

Internal Stakeholders' Contribution to Building Collapse in Lagos State, Nigeria: A Perceptual Survey

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ABSTRACT: Building collapse is a universal problem that has resulted in disruption, loss of lives and capital costs, as well as negatively affecting the image of the construction industry and its practitioners. The current study seeks to achieve the following objectives: (i) to assess the contributing factors of internal stakeholders to building collapse due to challenges faced in Lagos state, Nigeria; (ii) to determine the remedies to challenges faced by internal stakeholders towards reducing the spate of building collapses in the study area. The study adopted a survey research method. Questionnaires were administered to purposively selected internal stakeholders in the Nigerian construction industry within Lagos state. 127 questionnaires were administered to survey participants. The data collected was analysed using descriptive and inferential statistics. The results revealed a lack of consideration of life cycle costing of utilities, lighting and lifts; lack of proper integration and coordination of design elements; failure to consider the buildability and maintenance requirements during the design; absence of proper supervision and site inspections for quality checks; and failure to inspect materials storage on site, with their mean scores of 4.18, 4.11, 4.10, 4.10, and 4.10, respectively, as the top five contributing factors of internal stakeholders to building collapse in Lagos state. The study provided in-depth insight into the contributing factors of internal stakeholders to building collapse that can help construction professionals and stakeholders facilitate the development of strategies required to minimize the contributing factors of internal stakeholders to building collapse in the construction sector.

KEYWORDS: Building failure; construction stakeholders; Nigerian construction industry; perceptual survey; Remedies

1. Introduction

Buildings are structures that serve as shelters for mankind. Building is the third most essential need of mankind after food and clothing, and it appears to be the most precious and demanding asset [1]. This could be because, like every other activity of man, shelter needs shelter. According to Osuizugbo [2], a building is one of the most valuable assets for mankind and thus needs to be properly structured. Therefore, the methodology in which buildings are built must be properly managed and controlled for the safety and benefit of

building users. Past studies have revealed that many building developers in Nigeria engaged the services of quacks instead of professionals in the bid to cut costs, even at the detriment of lives [3]. Consequently, this often results in building collapse, which has an adverse effect on people and investment [4]. The occurrence of building collapses that is associated with man-made factors has become a major issue of concern across the states of Nigeria [2]. In the past years, Nigeria has witnessed the collapse of many buildings in various stages of construction, wherein many lives were lost, and property worth millions of Naira was destroyed [5]. These man-made factors of building collapse, which were caused by human errors during the building delivery process, can be avoided with a good system in place [2]. The success of every construction project depends on the competence of the internal stakeholders involved. The internal stakeholders are very crucial to any construction project as they are the coalition that can influence the project towards achieving a common goal [6]. The involvement and input of professionals in the construction of buildings from design to finish, including the supervision of every stage, is vital if standards are to be maintained [7]. Also, a study by Windapo and Rotimi [8] alluded to the importance of the contribution of competent professionals and stakeholders in producing healthy buildings. The absence of these professionals' results in failed projects and poor functional performance.

Building failures or collapses do not just occur; most cases of building collapses claim the lives of end users of the affected buildings [9]. According to Windapo and Rotimi [8], the number of lives lost is a clear indication of the severity of the problem. Even where lives were not lost, the injuries recorded were just as severe. Past studies have reported challenges faced by internal stakeholders in construction [7,10]. For instance, several people dishonestly brand and showcase themselves as building professionals, claiming to do the work of architects, engineers, and builders, designing, supervising, and constructing buildings, which has led to the collapse of numerous buildings in Nigeria [7]. Secondly, it has become a regular occurrence for residential and commercial buildings to collapse, as if the stakeholders and the building industry are ignorant of the phenomenon [2]. The incessant occurrence of building collapses has not gone without the accusations and counteraccusations of the internal stakeholders in the Nigerian construction industry [16]. And the continual building failures and collapses in Nigeria affect the good reputation of professionals in the industry [2]. Hence, it is important to investigate the perceived internal stakeholders' contributing factors to building collapse in Nigeria. Building failure and collapse have been an interesting area for many scholars [2, 4, 5, 7, 8, 9, 10, 15, 16, 17, 19, 22, 23, 26, 29], to mention a few. For example, Osuizugbo [2] studied builders' views on the incessant building collapse; Akinyemi et al. [4] studied issues and challenges of building collapse; Ayeni [7] investigated strategies for mitigating building collapse; and Ayodeji [9] studied causes and effects of building collapse in Nigeria. A glean from literature suggests that there is very little understanding of internal stakeholders' contributions to the building collapse in Lagos State, Nigeria. However, the study of internal stakeholders' contributing factors to building collapse in the Nigerian construction industry has not been sufficiently studied. Hence, this study tends to fill this knowledge gap by investigating internal stakeholders' contributions to the building's collapse in Lagos State, Nigeria. This study seeks to pursue the following objectives: (i) to assess the contributing factors of internal stakeholders to building collapse due to challenges faced in Lagos state, Nigeria; (ii) to determine the remedies to challenges faced by internal stakeholders towards reducing the spate of building collapses in Lagos state, Nigeria. This

research aims to contribute to building collapse research by highlighting the internal stakeholders' contributing factors to building collapse in the construction industry. An understanding of these factors would facilitate the development of strategies required to mitigate the contributing factors of internal stakeholders to building collapse in the construction sector. Although this study applies particularly to the Nigerian construction industry, the same method could be further extended to other countries' construction industries experiencing building failure and collapse.

2. Literature Review

The built environment has become more complex recently owing to interactions between all the stakeholders involved in the building process with divergent interests [11]. A stakeholder is defined as "an individual or group that has a vested interest or share in an undertaking" [12]. A variety of stakeholders are involved in building projects. Stakeholders in construction are divided into internal stakeholders (primary stakeholders) and external stakeholders (secondary stakeholders). Internal stakeholders consist of those directly involved in the decision-making process [6]. In the construction industry, for example, internal stakeholders include clients, consultants (architects, engineers, land surveyors, quantity surveyors, and project managers), contractors, subcontractors, and material suppliers [13]. The interactions and interrelationships between the internal stakeholders largely influence and determine the outcome or performance of the building. The internal stakeholders are responsible for decisions and total control of the project resources and have varying attitudes and influence on the development at different stages during the lifecycle of a project [11]. Rajeev and Kothai [6] noted that any decision made by the internal stakeholders, collectively or unilaterally, has long-lasting effects on the building's performance. On the other hand, external stakeholders consist of those who are affected by the outcomes of the decisions made by the organization and its activities in one way or another, but they do not have control over the project resources [6,11]. Examples of external stakeholders are regulators, local communities, environmental groups, and the media [12]. Unlike the internal stakeholders, they are not linked to the owner or client because they do not have any contractual ties to the project owner [12]. However, they still possess the power to greatly influence the project [14].

2.1. *Building failure and collapse in Nigeria.*

Building failures and collapses are due to poorly structured building projects [2]. Building failure is referred to as the inability of building components to perform their expected or principal functions [8,10]. According to Philip et al. [15], building failure is a negative consequence due to unscrupulous actions, negligence, ignorance, and poor decisions of building industry stakeholders. A building collapse occurs when a portion or the entire structure of a building fails and suddenly gives way because of the failure, such that the building can no longer serve its intended purpose. Failures in buildings can occur at any time, during their construction and after they have been inhabited [10]. In Nigeria, building collapse has become a common incidence and the geographical spread of the phenomenon suggests a high occurrence in major Nigerian cities like Lagos, Port Harcourt, Abuja, Enugu, Onitsha and Awka [2]. Building collapses do not just occur; most cases of building collapse

claim the lives of end users of the affected buildings [10]. According to Windapo and Rotimi [8], the number of lives lost is a clear indication of the severity of the problem. Even where lives were not lost, the injuries recorded were just as severe. The incessant occurrence of building collapses has not gone without the accusations and counteraccusations of the internal stakeholders in the Nigerian construction industry [16]. And the continual building failures and collapses in Nigeria affect the good reputation of professionals in the industry [2].

According to Taiwo and Afolabi [17], building collapses are caused by improper design, contractor's incompetence, faulty construction methodology, poor town planning approval, poor development monitoring process, non-compliance with specifications and standards by contractors and developers, use of substandard materials and equipment, inadequate supervision or inspection or monitoring, economic pressures, incompetent conversion, change of use of buildings, aged buildings, and poor maintenance culture, among others. Osuizugbo [2] revealed the fundamental possible causes of incessant building failures and collapses in Nigeria to include the non-regulatory arm of the building industry; lack of respect and negligence in the use of some key professionals in the building industry; design work by non-professionals; use of untrained persons for construction of buildings; lack of buildability and maintainability analysis on production drawings; lack of an effective national building code; and management of building production by unprofessional and unqualified personnel (quacks).

2.2. Contributing factors of internal stakeholders to building collapse.

Although the duties and obligations of each internal stakeholder are well defined, no internal stakeholder can be absolved of responsibility for the building collapse. All the participants involved in the construction of buildings are contributors to building failures in one way or another [4]. From the study conducted by Ayeni [7], most building collapses in Nigeria can be attributed to mainly human errors. Thus, a reduction in errors linked to the internal stakeholders in the construction industry resulted in a corresponding reduction in the number of building collapses. Building collapse has been an interesting area for many scholars. Past studies have covered topics such as builders' views on the incessant building collapse [2], issues and challenges of building collapse [4], strategies for mitigating building collapse [7], and the causes and effects of building collapse in Nigeria [9]. A glean from literature suggests that there is very little understanding of internal stakeholders' contributions to the building collapse in Lagos State, Nigeria. However, the study of internal stakeholders' contributing factors to building collapse in the Nigerian construction industry has not been sufficiently studied. Hence, this study tends to fill this knowledge gap by investigating internal stakeholders' contributions to the building's collapse in Lagos State, Nigeria.

A glean from literature revealed documentation errors, lack of understanding of clients' requirements, corruption in the construction industry, absence of proper supervision and site inspections, lack of/inadequate maintenance culture, illegal conversion, alteration, and additions to existing structures, and lack of public sensitisation and education of relevant professionals, among others, as contributing factors of internal stakeholders to building collapse [7,9,16,18-22].

2.3. Challenges faced by internal stakeholders in Nigerian construction industry.

There are several challenges that are confronting internal stakeholders in the construction industry. The internal stakeholders are perceived as the villains whenever there is a case of building collapse. However, there are many ethical internal stakeholders that, against all odds and challenges, have portrayed themselves professionally. Among the challenges raised by Ayeni [7] is the proliferation of contractors that are inexperienced, producing work that leads to the incessant building collapses being recorded. Clients are sometimes guilty of appointing the wrong or inexperienced consultants based on friendship or other personal reasons. Clients should follow the directives of the architects in their choice and appointment of competent consultants. Most of the time, the architects or other building professionals do not have any control over the appointments of the clients. The client ignores the recommendations of the consultants, thereby selecting quacks or mediocre contractors to implement the building projects. The studies by Ayodeji [9] and Ayeni [7] acknowledged deficient briefs as another challenge faced by building professionals. A building collapse may be an effect of inadequate client briefs. The requirements of the clients must be unambiguous to avoid failures at the inception of the project up to the construction process. Consultants are negatively affected by bad reputations and loss of confidence in them [18].

Sometimes the consultants may have to take the blame for a collapse due to poor quality materials. Another cause of building collapses in Nigeria is the lack of control by government agencies in the marketing of poor-quality building materials. Most professionals in the Nigerian construction industry are not well remunerated. What applies in the construction industry is that there is a fixed scale of fees. The scale of fees is dated and fixed by the Federal Government of Nigeria for each of the professionals (such as architects, civil engineers, electrical engineers, mechanical engineers, and quantity surveyors) and all such scale of fees are binding on all government contracts. These scales of fees are illegally negotiated downwards by unscrupulous government officials, leaving the professionals with no choice but to try to compensate for the cost and profits, thereby implementing shoddy jobs [18]. In Nigeria, most building owners are seen to be nonchalant when it comes to the maintenance of their property. Cumulative defects over time deteriorate buildings and reduce the lifespan of buildings [16]. However, when there is a collapse, the public is quick to point accusing fingers at the consultants, even though the collapse might have been as a result of many years of lack of maintenance. According to Adenuga [5], many building owners assume the role of constructor in a bid to save money. The owner purchases the cheap and inferior materials based on their limited knowledge and engages the work force directly without any clue of the responsibilities of the different trades. To make extra profits, clients boycott professionals in the building industry [23].

2.4. Internal stakeholders' roles in preventing building collapse.

No internal stakeholder in the building industry is immune from the effects of building collapse. The financial losses, loss of lives, and tarnished reputation have been of great concern to the builders, engineers, architects, owners, and even the government [5]. According to Adenuga [5], the internal stakeholders are directly connected and have greater control over the project. Therefore, they have a lot at stake in averting building failure and collapse. The public should be educated on the advantages of good design and construction,

as this helps the public understand the fundamental requirements of building. Internal stakeholders should also endeavour to demystify their functions such that the public becomes aware of those functions [16]. By doing so, the public is prevented from patronizing untrained individuals. Continuing professional education of professionals to keep professionals abreast of the new trends and construction practices must be encouraged [17]. This could be achieved when regular seminars are organised to discuss the problems of the industry and likely solutions [5]. Improved levels of conformance to and compliance with sustainable construction principles by construction stakeholders are required to abate building collapse, thereby improving capital and economic growth in Nigeria [8]. Clients should only enter contracts for the execution of building projects with competent contractors while accepting the advice of the consultants [22]. There should be collaboration between all the internal stakeholders (that is, the architects, engineers, estate surveyors, town planners, quantity surveyors, and builders, among others) to ensure buildings which are designed are built to specification through ensuring that the right materials and adequate supervision are carried out [7].

3. Research Methodology

The field survey method was used in the study to discover the contributing factors of internal stakeholders to building collapse and the solutions to challenges faced by internal stakeholders in order to reduce the number of building collapses. The list of contributing factors of internal stakeholders to building collapse and remedies to challenges faced by internal stakeholders towards reducing the spate of building collapse, which were identified in literature, were used to design a questionnaire to achieve the objectives of the study. The questionnaire survey was used to determine the perception of internal stakeholders in the construction industry. Some groups of internal stakeholders in the Nigerian construction industry were invited to participate in this study, and the target participants included architects, engineers, builders, and quantity surveyors involved in building construction who are registered with respective professional bodies in Nigeria. The rationale for these targeted respondents was that they have experience and they also play a role in building design, construction and decision-making. A pilot study was conducted before the survey instrument was administered to the participants to establish its comprehensiveness and accuracy. The survey instrument was updated with input from internal stakeholders of the construction sector as a result of the pilot test. The Likert scale questions were tested for reliability by using Cronbach's alpha. The result of Cronbach's alpha value using the Statistical Package for the Social Sciences (SPSS) v.20 was 0.954, which specified a high-degree of consistency for the scale internally. Thus, the questionnaire was accepted as reliable.

3.1. Research area.

This study was set in Lagos state, Nigeria. Lagos state is chosen as the study area because it is the economic nerve centre of Nigeria. As the economic nerve centre of Nigeria, Lagos is home to most of the financial institutions and the highest concentration of industries.

3.2. Data collection.

The study used a purposive sampling method to identify the representative sample for the administration of the questionnaire survey. The purposive sampling technique is a non-probability method that is based on the features of the study population. The sampling technique adopted was chosen because of the inability to obtain an updated list of registered quantity surveyors, builders, engineers, and architects from their respective professional bodies in the study area as at the time of carrying out this research. Using a 5-point Likert scale, where not severe = 1, slightly severe = 2, moderately severe = 3, highly severe = 4, and exceedingly severe = 5, the respondents were asked to indicate the level of contributions of internal stakeholders to the building collapse of each contributing factor. Secondly, to determine remedies to challenges faced by internal stakeholders towards reducing the spate of building collapses, participants were also presented with a 5-point Likert scale, where strongly disagree = 1, disagree = 2, neutral = 3, agree = 4 and strongly agree = 5. A total of 127 questionnaires were sent out to different internal stakeholders in Lagos state. Out of the 127 questionnaires distributed, 87 were adequately completed and returned, representing a response rate of 68.5%, which indicates a good response rate (Table 1).

Table 1. Responses of questionnaire

S/No	Respondents' Position	Distributed Questionnaire	Returned Questionnaire	Response Rate (%)
1	Architects	25	7	28
2	Engineers	64	54	84.4
3	Builders	20	17	85
4	Quantity Surveyors	18	9	50
7	Total	127	87	68.5

3.3. Method of analysis.

Percentage, frequency, mean, rank, and One-Sample 't'-test were adopted to analyse the data collected from the respondents. SPSS version 20 was used. The One-Sample 't'-test inferential statistics was used to test if there was a significant effect(s) of the contributing factors of internal stakeholders on building collapse in Lagos state.

4. Results and Discussion

This section of the paper presents the demographic characteristics of survey participants, results, and analysis of contributing factors by internal stakeholders to building collapse and remedies to challenges faced by internal stakeholders to reduce the spate of building collapses in Lagos state, Nigeria.

4.1. Demographic characteristics of respondents.

The study investigated the profiles of the respondents to provide an insight into the credibility of the responses gathered. The summary result of the characteristics is presented in Table 2. According to Table 2, respondents with engineering, building technology, and quantity surveying backgrounds contributed more to the study, with 62.1%, 19.5%, and 10.3%, respectively. The results in Table 2 imply that the participation of professions in the construction field is fit to express a reliable opinion that would afford the study comprehensive information sufficient to reach a conclusion as regards the phenomenon under

discussion. 72.4% of the respondents are males and 27.5% are females. This simply implies that most of the research questionnaire was filled out by males. However, the interests of both gender categories are well represented without bias. This gave a fair view of the construction industry.

Table 2. Demographic characteristics of respondents.

Demographic Data	Frequency	Percentage
Professional Background		
Architects	7	8.0
Builders	17	19.5
Quantity Surveyors	9	10.3
Engineers	54	62.1
Total	87	100.0
Gender		
Male	63	72.4
Female	24	27.5
Total	87	100.0
Age Bracket		
Below 30 years	7	8.0
31 – 35 years	9	10.3
36 – 40 years	14	16.1
41 – 45 years	13	14.9
46 – 50 years	24	27.6
51 and above	20	23.0
Total	87	100.0
Educational Qualification		
ND	5	5.7
HND	28	32.2
B.sc/B.Tech.	29	33.3
M.sc	22	25.3
PhD	3	3.4
Total	87	100.0
Years of working experience in the construction industry		
Below 5 years	-	-
5 – 10 years	15	17.2
11 – 15 years	8	9.2
16 - 20 years	32	36.8
21 – 25 years	17	19.5
26 – 30 years	11	12.6
31 years and above	4	4.6
Total	87	100.0
Type of organisation belong		
Client	17	19.5
Consultant	22	25.3
Contractor	48	55.2
Total	87	100.0

The results in Table 2 also indicate that 81.6% of the respondents are within the age bracket of 36–51 years. This shows that the respondents are mature enough to participate in the study. It therefore indicates that respondents whose opinions were sorted are adults and could provide reliable information about the phenomenon being discussed. It was also revealed in Table 2 that respondents with academic qualifications of B.Sc. Those with HND (33.2%) participated more in the study than those without (33.2%); the least participation was of PhD holders (33.3%). Respondents, therefore, are educated and knowledgeable enough to express reliable opinions, useful in making a generalization about the phenomenon being studied. Furthermore, the results in Table 2 reveal that all the respondents have a minimum of 5 years of experience in the construction industry, and 82.7% of the respondents have been practising from 11 years to more than 31 years. From the results obtained, it could be inferred that the respondents are not without prior experience in construction; rather, the respondents have had certain years of experience that could afford them the ability to express reliable

opinions as regards the phenomenon under discussion. Therefore, we can safely assume that the responses collated are reliable given the respondents' years of experience in the construction industry. In addition, results in Table 2 show that 19.5% of the respondents indicated their position as client, 25.3% of the respondents indicated their position as consultant, and 55.2% of the respondents indicated their position as contractor. It thus implies that the opinions of construction stakeholders were duly considered in the study; the opinions gathered therefore cover relevant spheres of operations as applicable to construction.

4.2. Contributing factors of internal stakeholders to building collapse in Nigeria.

Forty-nine (49) contributing factors of internal stakeholders to building collapse were identified for the study and grouped into six stakeholders, namely; client, architect, structural engineer, service engineer, builder and quantity surveyor. Table 3 shows the mean score, rank and tcal for the 49 contributing factors of internal stakeholders to building collapse. The mean scores of those factors ranges from 3.06 to 3.98, which indicates a moderate severe to building collapse and the remaining 12 factors ranges from 4.01 to 4.18 indicating a highly severe to building collapse in Lagos state, Nigeria as shown in Table 3. Secondly, the study used One-Sample 't'-test to test if there is no significant effect(s) of the contributing factors of internal stakeholders on building collapse in Lagos State. Results in Table 3 shows that their calculated p-values ($p=0.00$) are lower than the significant value ($p=0.05$), hence they are all significant. Based on this, null hypothesis was rejected and alternative hypothesis accepted. Thus, this study concludes that, there is a significant effect(s) of the contributing factors of internal stakeholders on building collapse in Lagos State.

4.3. Remedies to the challenges faced by internal stakeholders.

This part of the study showed the results of the data analysis of remedies to the challenges faced by internal stakeholders that led to building collapse in the study area. Twenty-six (26) measures or remedies to challenges faced by internal stakeholders were identified for the survey. As shown in Table 4, "Clients should not pressurise internal practitioners" has the highest mean score (MS) of 4.56 and was ranked first. This finding suggests clients should not compel or pressurise consultants and contractors to agree to unrealistic or unreasonable times that may lead to 'cutting corners' or taking 'short-cuts'. This was followed by "Clients should make adequate funds available for construction" with a mean score of 4.54, ranked second; "Stakeholders should shun bribes and corruption" with a mean score of 4.46, ranked third; "Stakeholders should adhere to the ethics of the profession" and "Ensure the inspection of materials before use" with the same mean score of 4.44, and were ranked fourth each. From the rear, "Building professionals should continually enlighten each other on how to embrace good and quality professional practices" was ranked lowest with a mean score of 4.01. The study identified many contributing factors of internal stakeholders to building collapse in the construction industry and grouped them into six stakeholders, namely: client, architect, structural engineer, service engineer, builder, and quantity surveyor. This study looked at the ways in which internal stakeholders in Lagos state, Nigeria, contributed to the collapse of a building. Regarding issues that bother the client, top among the contributing factors of internal stakeholders to building collapse is a lack of understanding of the client's requirements. This finding supports the findings of Okuntade [24], that poor understanding of

clients' needs, and expectations is an issue that fuels poor performance during construction. The client requirement is that which outlines the details that a project must follow.

Table 3. Contributing factors of internal stakeholders to building collapse.

Factors	MS	Rank	t _{cal}	DF	P-value
Clients					
Lack of understanding of client's requirement	3.70	1	46.099	86	0.00
Lack of adequate maintenance culture.	3.64	2	46.493	86	0.00
Delay of progress payments to consultants and contractors	3.62	3	44.979	86	0.00
Inadequate funding	3.61	4	46.688	86	0.00
Unclear project brief	3.56	5	42.177	86	0.00
Excessive changes and alterations	3.16	6	25.414	86	0.00
Architect					
Lack of proper integration and coordination of design elements	4.11	1	68.690	86	0.00
Improper planning	4.06	2	57.924	86	0.00
Absence of proper supervision and site inspections	3.65	3	45.278	86	0.00
Documentation errors	3.55	4	46.571	86	0.00
Lack of adherence to zoning and planning regulations in design	3.55	4	44.568	86	0.00
Lack of adherence to building codes and practices	3.21	6	24.303	86	0.00
Failure to prepare specifications for all construction items	3.18	7	24.826	86	0.00
Structural Engineer					
Failure to consider the buildability and maintenance requirements during the design	4.10	1	64.729	86	0.00
Absence of proper supervision and site inspections for quality checks.	4.10	1	69.518	86	0.00
Failure to inspect materials storage on site	4.10	1	59.100	86	0.00
Failure to carry out proper soil tests before the commencement of construction	4.07	4	62.624	86	0.00
Lack of preparation of preliminary engineering drawings and equipment specification for proper schedule planning and budgeting	4.06	5	57.924	86	0.00
Failure to conduct comprehensive strength test on cube samples	4.01	6	66.792	86	0.00
Lack of testing on the building materials (reinforcement bars and blocks).	3.66	7	46.792	86	0.00
Lack of feasibility study	3.55	8	45.537	86	0.00
Documentation errors	3.53	9	52.596	86	0.00
Service Engineer					
Lack of consideration of life cycle costing of utilities, lighting, and lifts	4.18	1	67.137	86	0.00
Failure to carry out feasibility studies	4.08	2	71.400	86	0.00
Failure to provide adequate access for the installation / maintenance of service	3.59	3	47.249	86	0.00
Failure to consider the buildability and maintenance requirements during the design	3.53	4	49.726	86	0.00
Failure to prepare proposals regarding conceptual design.	3.08	5	27.714	86	0.00
Builder					
Failure to write report on the builder's documents	4.02	1	58.034	86	0.00
Failure to ensure construction methodology	4.01	2	64.447	86	0.00
Failure to adequately manage the construction process	3.98	3	62.855	86	0.00
Failure to be in charge of building maintainability	3.98	3	62.855	86	0.00
Failure to suggest solution to technical problems	3.69	5	43.996	86	0.00
Failure to assess the workmanship of craftsmen	3.62	6	44.079	86	0.00
Failure to provide building production documents	3.61	7	48.928	86	0.00
Failure to ensure maintainability analysis of production information	3.57	8	53.612	86	0.00
Failure to study the production information	3.56	9	49.101	86	0.00
Failure to prepare programme of work	3.54	10	46.372	86	0.00
Quantity Surveyor					
Failure to study life cycle cost and cost in use	4.01	1	58.661	86	0.00
Lack of implementation of cost monitoring system	3.59	2	46.189	86	0.00
Failure to provide accurate final cost information for feedback	3.57	3	47.009	86	0.00
Failure to study the feasibility of capital project	3.57	3	43.186	86	0.00
Failure to advise on capital investment policy	3.54	5	48.657	86	0.00
Failure to establish procedures for measuring of variation and costing and feedback into the overall cost budget	3.52	6	46.010	86	0.00
Failure to arrange for regular measurement, valuation and certification of work	3.49	7	46.779	86	0.00
Failure to monitor capital project	3.41	8	52.947	86	0.00
Failure to produce and update cash flow requirement	3.15	9	27.371	86	0.00
Failure to identify client objective and priorities.	3.14	10	28.245	86	0.00
Failure to advise on financial plans and procurement	3.07	11	26.601	86	0.00
Failure to prepare budget for the project	3.06	12	25.601	86	0.00

Table 4. Remedies to the challenges faced by internal stakeholders.

Remedies	MS	Rank
Clients should not pressurise internal practitioners	4.56	1
Clients should make adequate funds available for construction	4.54	2
Stakeholders should shun bribes and corruption	4.46	3
Stakeholders should adhere to ethics of the profession	4.44	4
Ensure the inspection of materials before use	4.44	4
Clients should avoid the engagement of quacks	4.41	6
Builders must also suggest solutions to construction challenges	4.40	7
Structural engineer should endeavour to carry out regular site inspections	4.37	8
Builders must study all the production information meticulously	4.37	8
Builders must ensure that construction methodology is clear	4.36	10
Stakeholders should ensure that the steps for building approval by the concerned ministry are adhered to	4.34	11
Clients should reduce the frequency of change orders	4.32	12
The objective and priority of the client should be made clear	4.32	12
Builders must adequately manage the construction process	4.30	14
Establish procedure for regular measurement and valuation of work.	4.30	14
Ensure tests are conducted on the reinforcement bars, blocks, and concrete test cubes	4.29	16
Adequate planning should be put in place before construction commences	4.29	16
Make lifecycle cost analysis at design stage	4.28	18
Carry out feasibility studies during the design stage	4.28	18
Ensure that buildability and maintenance requirements are considered during the design stage	4.26	20
Clients should solicit the service of professionals to prepare comprehensive briefs	4.26	20
Clients should deal directly with recognized professionals with good track records and credibility	4.25	22
The specification should be made as clear as possible for proper understanding	4.25	22
The consultants should ensure that the drawings are checked repeatedly for errors in design and details	4.24	24
Building professionals should endeavour to make accurate documentations and production information	4.20	25
Building professionals should continually enlighten each other on how to embrace good and quality professional practices	4.01	26

Understanding the client's requirements, therefore, is an approach to determining the activities and resources (human, material, and equipment) that would be required to achieve the project goal in terms of time, cost, and quality, thereby satisfying the client's needs. An understanding of clients' requirements is needed to guide the various construction-related activities and align them with the client's expectations. A shortfall in understanding the client's requirements affects the output of the project. Osuizugbo [3] asserts that successful achievement of a building project requires careful project briefing, timely planning, scheduling, and coordination of numerous and interrelated activities well communicated through the brief. The top contributing factor of internal stakeholders to building collapse, according to the architect, is a lack of proper integration and coordination of design elements. The essence of designing buildings is to provide a conducive and suitable built environment for its users, satisfying their physical and environmental needs at the same time. Ohlendorf [25] stated that inadequate project analyses from the initial phase, design inconsistency, and poor documentation are factors that limit building maintenance and can contribute to reducing the building value. To continually serve the intended purpose, therefore, the proper integration and coordination of design elements is highly imperative. Hence the need for a well-planned design that fosters functionality of the built structure in buildings related to their purpose of being erected. Regarding issues that relate to the structural engineer, the top contributing factor of internal stakeholders to building collapse is failure to consider the buildability and maintenance requirements during the design. Buildability and maintenance requirements during the design are required to maintain the value of a building, ensure optimum use, maintain a suitable appearance, and increase the life cycle. Failure to consider

the buildability and maintenance requirements of a building during the design phase therefore impacts negatively both on the future maintenance and the lifecycle of such a building.

Regarding issues that border on the Service Engineer, the top contributing factors of internal stakeholders to building collapse are lack of consideration of life cycle costing of utilities, lighting, and lifts. This finding supports the findings of Olagunju et al. [26], who discovered that among the factors contributing to building collapse are the life cycle cost of the building and poor documentation. To continually keep buildings in good condition and preserve their value, operating and maintenance costs need to be well prepared for. Maintenance, as it were, can be very costly at times and requires sufficient funding to ensure effectiveness. Lack of consideration of life cycle costing of utilities such as lighting and lifts, therefore, places a form of limitation on the nature and type of maintenance that can be affected in times of need. As a result, retaining the building's value and keeping it functional becomes difficult, potentially leading to building collapse over time. Regarding issues that border on the builder, the top contributing factor of internal stakeholders to building collapse is the failure to write a report on the builder's documents. Documentations usually consist of several documents put together as related to a definite project in construction, ranging from contracts to drawings, specifications, BIM designs, estimates, and every other document necessary to complete a project. Effective documentation in building projects does not only help to identify early warnings of trouble but also fosters a technical way of managing the potential troubles in different phases of the building project, thereby contributing towards attaining performance in the project in the long run. However, failure to write a report on the builders' document debar project participants from accessing information that is necessary, which basically bears its negative influence on the project. Regarding issues that border on the quantity surveyor, top among the contributing factors of the contributions of internal stakeholders to building collapse are failure to study life cycle cost and cost in use. The application of life cycle cost (LCC) as it relates to buildings is largely dependent on detailed information to give a comprehensive view and understanding of both the built environment and the building to be managed. Access to information, both historical and present, therefore is highly germane in applying life cycle cost. Any shortfall in this regard limits the essence of studying the life cycle cost; application of the life cycle cost, therefore, may not be realizable. Failure to study the life cycle cost and the cost of use, as such, bears consequences on the value of the building. Buildings, therefore, may not continually be accorded the required attention, which creates the platform for poor management, thereby limiting the building value and, as this lingers, may result in collapse.

In addition, the study provides remedies to challenges faced by internal stakeholders to eliminate or reduce the spate of building collapses. The findings revealed the following as the remedies to the challenges faced by internal stakeholders which lead to building collapse: clients should not pressurise internal practitioners; clients should make adequate funds available for construction/development; stakeholders should shun bribes and corruption; stakeholders should adhere to the ethics of the profession; and ensure the inspection of materials before use. All these measures, when imbibed, provide remedies to challenges faced by internal stakeholders to eliminate or reduce the spate of building collapses. This is because it instils discipline, commitment, and dedication in the client and other parties involved in the project. As such, they see the need for proper planning prior to commencing construction. This is therefore supported by the findings of Muhwezi et al. [27] that, in a

normal setup, building projects are expected to be constructed within a projected duration of time, for quality to be recorded at completion. Vanegas [28] asserted that buildings are expected to be properly planned, designed, and erected, while Windapo [29] opined that the project owner is solely responsible for the supply of capital for building construction. From the analysis of the data, it was revealed that there is a significant effect(s) of the contributing factor of internal stakeholders on building collapse in Lagos State, Nigeria. This implies that the respondents (architects, engineers, builders, and quantity surveyors) have a common view regarding the contributing factors of internal stakeholders to building collapse in Nigerian construction activities. This study has provided an in-depth understanding of the contributing factors of internal stakeholders to building collapse that can keep the internal stakeholders informed on potential causes of building collapse.

5. Conclusion

The current study set out to achieve the following objectives: (i) to assess the contributing factors of internal stakeholders to building collapse due to challenges faced in Lagos state, Nigeria; and (ii) to determine the remedies to challenges faced by internal stakeholders towards reducing the spate of building collapses in the study area. Based on the survey findings, the top five contributing factors of internal stakeholders to building collapse, as considered by the survey participants with their mean scores of 4.18, 4.11, 4.10, 4.10, and 4.10, were: lack of consideration of life cycle costing of utilities, lighting, and lifts; lack of proper integration and coordination of design elements; failure to consider the buildability and maintenance requirements during the design; absence of proper supervision and site inspections for quality checks; and failure to inspect materials storage on site, respectively. These results show a highly severe building collapse in Lagos state, Nigeria. In addition, the study revealed that there is a significant effect(s) of the contributing factors of internal stakeholders on building collapse in Lagos state. Furthermore, the study revealed that clients should not pressurise internal practitioners, clients should make adequate funds available for construction, stakeholders should shun bribes and corruption, stakeholders should adhere to the ethics of the profession, and ensure the inspection of materials before use as the top five remedies to the challenges faced by internal stakeholders that lead to building collapse in the study area. The study identified a new factor, "clients should not pressurise internal practitioners," which has not been reported in the existing literature. This was achieved as a result of a pilot study conducted on the survey instrument. The study recommends that the internal stakeholders should ensure positive contributions as they perform their roles in building construction, such that issues that bear the potential of spurring collapse in buildings would have been averted in building construction. Secondly, the various remedies that can be leveraged on to deal with the challenges faced by internal stakeholders and eliminate or reduce the spate of building collapses should be prioritised and adopted by stakeholders in building construction. There are limitations to this study. First, the study focused on the internal stakeholders in the Nigerian construction industry. Secondly, the findings reported in this manuscript were not validated. Despite the limitations, the study provided in-depth insight into the contributing factors of internal stakeholders to building collapse that can help construction professionals and stakeholders facilitate the development of strategies required to minimise the contributing factors of internal stakeholders to building collapse in the construction sector. Additionally, the study contributes to the body of knowledge on remedies

that can be employed in curbing the challenges faced by internal stakeholders to reduce the spate of building collapses in Lagos state, Nigeria. Although the study was conducted in Lagos, Nigeria, it could be used to help prevent building collapses in other countries. Minimising the rate of building collapses in the construction sector is very important for the long-term survival of the construction sector in Nigeria, construction businesses and the building users.

Competing Interest

The authors declare no conflict of interest.

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