

Assessment of the Extent of Compliance in the Preliminary Site Investigation for Erecting Building Structures in Minna Metropolis

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Abstract: The study was designed to assess the extent of compliance in the preliminary investigation before building construction among residential building owners in Minna metropolis. Three research questions guided the study. A descriptive survey research design was employed for the study. The study was carried out in Minna metropolis. A total of 134 residential owners were used as the population for the study. A structured questionnaire was developed and used for data collection. The instrument was validated by three lecturers and the reliability coefficient of the instrument was 0.79 using Cronbach Alpha statistic. Mean and standard deviation were used to answer the research questions. The findings of the study revealed that the extent of compliance to preliminary investigation was low before erecting most of the building structures in Minna metropolis. The study further revealed that cost, contractor's level of gridness and client level of knowledge were some challenges that hinder the extent of compliance in the preliminary site investigation for erecting building structures. Based on the findings, it was recommended that building owners should consider it necessary to conduct preliminary investigation before erecting building structures.

Keywords: Assessment, Building, Construction, Site, Structures

Introduction

The importance of preliminary investigation before erecting any building structures cannot be over emphasized. This is because; quality building construction is a solution to the menace of building failure, lost of lives, properties and meaningful technological growth and development. This explain why building regulatory bodies such as National Institute of Building (NIOB), Council of Registered Builders of Nigeria (COREN) has consistently called for the involvement of the registered professional builders and all related agencies at all levels to enforce and comply with standard building regulations and practices among the building owners in Nigeria.

Building structure may be residential, office or shops. The purpose, for which building is erected, should be made to satisfy the test of time and to provide reasonable comfort for safe use. To actualize this dream, building owners particularly the residential building owner must conduct the preliminary investigations to obtain the necessary information before erecting building structures. Preliminary site investigation, provide the needed information on the load bearing capacity the soil can safely carry without any noticeable settlement, the quality of the materials to be used, the mix design and the projection in the strength of the materials to be used for building construction (Madan, Walter &

Diane, 2009). According the author, the quality of building materials and the projection in the strength of the materials to be used for building construction are vital indices in curtailing building failure in Nigeria. Iyagba (2002) stated that, absence of planning approval and improper soil investigation contributes to unsafe structure and building failure.

Suryakanta (2014) stated that, the objective of site investigation should include to; access the general suitability of the site; achieve safe and economical design of foundations and temporary works; know the nature of each stratum and engineering properties of the soil and rock which may affect the design and mode of construction of proposed structure and foundation; foresee and provide against difficulties that may arise during construction due to ground and other local conditions, find out the sources of construction material and selection of sites for disposal of water or surplus material; investigate the occurrence or causes of all natural and man-made changes in conditions and the results arising from such changes; ensure the safety of surrounding existing structures; design for the failed structures or remedial measures for the structures deemed to be unsafe and to locate the

ground water extent and possible corrosive effect of soil and water on foundation material.

Also some of the buildings bye laws that are expected to be complied before the construction of building structures are information about the nature of the soil. Information about bearing capacity of the soil, determining the specific gravity of the sand before erecting building structures, obtaining permit from the regulatory bodies before erecting building structure among others. To make significant impact on the effects of building failure, necessary information about the soil condition, quality of the materials to be used among others must be sought and obtained.

Unfortunately, building owners in Minna metropolis seems to neglect preliminary investigation before planning and carrying out construction. To support this, Ibrahim et al (2013) stated that most of the residential buildings owners do not care to investigate and obtain the necessary information at first before erecting building structures that will make the building stand the test of time. Suryakanta (2014) noted that, the knowledge about the site forms a vital role in the safe and economical development of a site. A thorough investigation of the site is essential preliminary information to the construction of any civil engineering works. Also, Olusola, Ojambati & Lawal (2011) stated that, a good practice for erecting building structures is to carry out critical examination of the site to determine the probable soil condition at the site and the behaviour of existing structures adjacent to the site as well as other facts available through local experience. According to Olusola, Ojambati & Lawal (2011) building design, design error, site production and use of poor materials are technological factors in building failure. Similarly, Ivor, (1996) stated that all potential building sites need to be investigated to determine their suitability for building and the nature and the extent of the preliminary work that will be needed. According to the author, particular attention should be given to the nature of the soil and its probable load bearing capacity by means of trial holes or boring as there may be variations over the sites, the extent of water table, the position and sizes of main services, the nature and conditions of site boundaries.

Obande (1996) stated that, the advantages of preliminary investigation before buildings are erected will save the client and contractor from future tussles with the local authority and/or occupier of adjacent property; forewarn the client or

contractor of the type of problem to be expected during operations and enable him to take steps in advance to solve them and to prevent unnecessary danger to workmen, through proper planning of the operation. Also, Barry's, Emmitt and Gorse (2005) stated that, the main purpose of site analysis is to identify and hence reduce the risks associated with the development by recording site features and soil characteristics, helping to determine the design and cost of suitable foundations and structure. A thorough site analysis according to the author is an essential first step that will assist development, design and construction decision.

Preliminary investigation before erecting any building structures should be considered important as this will provide the client with the necessary information about the soil condition (Dimuna, 2010). Other preliminary investigation according to Dimuna, (2010) may include physical inspection of the materials and conducting the specific gravity test of the materials. For example, good sharp sand should produce a wax sound when squeezed in one's hand or palm. Akinpelu (2002) stated that the specific gravity of material must be consider paramount before use as this will help in determining good materials from bad ones. According the author, building materials such as cement, sand or quartz must conform to building standard regulations before used to avert building failure.

Building failure are common phenomenon around the world and is no longer news in Nigeria but has become problem when it's resulted in loss of lives and properties. Building failure can occur during or after construction processes. Iyagba, (2002) stated that there is no singular explanation for the cause of building failure: more often there is a combination of reasons for such structural failure in buildings. Failure in building could be classified under two categories namely: cosmetic and structural failure (Ayinuola, 2004). Cosmetic building failure occurs when an aspect is added or subtracted from the building thus affecting the structural outlook while a structural failure on the other hand affects both structural stability and the total outlook of the building. This could be as a result of lack of preliminary investigation. Hence the study is to determine to assess the extent of compliance in the preliminary site investigation for erecting building structures in Minna metropolis.

Statement of the Problem

Several causes of the building failure have been attributed to negligence and refusal by both client and contractor to conduct preliminary investigation

in order to determine the soil type and quality of building materials among others. However, the use of necessary information from the preliminary investigation, good mix design and the consistency in the mix, quality of the materials and the projection in the strength of the materials used for building construction will assist in reducing the menace of building failure. But regrettable to note that building collapse appears to be on the increase particularly among the residential building owners in Minna metropolis. What may actually be the cause of the increase in building failure? Probably negligence on the part of building owners to carry out preliminary investigation before erecting building structures might be problem responsible for the failure. Omoogun, Oloyede & Akinjare (2010) stated that, negligence and disregard in areas such as soil type, bearing capacity of the soil, building design, planning for extra ordinary loads and stress from strong winds, earth quake for tall buildings, foundation works and quality of building materials are several related cause of building failures. Also, Francis (2014) stated that cost, negligence, lack of supervision, client-based knowledge and corrupt tendencies in the construction industries are challenges affecting the preliminary site investigation. Based on the foregoing, therefore, the study was designed to determine the extent of compliance on the preliminary investigation for erecting building structures in Minna metropolis.

Purpose of the Study

The purpose of the study is to assess the extent of compliance in the preliminary investigation for erecting building in Minna metropolis. Specifically, the study seeks to determine:

1. The extent of compliance in the preliminary site investigation for erecting building structures in Minna metropolis
2. The challenges that hinders extent of compliance in the preliminary site investigation for erecting building structures in Minna metropolis
3. The ways to improve the practice of residential building owners towards conducting preliminary site investigation before erecting building structures.

Research Questions

1. To what extent is the preliminary site investigation complied with for erecting building structures in Minna metropolis?
2. What are the challenges that hinders the extent of compliance in the preliminary site investigation for erecting building structures in Minna metropolis?

3. What are the solutions to improve the compliance in the preliminary site investigation for erecting building structures?

Methodology

Descriptive survey research was adopted for the study because the study involves the use of questionnaire to determine the extent of compliance among the residential building owners on the preliminary site investigation before erecting building structure. The descriptive survey research design was considered appropriate because the study focused on the collection of data from groups of respondents in Minna metropolis in Niger state. The study was conducted in Minna metropolis, Niger state. This includes areas as new layout Albishiri, Chanchaga, Maitumbi, Bosso Estate extension, Shanu village and Gbeganu. The total population for the study was 134 respondents comprising of 124 residential building owners with certify building plan under construction and 10 registered builders from Federal University of Technology, Minna. Structured questionnaire title Assessment of the Extent of Compliance in the Preliminary site Investigation for Erecting Building Structures in Minna Metropolis (AECPIEBSMM) was developed by the researcher and used for data collection.

The instrument was validated by three experts in the Department of Industrial and Technology Education, Federal University of Technology, Minna. The reliability co-efficient of the instrument was found to be 0.88 and the internal consistency was found to be 0.79 using Cronbach Alpha statistic. Mean and standard deviation were used to analysis the data collected for study.

Results and Discussion

Research Question 1.

To what extent is the preliminary site investigation complied with for erecting building structures in Minna metropolis

Table 1
Mean Response of Respondents on the extent of compliance in preliminary site investigation for erecting building structures in Minna metropolis

S/NO	ITEMS	\bar{X}_1 N ₁ =124	\bar{X}_2 N ₂ =10	\bar{X}_t	Remarks
1	Information about the nature of the soil	2.26	2.35	2.31	VLE
2	Information about bearing capacity of the soil	2.60	2.22	2.41	VLE
3	Necessary information about the quality of cement to be use before erecting building structure	2.31	2.15	2.23	VLE
4	Determining the specific gravity of the sand before erecting building structures	2.19	2.56	2.34	VLE
5	Good mix design before erecting building structures	2.43	2.54	2.49	VLE
6	Conduct slump cone test to determine the consistency and workability in the mix	2.33	2.22	2.28	VLE
7	Obtaining the crushing strength of concrete (cube test) before erecting building structures.	2.17	2.09	2.13	VLE

8	Determining the strength of blocks before erecting building structures	2.70	2.08	2.44	VIF
9	Obtaining permit from the regulatory bodies before erecting building structure	2.10	2.30	2.29	VIF
10	Engaging professional builder to oversee the construction work	3.12	2.65	2.89	MF
11	Information about the dept of foundation trenches	3.51	2.38	2.95	MF
12	Physical inspection of the materials before used	2.41	2.19	2.30	VIF

Keys

X_1 = Mean Responses of Residential Building Owners
 X_2 = Mean Responses of Registered Builders
 N_1 = Number of Residential Building Owners, N_2 = Number of Registered Builders
 X_3 = Grand Mean of all Respondents,

The analysis of the data presented in Table 1 revealed that the respondents disagreed to 10 out of 12 preliminary investigations as necessary information not being sort before erecting building structures among the residential building owners in Minna metropolis with mean ranging from 2.13 – 2.49. Two items were agreed as complied. This signifies that all the 9 preliminary investigation are not being complied with before erecting building structures among the residential building owners in Minna metropolis. Hence the likelihood of building collapse in Minna metropolis. However, items relating to information about the depth of foundation trenches and engaging professional builders to overseas the construction work were complied with.

Research Question 2.

What are the challenges that hinder the extent of compliance in the preliminary site investigation for erecting building structures in Minna metropolis?

Table 2: Mean Responses of Respondents on the Challenges that Hinder the extent of Preliminary site Investigation for Erecting Building Structures in Minna Metropolis

S/NO	ITEMS	\bar{X}_1 $N_1=124$	\bar{X}_2 $N_2=10$	\bar{X}_3	Remarks
1	Negligence on the part of contractor/residential building owners to carry out preliminary investigation before erecting building structures	3.33	2.87	3.10	Agreed
2	Client base knowledge	2.89	3.09	2.99	Agreed
3	Cost of preliminary investigation	2.56	3.22	2.89	Agreed
4	Time taken to sought and obtain preliminary investigation	3.11	2.67	2.89	Agreed
5	Corrupt tendencies from the part of contractor handling the project	3.56	3.22	3.39	Agreed
6	Absence of the law to be enforced	3.44	2.97	3.21	Agreed
7	Incompetence of the relevant professional bodies.	2.66	3.02	2.84	Agreed

Keys

X_1 = Mean Responses of Residential Building Owners
 X_2 = Mean Responses of Registered Builders
 N_1 = Number of Residential Building Owners, N_2 = Number of Registered Builders
 X_3 = Grand Mean of all Respondents

The result in Table 2 revealed that all the items under this sub-heading are rated agreed with mean scores ranging between 2.84 – 3.39. This signifies that

challenges are enormous to hindrance of preliminary investigations before erecting building structures among the residential building owners in Minna metropolis.

Research Question 3:

What are the solutions to improve the compliance in the preliminary site investigation for erecting building structures?

Table 2: Mean Responses of Respondents on the solution to improve the compliance in preliminary site investigation for Erecting Building Structures in Minna Metropolis

S/NO	ITEMS	\bar{X}_1 $N_1=124$	\bar{X}_2 $N_2=10$	\bar{X}_3	Remarks
1	Thorough investigation of the site should be conducted before erecting building structures	3.33	3.17	3.25	Agreed
2	Regular awareness programme to educate the client on the necessary information to be sought before erecting building structure should be in place	3.44	3.09	3.27	Agreed
3	Cost of preliminary investigation should be made affordable to encourage client to comply with.	2.65	3.22	2.94	Agreed
4	Results of preliminary investigation should be made available and on time	3.61	2.89	3.25	Agreed
5	Physical inspection of building materials should always be carried out before use.	3.16	3.52	3.34	Agreed
6	There should be presence of the law to be enforce on the defaulters of preliminary investigation	3.24	2.99	3.12	Agreed
7	Building regulatory bodies and other relevant agencies should be sensitize to enforce building standard regulation at building construction site.	2.86	3.20	3.03	Agreed
8	Specific gravity test of building materials such as cement and sand among others should be conducted first to ascertain its quality before use.	3.10	2.91	3.01	Agreed
9	Slump cone test of concrete should be carried out to determine the workability of the concrete mix.	2.87	2.69	2.78	Agreed
10	Test to determine the projection of the strength of concrete should always be carried before erecting building structures.	3.77	2.42	3.10	Agreed

Keys

X_1 = Mean Responses of Residential Building Owners
 X_2 = Mean Responses of Registered Builders
 N_1 = Number of Residential Building Owners, N_2 = Number of Registered Builders
 X_3 = Grand Mean of all Respondents

The result in Table 3 revealed that all the items listed were agreed by the respondents as the way of improving residential building owners on preliminary investigation before erecting building structures in Minna Metropolis with mean scores ranges from 2.78 – 3.34.

Discussion of the Findings.

The findings of the study on Table 1 revealed that, the respondents disagreed to 10 out of 12 preliminary investigations. This signifies that all the 10 necessary information are not being sought before erecting building structures among the residential building owners in Minna metropolis. This finding is in line with the view of Ibrahim, Bankole, Ma'aji, Ohize, and Abdul, (2013) who stated that most of the residential buildings' owners do not care to investigate and obtain the necessary

information at first before erecting building structures that will make the building stand the test of time. Similarly, Omoogun, Oloyede and Akinjare (2010) stated that, negligence and disregard in areas such as soil type, bearing capacity of the soil, building design, planning for extra ordinary loads and stress from strong winds, earth quake for tall buildings, foundation works and quality of building materials are several related cause of building failures.

Findings on Table 2 revealed that all the 7 items listed were rated agreed by the respondents with mean scores ranging between 2.84 –3.39. This implies that all the items were the challenges affecting the building owners from conducting preliminary investigations before erecting building structures in Minna metropolis. This finding is in line with the views of Francis (2014) who stated that cost, negligence, lack of supervision, client-based knowledge and corrupt tendencies in the construction industries are challenges affecting the preliminary site investigation.

The result in Table 3 revealed that all the items listed were agreed by the respondents as the solution to the compliance in preliminary investigation for erecting building structures in Minna Metropolis with mean scores ranges from 2.78 – 3.34. This finding is in line with the views of Olusola, Ojambati and Lawal (2011) who stated that, a good practice for erecting building structures is to carry out critical examination of the site to determine the probable soil condition at the site and the behaviour of existing structures adjacent to the site as well as other facts available through local experience. Similarly, Ivor, (1996) stated that all potential building sites need to be investigated to determine their suitability for building and the nature and the extent of the preliminary work that will be needed. According to Ivor, particular attention should be given to the nature of the soil and its probable load bearing capacity by means of trial holes or boring as there may be variations over the sites, the extent of water table, the position and sizes of main services, the nature and conditions of site boundaries. Supporting the views, Obande (1996) stated that, the advantages of preliminary investigation before buildings are erected will save the client and contractor from the followings

- Future tussles with the local authority and/or occupier of adjacent property
- Forewarn the client or contractor of the type of problem to be expected during operations and enable him to take steps in advance to solve them and

- To prevent unnecessary danger to workmen, through proper planning of the operation.

Meanwhile, Stephen and Christopher (2005) stated that, the main purpose of site analysis is to identify and hence reduce the risks associated with the development by recording site features and soil characteristics, helping to determine the design and cost of suitable foundations and structure. A thorough site analysis according to the author is an essential first step that will assist development, design and construction decision.

Conclusion

The study investigated the extent of compliance in the preliminary investigation before erecting building structures among residential building owners in Minna metropolis. The study concluded that residential building owners in Minna metropolis do not comply with the preliminary investigations before erecting building structures. This practice could lead to building failure, loss of life and properties. However, cost, corrupt tendencies from the part of contractor, clients-based knowledge and negligence of the law enforcement agencies were some of the challenges hindering preliminary investigation before erecting building structures among residential building owners in Minna metropolis. Thus, subsidizing the cost of preliminary investigation, timely and prompt result of preliminary site investigation, regular enlightenment programme, supervision of building by the professional builders and relevant agencies among others will foster compliance to preliminary investigation before erecting building structures among residential building owners in Minna metropolis.

Recommendations

1. All the preliminary investigations identified in this study should be made a requirement for approving any building plans and construction.
2. Door to door awareness campaign should be carried out to educate the general populace on the importance of conducting preliminary site investigation before erecting building structures.
3. Government should enact laws to punish violators of preliminary investigation before erecting building structures in Nigeria.
4. Registered Builder from the Nigerian

Institute of Building should oversee to the supervision of building construction projects by the registered qualified personnel.

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