaji street Idumota Lagos	Not confirmed yet	1
2015	3 storeys	Ebutte metta, Lagos	Structural failure	None
2015	3 storeys	Swamp street Odunfa Lagos island	Structural failure	None
2016	2 storeys	Mile 12, Lagos	Structural failure	1
2016	Residential	Horizon 1, Lekki, Ikate, Lagos	Structural failure	18
2016	5 storeys under construction	Lagos peninsula (Lekki district)	Structural failure	30
2017	4 storeys	3 Massey St, Lagos Island	No results	None
2018	4storeys	Jabi Federal Capital Territory Abuja	Substandard material	2
2019	3 storeys	Ita Faaji area Lagos, Nigeria	Distortion/master plan	20
2021	Lagos high-rise	Ikoyi, Lagos, Nigeria	Under construction	15
	Total	Only Abuja and Lagos	-	397

Source: authors, Review, 2010 – 2021.

Causes of Building Collapse in Nigeria

Poor foundation, dilapidation, failure of building members, poor maintenance culture, construction defects, flood, and fire incidence accounted for more than 94 percent of 139 recorded cases of building collapse (Layi & Ademola, 2016)

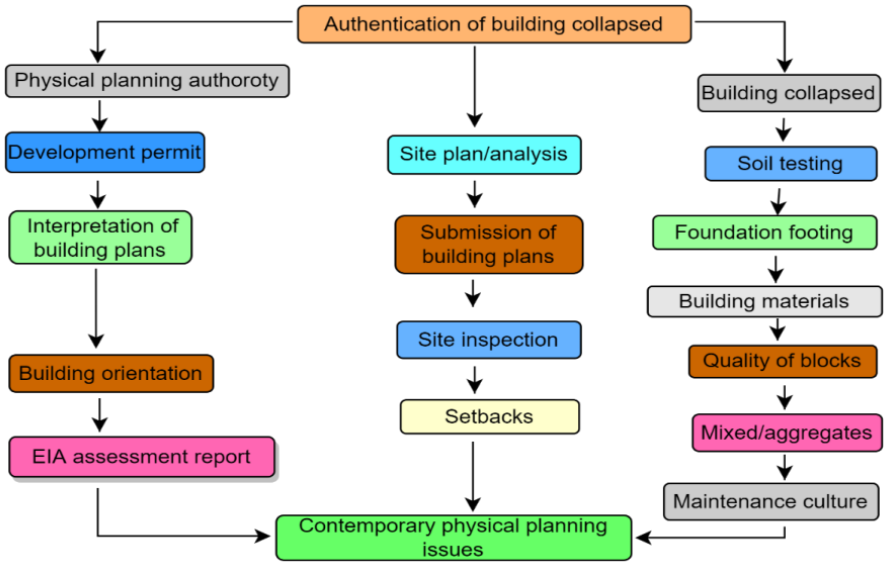

Figure 1. Contemporary building challenges in Nigeria
Source: Author's, 2021.

Lagos State Urban planning and Development Regulations, Under Nigeria Urban planning law

- Enforcement of building regulations
- Inspection building sites and authenticate the quality, record the quality at every stage.
- Removal of kinds of buildings not conforming and compliance with the regulation.
- Authentication and removal of unsatisfied buildings from collapse
- Presentation of a certificate on the completion of building and authentication for habitation
- Maintenance of building service and material evaluation, testing, and fire extinguishers
- Adhere to planning permission to achieve zero tolerance of illegal developments
- Carrying out public enlightenment on building regulation and control.

The regulations and laws give the local authorities to enforce, inspect all buildings, verify and authorise their conditions, and issue a certificate in accordance with the regulations. Section 48 requires developers to submit all drawing plans, as well as a risk insurance policy certificate. drawing plans under section 48 as well as a risk insurance policy certificate.

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3. Methodology

This study was based on the actualisation of building failure and collapse, the study employed quantitative research techniques. Data on physical planning regulations and other professionals at building industry were structured and featured with the local builders and site supervisors through questionnaire administration. Conference proceedings; reports, and journals on building collapse were also consulted from reliable internet sources. The researchers distributed questionnaires to professionals in the building construction industry(Essien & Ajayi, 2017). Frequency distribution, percentages, and mean response analysis were among the descriptive statistical techniques used. Prof et al., (2015) used a Vensim model to create a causal loop diagram in order to identify major leverage points on which policies should be based and to control extreme building collapse (Hamma-Adama et al., 2020). In addition, simple linear regression analysis mostly used to estimate the relationship between the number of casualties and the height of the collapsed buildings (Ede, 2010); (Ede et al., 2021).

Ayodeji, (2011). focuses on two action areas: Abuja, Federal Capital Territory, and Lagos State. Qurix & Doshu, (2020).structure questionnaire to validate professionals and the historical trend of building collapse in Nigeria Primary and secondary data were used by the research group. The questionnaire survey was used in this paper. A total of 66 questionnaires administered by professionals within field of planning and building sectors at the Capital Territory Development Authority (FCDA) in Abuja and the Lagos State Urban Development Board (LSUDB). On the working site, 20 construction workers were interviewed orally on the job site by an ad hoc team. The percentage of planning professionals who are committed to making sure contribution to building collapse. The study also revealed that the measure was implemented by relevant planning authorities, but a lack of political will and developer attitudes discouraged planning authorities from actively carrying out their duties.

This study employed Chi-square goodness of fit and simple linear regression analysis to determine the relationship and coefficient of correlation between planning coordination and building collapse. The use of secondary data was emphasised, and previous cases of building collapse in Lagos, Nigeria, from 1978 to 2013, were within 5 years, and incidences were aggregated into six years of re - occurrence (Layi & Ademola, 2016). The researchers used descriptive statistics and a Global Positioning System to pinpoint the point of building collapse. Secondary data were used in conjunction with primary data obtained through a structured questionnaires to effectively assess the threat of building collapse (Conference & Universi, 2019).

Table 5. Demography of Respondents

Types of specialisation	Frequency	Percentage
Planning professionals	22	33.33
Architectures	12	18.18
Quantity surveying's	10	15.15
Structural engineers	8	12.12
Geoinformatics	4	6.06
Electrical engineers	4	6.06
Mechanical engineers	6	9.09
Total	66	100%

Source: Author's: 2021

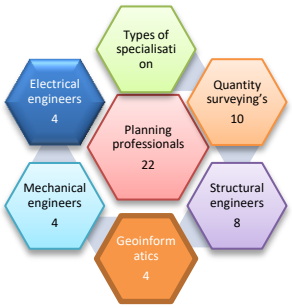

Figure 2. Professionals involved in the coordination of building development guides.

4. Result and Discussion

The need to build a strong and sound building should be such a type that supports its load-bearing including that of the occupants. Numerous factors contributed to building failure and collapse. The factor can be categorised as physical, social, or economic. The physical factors were related to natural and man-made as a result of the inability to take an appropriate measure from the pre-plans stage.

Table 6. Summary of responses on physical planning authorisation and building collapse

Physical planning authorisation and building collapse	**5 - 4**	**3**	**2 - 1**	**Remark**
Does the developer obtain a development permit before building?	3	0	2	5
Is the building plan tailor to the site plan?	3	0	2	5
Does the developer satisfy the requirement for site analysis?	2	0	1	3
Does the authority translate to the developer before approval?	4	0	1	6
Does the authority interpret to the developer before approval?	3	0	1	4
Does the site plan follow Setback's regulations?	3	0	2	5
Does the building	3	0	1	4

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orientation point in the right direction?				
Does the planning authority inspect the building site regularly?	3	0	1	4
Do the developers attach an EIA report for the high-rise building?	3	0	1	4
Do authorities satisfy the foundation footings while inspecting?	3	0	2	5
Was the developer taken building maintenance appropriately?	3	0	2	5
Do authorities study the building plans appropriately?	3	0	2	5
Does the EIA satisfy soil test	2	0	0	2
Does the quality and strength of blocks meet the standards?	3	0	2	5
Is the nature of the material and mixed aggregate acceptable?	3	0	2	5
Total	44	0	22	66

Summary of responses on authentication of physical planning regulations; 5 - 4 = Agreed, 3 Neutral, 2-1 = Disagree
Source: Authors, 2021.

The table above depicts the level of professional conduct and developers' responses to physical planning authorities regarding compliance and noncompliance with building regulations. 22(33.33%) of the fifteen variable cases of building collapse there under regulatory planning profession collapsed buildings without planning permits and supervision.

Figure 3. Collapsed Building in Lagos, Nigeria, 2021

Figure 4. collapsed Building in Lagos, 2021

Table 7. Relationship between physical Planning authorisation and building collapse

The building process and structural considerations	O	E	(O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
Building permit	3	2	1	1	0.5
Site plan	3	2	1	1	0.5
Site analysis	2	1	1	1	0.5
Submission of Plans	4	1	3	9	9
Building plan interpretation and approval	3	1	2	4	4
Setbacks	3	2	1	1	0.5
Building orientation	3	1	2	4	4
Site inspection	3	1	2	4	4
Environmental impact assessment	3	1	2	4	4
Foundation footings	3	2	1	1	0.5
Building Maintenance at the site	3	2	1	1	0.5
Drainages	3	2	1	1	0.5
Soil testing	2	0	2	4	4
Quality of blocks	3	2	1	1	0.5
Mixed aggregates	3	2	1	1	0.5
Total	∑44	∑22	∑22	∑38	∑33.5

Source: Authors, 2021.

$$X^2 = \sum \frac{(O - E)^2}{E}$$

$$\frac{33.5}{22} = 1.5227.$$

$X^2 = 1.5227.\ \alpha = 0.05$

df = 15 - 1 = 14. 5 = 1= 4. df=14

Decision: Since > 0.05

$X^2 = 1.5227 >$ critical value 23.68479

The computed value of 1.5227 is less than the critical value of 23.68479 H_0 rejected and H_1 accepted. There is a strong relationship between physical planning authorisation and building collapse.

Table 8. Coefficient correlation between physical plan authentication and building collapse

The building process and structural considerations	X	Y	XY	X^2	Y^2
Building permit	3	2	6	9	4
Site plan	3	2	6	9	4
Site analysis	2	1	2	4	1
Submission of Plans	4	1	4	16	1
Building plan interpretation and approval	3	1	3	9	1
Setbacks	3	2	6	9	4
Building orientation	3	1	3	9	1
Site inspection	3	1	3	9	1

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Environmental impact assessment	3	1	3	9	1
Foundation footings	3	2	6	9	4
Building Maintenance at the site	3	2	6	9	4
Drainages	3	2	6	9	4
Soil testing	2	0	0	4	0
Quality of blocks	3	2	6	9	4
Material mixed/aggregates	3	2	6	9	4
Total	∑x44	∑y22	∑xy66	∑ X^2 132	∑ $y^2$38

Source: Authors, 2021.

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

$$r = \frac{15*(66) - 44*(22)}{\sqrt{[15*132 - (44)^2][15*22^2 - (38)^2]}}$$

$$r = \frac{15*(66) - 44*(22)}{\sqrt{[15*132 - 1936][15*484 - (1444)]}}$$

$$r = \frac{990 - 968}{\sqrt{[1980 - 1936][7260 -]1444}}$$

$$r = \frac{44}{\sqrt{44*5816}} = \frac{44}{\sqrt{255904}}$$

$$r = \frac{44}{255904} = 0.0002$$

$$r = 0.0002$$

$$df = 15 - 1 = 14$$

Therefore: r = computed value = 0.0002 < 2.153904 therefore, H_0 rejected, H_1, accepted. There is a coefficient correlation between the physical planning authority and building collapse.

4.1 Discussion

The paper looks at the authenticity of physical planning activities and building regulations in order to keep structures from collapsing. The study focuses on two objectives. Firstly, examine the procedural basis for physical planning regulations. Secondly, assess the structure physical planning system on contentious causes of building collapse. The persistent rise in building collapses in Nigeria is due to low standards of building materials at the construction site yielding poor aggregate, resulting in weak strength of the material with high load-bearing walls. Table 1 discussed global building collapse trends. According to the review, there have been over three hundred (300) casualties between 2020 and 2021. Between 2006 and 2019, Lagos and Abuja suffered 250 causalities. Between 2010 and 2020, Nigeria had a high number of building collapses (tables, 4 and 5).

Tables 5 and 6 determine the relationship between the physical planning authority and other professionals in the building industry using Chi-Square goodness of fit. As a result, there is a significant relationship. The coefficient between planning and other professionals in the building industry was discussed in Chapters 7 and 8. These two methods were used to demonstrate the effectiveness of the two indicators in building collapse analyses. The study also noted that, boycott from physical planning authority, violation of building code and bye-laws, and approval process; unskilled professionals in assessing building designs; haphazard building construction, and poor level of responses.

Causes of Building Collapse

The causes of building collapse range from poor design, negligence, incompetence, poor construction, poor foundation, excessive load-bearing, and corruption (Prof et al., 2015). Building collapse in Nigeria is a result of sub-standard materials, poor based and foundation failure, structural defects, poor workmanship, poor design, quackery, poor supervision, dilapidated structure, geotechnical issues, uncontrol demolition, fire incidence, non-consultation of professional, client failure to reach an agreement for professional service and corruption (Hamma-Adama et al., 2020). The most common highly affected buildings were residential and commercial type while; the dominant causes of building failure were the result of poor design, non-adhering to planning regulations, standard and substandard materials.

The study revealed that the quality of materials is mostly inferior and cannot stands for a long duration, poor aggregates, and inefficient supervision also constitute to the collapse of buildings (Ayodeji, 2011). Structural development without planning approval and rushed to escaped demolition or stop-works orders from the relevant authority is one of the factors leading to building collapse, and poor supervision, use of substandard materials, and unskilled professionals constitute 27.7% of collapsed cases (Qurix & Doshu, 2020).

Challenges of Building Failure and Collapse

- Lack of political will to empower physical planning authorities and associate environmentalists to enforce regulatory law guiding the management and control of urban land uses and development. Politics has taken a new dimension where the developer took decisions without consulting the appropriate authority.
- Malfunctioning of building code as well as weak enforcement order and lack of trustworthy within the management staff result to mismatched and misinterpretation, execution of non-conformity of a building plan execution.
- Poor building materials or low-quality materials were among the factor that contribute to building failure and collapse in Nigeria.
- Poor site investigation and supervision. Inadequate knowledge of soil characteristics and load-bearing capacity to withstand such terrain.
- Lack of application for site inspection and improper

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site inspection. Most developers and site engineers boycott Urban Planning Law for frequent building inspections as specified in section 36 Nigeria Urban Regional Planning Law of 2004 as amended.

- Use of low-quality material, and management. The use of substandard material and poor aggregates without proper checkmating from the planning authority and professional builders contributes to building failure. Weak foundation footings at the course of construction. Adequate measures were not taken to ensure if the normal foundation dept was adopted as it's been done in a developed country like the United Kingdom where National Housing Building Control Agency authenticates that standard specifications are put in place to enhance sustainability.
- No consultation with professionals on structural matters.
- Non-Adherence to approved building plans. This is a result of the absence or lack of building plans. The bricklayer used his idea to build without drawing plans and manipulate the building accordingly.
- Corruption is one of the major challenges where officers approved plans without documentation at the office and no evidence of supervision or inspection from the relevant planning authority.
- Fire outbreak. The use of flammable materials weakens structural members of the building especially, reinforcement bars, blocks, and steel trusses; in the course of fire disasters.

Measures for Building Collapse

- Developers; and site engineers should make all requirement drawing and attached EIA report for industrial and high-rise buildings.
- Developers should adhere to planning laws and obtain approval before erecting any structures
- Public awareness of frequent building collapse and use of quality material aggregates rather than managing materials that may yield poor results.
- Enforce a strong development order on any client or contracted who violates planning regulations without political interference.
- The site inspection team should comprise all professionals including planners, structural engineers, architectures, mechanical engineers, builders, electrical engineers, quantity surveyors, and Geoinformatics to harmonise professional skills to authenticate their professional experience.
- Developers should adhere to zoning regulations and obtain a development permit or approval before erecting a structure. This would ease the development control unit to carry out a smooth site inspection.
- Employment of professional builders is also a key factor to be addressed to avoid the use of unskilled and cheaper bricklayers at the construction site.
- Inadequate knowledge by town planners to interpret building plans is another contributing factor to preparing site reports during the course of supervision.

The Implication of Physical Planning on Building Collapses and Sustainable development

The political will, policymakers, planning coordination, improvement of professional skills, and public participation should be a state priority to overcome the problems of building collapse in Lagos and Nigeria (Layi & Ademola, 2016). The causes of building construction in Nigeria include weak or fault foundations, inefficient stringent quality control in material utilisation, and management, boycotting the professionals, proper site investigation, and engagement of experienced personnel (Essien & Ajayi, 2017).

5. Conclusion

The study has proven that the increasing number of building collapse in Nigeria and the apparent failure of the physical planning authority or development control department and structural engineers to proactively enforce development control order by section 35–36 of Nigeria's urban and regional planning law Decree No. 88 of 1992 and 2004 Act as amended. To authenticate and save buildings from collapsing and the lives of properties, the input of all the professionals in the building industry must not be bypassed. The physical planning authority or development control units need a more hands-on desk from political will and legal backup as an ingredient for active granting of building and development permits, absolute and adequate manpower to enforce development order.

The development control team should comprise a team of professional and skilled Town planners who is well knowledgeable in designing and interpreting building plans not an Anthony general of approval without understanding the content of the design or prepared plans. The records also indicate that between 2010 and 2021, seventy-six. computed value = 0.0652 < 1.725 therefore, H0 rejected, H1, accepted. Therefore, is a correlation of coefficient between planning and other professionals in the building industry. Between 2010 to 2021, seventy-six buildings collapsed, and over 252 buildings collapse just in two states of Nigeria.

The study further revealed that most of the structures were not sounded enough to withstand load due to load, size, shape, and availability of building material; fatigue caused by instability of the structure due to building cracks at stress points under load conditions; failure to stick to design and manipulation of the original plan; use of defective materials from manufacturer and directly placed on the building; natural disaster and poor maintenance either by occupants or tents for commercial building.

The study also noted that, boycott from physical planning authority, violation of building code and bye-laws, and approval process; unskilled professionals in assessing building designs; haphazard building construction, and poor level of responses.

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5.1 Recommendation

Building a relationship between, the client; and site engineers is a key factor to foster at every stage of structure development on site to building and sharing ideas amongst the physical planning authority, site engineers, and developers. Building collapse is on the persistent rise in both structural failure and numbers of casualties in Nigeria. The commonest factor is negligence and avoidance of planning protocols to exhaust the whole space without adherence to space standards ratio.

The study revealed that out of 66 respondents of all categories and building surveys, 33.33% of building collapses were approved and obtained planning permission (Table 6). This study recommended that the nature of the soil and general topography should always consider before deciding to embark on a particular portion of land. The quality of building materials, engineering, or building standards measurement methods should even be taken into consideration. the standard of a building lies within the strength of its materials.

Frequent and routine supervision of construction work by professionals; education of the general public on the requirement to forestall building collapse instead of manage situations; employment of competent professionals; the difficulty of building approval before the erection of the structure; and involvement of a structural engineer in an exceedingly high-rise building. The outburst in building collapses in Nigeria, particularly in residential and commercial buildings, must be addressed. The culture of site engineers and developers saving money that ought to be spent on foundations when building on swamp ground should be discouraged.

Professionals with training within the industry, like town planners, architects, engineers, and planning authorities, should work towards the implementation of building codes and make sure the style of soil capacity for a specific form of building. Developers and site engineers should follow physical planning rules and not execute or build buildings too quickly to avoid planning penalties.

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