

**CONSTRUCTION MANAGEMENT SKILLS NEEDED BY TECHNICAL COLLEGE
GRADUATES TO PREVENT BUILDING COLLAPSE IN MINNA METROPOLIS
NIGER STATE**

BY

ABOKI, Friday

2018/3/74399TI

**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF INDUSTRIAL
AND TECHNOLOGY EDUCATION, SCHOOL OF TECHNOLOGY EDUCATION,
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BACHELOR OF TECHNOLOGY (B. TECH) DEGREE IN INDUSTRIAL AND
TECHNOLOGY EDUCATION.**

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DECLARATION

I, ABOKI, Friday, with matriculation number 2018/3/74399TI, an undergraduate student of the department of Industrial and Technology Education, certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other University.

ABOKI, Friday

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.....

2018/3/74399TI

Sign and Date

CERTIFICATION

**This project has been read and approved as meeting the requirement for the award of
B. Tech degree in Industrial and Technology Education, School of Technology
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DEDICATION

With profound joy and gratitude in my heart, I dedicate this project to God Almighty for His Unshakable and Unbreakable Faithfulness. His Divine and constant guidance in my life has made this project a reality today. Thank God.

ACKNOWLEDGEMENTS

I acknowledge God almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this program and on His wings only have I soared. I will like to express my special thanks to my supervisor, Mr. B. J. Elkalia who gave me the golden opportunity to do this wonderful project on the topic; Construction Management Skills Needed by Technical College Graduates of Building to Prevent Building Collapse in Minna Metropolis Niger State.

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ABSTRACT

This study examined the construction management skills needs by Technical College Graduates of Building to prevent building collapse in Minna metropolis Niger state. Five research questions were developed to guide the study and one null hypothesis were tested at 0.05 level of significance. The study employed a survey research design. The study used a four-point scale questionnaire, which contains a total of 44-items, as instrument. The total population of the study was 100 respondents comprising 80 building students in six technical colleges and 20 technical teachers. The findings of the study reveal the Ability to bring together the designer and operatives for prevention of building collapse, Ability to provide exact position for prevention of building collapse, Ability to control the compromising attitude of some workers of the town planning community for prevention of building collapse. The study recommended among other things, identified construction management skills should be integrated into the curriculum of building construction of technical colleges.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Buildings are structures that serve as shelters for humans, properties and activities such as houses, factories, offices, schools and hospitals. Bortolini and Forcada (2019) stated that buildings should be properly planned, designed and constructed to obtain desired satisfaction from the environment. The primary function of a building is to provide shelter from the weather, fire outbreak, warmth, and comfort to the users. Chidi, *et al*, (2017) stated that buildings are used for residence and support for other human activities. In essence a building has an important role in the life of man as it is one of man' s basic necessities of life after food in the ranking of man' s greatest needed and it must be properly constructed in order to avoid collapse.

Building collapse is a state of complete failure when the structure has literally given way and most parts have caved in, crumbled or buckled, the building can no longer stand as originally built. It occurs to the building during or after the construction is completed Falana and Ipindola (2020). Richard (2002) said that many lives and property have been lost in the collapse of buildings. Unfortunately, there are still a number of buildings of similar circumstances.

Building collapse are caused by natural forces or that caused by the influence of man either due to his negligence or incompetence Acio, (2018). Preventing building collapse are those actions, that are taken when design and construction standards are appropriately stated, adhered to and tailored by the professionals and the planning authority. According to Mhlongo, (2019) the ways of preventing building collapse are good team-work, adequate supervisory control, collection of feedback from past failures, better training of staff, adequate quality assurance strategies and procedures, regular design reviews, motivation, responsibilities, and project documentation. These ways of preventing building collapse as stated by Mhlongo, (2019) are the components of construction management.

Construction management is a process in which the interest and efforts of all principal parties involved in a construction project are integrated and coordinated by a control entity. Nwachukwu (2010) stated that, construction management provides continuous involvement and full-timers supervision during the actual construction phase, because of the intimate involvement of the construction manager from the projects inception, there is full knowledge and commitment to the owner' s needed and desires relative to clarification of contract plans and specification. A construction manager is appointed as a professional consultant with the know-how to inspect work on site and issue instructions. Construction managers give the client greater control over funds during construction because he has a contract with the entire trade and specialist' s contract.

Construction management according to Mohamed, (2019). comprised the architectural and engineering services carried out during the pre-design and construction of new facilities. The functions of construction manager reflect the activities involved in managing, planning, decision-making, supervision, organizing, leading and controlling. These functions constitute a circle of action in which each component leads to the next. Since building development project execution involves various professionals, Architect, engineers, quantity surveyors, builders, surveyors, urban and regional planners, it will be disastrous if there is none to coordinate the interest and functionalities of professionals together with other-non-professionals and the client. Construction management is the key component of every building project. Oyegoke, Awodele and Ajayi (2019) stated that construction management includes the general construction planning, proper organization, monitoring of conformance to design and specifications, monitoring of compliance of building codes, continual construction safety and site supervision.

Construction planning skill is the administrative process that translates policy into a method of reacting objectives. It lays down strategies on how a project will be carried out through planning. Planning helps to determine the materials, staff and machines that will be needed for the building project. It also helps in determining other necessary details that will help in carrying out the project. According to Mamo (2019). Planning results from the preceding processes of forecasting. It is the most important of the processes in management it is within this process that instructions are issued for action to be taken by the site organization.

Site organization skill is the process of arranging for a project work to be executed by acquiring land for the construction work, initial project preparations, site study and recruitment of work men. According to Armstrong (2019) organization provides the framework of management, the basic structure upon which the succeeding executive and

supervisory functions can build in accordance with the policy principles determined by the directors in order to control the workers.

Controlling skill according to Callistus and Clinton (2018) is the process of controlling any resource (human, material and time) in a construction industry. It is hinged on proper planning, coordinating and organization of the resources. The control of the resources in any construction industry therefore is a full responsibility of all the parties involved in the process. Control has to do with the management of resources and processes in a construction industry.

Safety skill in the construction industries could be regarded as the planned measures or precautions that should be taken to control situations and acts in an endeavour to prevent injuries to the workers concerned. According to Scott (2018) modern discoveries have shown that safety can be achieved in many construction industries where the workers concerned are disciplined and are prepared to obey the rules and regulations guiding any aspect of work going on in the site or industry. Proper safety can only take place at the site when there is serious supervision by the management.

Site supervisor is any person who is given authority and responsibility for controlling the workers at the site and is skilled in construction methods. Kassab (2020) that the site supervisor is responsible for construction administration, site inspection, record keeping and documentation of the project, he ensures that work is done in strict conformance with plans, specifications except where permitted by authorized variations, and with well-established construction practice.

A builder is a person that has taken building as a profession; such individual is engaged in building or repairing houses or other large structure and specializes in building works. A builder according to Grubbauer (2020) is an individual that builds especially one that

contracts to build and supervises building operation. He constructs the building to obtain desired satisfaction and also ensures compliance to building regulations.

Construction managers are to discharge their duties to control the skilled workers in the site after planning to ensure that the skilled workers adhere to the building codes Meaux (2020).

The skills and abilities needed by construction managers are responsible for directing the skilled personnel in the site in order to prevent building collapse.

Skill is the ability to do something. It is the capacity, systematic and sustained effort to smoothly and adaptively carry out complex activities or job functions involving ideas Odinaka (2019). He stated that skill is the ability to put into use acquired competencies, attitude and behavior after an exposure to theories and practical' s inherent in a field of study. Hall in Odinaka (2019) stated that skills are well established and are needed for performing certain tasks in work situation, because skills are practical activities which individual perform for work to be done effectively, especially building students in technical colleges.

Technical colleges are institution where vocational courses are offered by students. Technical Colleges are established to prepare students to acquire practical skills and basic scientific knowledge and attitude required of technical college students at sub professional level. Okudo (2018) stated that technical colleges give full crafts man training intended to prepare students for entry into various occupations. Students who have the first school leaving certificate are given six years vocational training where it is difficult to attract enough junior secondary schools leavers into vocational programs. Nwachukwu, Bakare and Jika (2009) explained that technical colleges provide students through training with the relevant and adequate knowledge, skills and attitude for employment under the guidelines of a teacher in related occupations. Technical Colleges train students in various types of trades in which building construction is one of the courses in the program of technical colleges.

The purpose of technical colleges according to the FGN (2014), is the acquisition of practical and applied skills as well as basic scientific knowledge that will enable individuals to be self-reliant, useful members of the society. Graduates of technical colleges are individuals who have completed and received training in building construction practical in technical colleges for either three or six years (Okpala & Aniekwu, 2005). These graduates of technical colleges have possessed practical experience, and familiar with the tools and working rules and regulations with techniques for planning construction operation. These technical college graduates needs to be involved at construction site.

1.2 Statement of the Problem

The frequent rates of collapsed building in some of Nigerian state such as Lagos and Abuja in the past few years have become very alarming and worrisome (Nwosu & Zima 2021). Many lives and property have been lost in the collapse of buildings.

It was discovered that, building without approved drawings and in some cases no drawing at all, can result in the collapse of the building more so when the drawings were not vetted by qualified professional authorities before the buildings are erected, without drawing, all constructions are based on guess work. Adeniregun (2015) said that town planning authorities at times approved technically deficient drawings. This may be as a result of ignorance on the part of town planning personnel who vet and approved these drawing.

Substandard material especially reinforcement rods, steel sections and cement can contribute immensely to failure of buildings. The use of low quality material is one of the major causes of structural failure. Insufficient and unskilled workmanship (labour) input can also contribute to failure of buildings. When a contractor cannot read building drawings or where refuses to listen to the instruction of the consultants this can lead to problems like defect ing building or building collapse. Proper soil investigation is not carried out and the absence of soil test report to the architect and the structural engineer. Lack of adherence to specifications

by the unqualified and unskilled personnel, illegal conversion of buildings which lead to structural deficiencies, poor and bad construction practices and lack of proper supervision by professionals.

The compromising attitude of the professionals in building industry has lead to failure in complying with the bye laws and building regulation, folagbade (2017) stated that, these have resulted into the use of sub-standard material, poor workmanship, incompetent contractors, on compliance with specifications standard by developers/contractors. It is against the above stated problem that the study seek to determine the construction management skills needed by Technical College Graduates to prevent building collapse in Minna metropolis Niger state.

1.3 Purpose of the Study

The purpose of the study is to determine construction management skills needed by Technical College Graduates to prevent building collapse in Minna metropolis Niger state. Specifically, the study will determine:

1. The construction planning skill needed by Technical College Graduates to prevent building collapse.
2. The organization skill needed by Technical College Graduates to prevent building collapse
3. The controlling skill needed by Technical College Graduates to prevent building collapse
4. The construction safety skill needed by Technical College Graduates to prevent building collapse
5. The site supervision skill needed by Technical College Graduates to prevent building collapse

1.4 Significance of the Study

The findings of the study if implemented will be of benefit to N.B.T.E., Teachers of Building Construction in Technical Colleges, Students and Technical College graduates, Ministry of Works and Housing, Landlords and Tenants.

The study would enable NBTE to update the curriculum for building construction in Technical Colleges during curriculum review. The curriculum would aim at providing the right knowledge and skills needed by graduates of building to prevent building collapse.

The findings of the study will help teachers of building construction to improve in their methodology of teaching. It will improve the teaching and learning process in that it would provide the construction management skills needed by graduates of building. This would help to equip the students so that when they graduate, they will be more proficient in the discharge of their duties. The study would also enable teachers of building construction to engage in practical based lessons which would help to impart the right practical skills to the students.

The findings from this study will encourage students to develop more interest in building construction. They would acquire the needed practical skills that will help them become proficient with the future prospect. They would be made to realize the construction management skills needed for the prevention of building collapse.

The findings of the study will make technical college graduates of building to be self-reliant and not depend on government for an employment. People will like to patronize them since they are known for being proficient in discharging their duties. Building graduates will be conversant about the construction management skills. On the long run, if the building graduates practice what they have being taught, there would be reduction in cases of building collapse.

The findings of the study will also be beneficial to Ministry of Works and Housing. The Ministry would be reminded of the detrimental effects of not checkmating the activities of builders, architects and construction managers. They would realize the need for strict

standards, regulations, monitoring and enforcement of building laws. The study will make ministry of works and housing to be serious with supervision in other to prevent building collapse.

The findings of the study will make the land lords to know the quality of materials to be used in other to prevent building collapse. They would be made to know the dangers of engaging non-professionals in building projects.

The findings of the study will make the tenants to report to ministry of works and housing of any sign that can result to building collapse in order to prevent it before it escalates

1.5 Scope of the Study

The study is delimited to construction management skills needed by technical college graduates in Minna metropolis Niger state. The study will cover planning, organization, controlling, safety and site supervision in Minna metropolis Niger state. However, due to constraint of time decision-making and motivation aspect of construction management will not be included in the study.

1.6 Research Question

1. What are the construction planning skill needed by Technical College Graduates to prevent building collapse?
2. What are the organization skill needed by Technical College Graduates to prevent building collapse?
3. What are the controlling skill needed by Technical College Graduates to prevent building collapse?
4. What are the construction safety skill needed by Technical College Graduates to prevent building collapse?

5. What are the site supervision skill needed by Technical College Graduates to prevent building collapse?

1.7 Hypotheses

H₀₁ There is no significant difference between the mean responses of building students and technical teachers on construction planning skill needed for prevention of building collapse.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The review of related literature to this study is organized under the following subheadings:

2.1 Conceptual Framework

2.1.1 Technical Colleges in Nigeria

2.1.2 Building Construction

2.1.3 Building as an Organizational Process

2.1.4 Building Collapse

2.1.5 Causes of Building Collapse

- 2.1.6 Prevention of Building Collapse
- 2.1.7 Construction Management
- 2.18 Skills needed in Construction management

2.2 Related Empirical Studies

2.3 Summary of Review of Related Literature

2.2 Conceptual Framework

2.1.1 Technical Colleges in Nigeria

Technical colleges are institution where vocational courses are offered by students. In order to acquire skills, they are established to prepare students to acquire practical skills and basic scientific knowledge and attitude required of technical college students at sub-professional level (Olaoye *et al.*, 2019). He stated that technical colleges give full craft man training intended to prepare students for entry into various occupation. Students who have the first school leaving certificate are given six years vocational training where it is difficult to attract enough junior secondary schools leavers into its vocational programs. Niran,(2016) explained that technical colleges provide students through training with the relevant and adequate

knowledge, skills and attitude for employment under the guide lines of teachers in related occupation. They train students in various types of trades and building construction is one of the courses in the program of technical colleges.

Technical education according to Yisa, (2013) includes the training of artisans, craftsmen, technicians and technologists. The technicians are trained to perform as executor of professional ideas; the craftsmen are the cadre of manpower with a high level of manual dexterity in a given trade, who under the direction of the technician assist in the realization of the professional concepts. The artisan is the next lower level of skilled manpower, sometimes referred to as semi-skilled. The training of technicians and technologists in Nigeria is mainly undertaken in the polytechnics, while craftsmen training is undertaken in technical colleges (formerly Trade Centre' s or Technical Training Schools); and artisans are the semi-skilled in vocational training centers and no formal establishments such as road side mechanics or through the apprenticeship system.

The incidence of a formal technical college in Nigeria may be traced to the 1940s with the inception of the Federal College Yaba, Lagos which was established in 1948. However, this is not to say that there were no vocational or technical institutions established in the fifties and early sixties but some have been converted into polytechnics (Akinde and Vitung 2020).

Programmes/courses offered from historical prospective taking bearing from the colonial days (pre-independence), technical college in Nigeria of their equivalence offered only main craft courses leading to the award of the London City and Guilds (C &G) intermediate and final up to the full technological certificate (FTC). In the seventies to the early eighties, the West African Examination Council (WAEC) technical stepped into offering Craft and Advanced Craft Certificates in seven basic engineering trades in mechanical engineering craft practice, electrical, welding, fabrication, motor vehicle, radio and refrigeration and five

building and wood work trades (carpentry, furniture making, painting and decorating, plumbing and fitting and block-laying.

Lawrence (2011) stated that technical colleges were until the later part of the seventies, like trade schools running three year trade courses which only led to the intermediate examinations of the City and Guild of London Institute. However, their duration was extended to five years and their curricular broadened to include general secondary school subjects. This was intended to attract a large percentage of students to technical course.

By middle eighties (1985) into early nineties new programmes offered at the National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC) to totally replace the colonial (C&G) and (FTC) emerged with the curriculum and the module specifications in all the trades prepared by the national board for technical education (NBTE) in the behavioural objectives format indicating the general and the specific performance objectives for each component topics of the course units. These two new certificates NTC and ANTC replaced the foreign C&G intermediate and final as well as the FTC and the WAEC. The technical colleges are expected to comply with the provisions of Education National Minimum Standards and Establishment of Institution Decree 16 of 1985. The curricular of the NTC and ANTC were adopted to meet the requirements of the 6-3-3-4 educational system. A minimum of nine years basic general formal schooling education is required as entry requirement into the technical colleges.

The purpose of technical colleges according to the FGN (2004), lead to the acquisition of practical and applied skills as well as basic scientific knowledge that will enable individuals to be self-reliant, useful members of the society which the graduates of building will be involved. Graduates of technical colleges are individuals who have completed and received training in building construction practical in technical colleges for either three or six years

Goodman, et al (2013). Graduates of technical colleges have possessed practical experience, and familiar with the tools and working rules and regulations with techniques for planning construction operation. These technical colleges' graduates need to be involved at building site.

2.1.2 Building Construction

Buildings are structures that serve as shelters for man, his properties and activities. They must be properly planned, designed and constructed to obtain desired satisfaction from the environment. Abubakar, (2021) said that building is a structure used especially for a dwelling, factory, store, shop, or warehouse. Buildings existing to meet a primary physical need of shelter for man, his goods, his animals and all the mechanical and electrical equipment he requires for his present day existence. In addition to meeting this physical need, buildings and well related groups of buildings may also satisfy man' s desire for mental and spiritual satisfaction from his environment. To achieve these, buildings must be well designed as well as efficiently constructed.

Structures are part of a building and cannot be conceived in isolation but must be conceived as part of the whole design architectural, structural services. App, (2019) said that, the structure of the building is that of the building construction, which gives the construction sufficient strength to withstand the loads to which the whole building is subjected. A building structure does this by carrying the load imposed on it and transferring them safely to the foundation and hence the ground thus, every part of a building structure.

The Function of a Building

A shelter is basically a protection from the elements and the function of a building is to enclose space-so that a satisfactory internal environment may be created relative to the purpose of the particular building. Faremi, et al (2021) said that, the space within the building

must provide conditions appropriate to the activities to take place within it and satisfactory for the comfort and safety of any occupant. Thus the space will be designed in terms of size and shape and in terms of environmental factors such as weather and noise exclusion, and the provision of adequate heat, light and air. The fabric of the building must be designed to ensure that any standard in respect to these are attained.

The building fabric can be seen, therefore, as the means by which the natural or external environment may be modified to produce a satisfactory internal environment and for this reason it has been called the environment envelop. In filling this function the building and its parts must satisfy certain requirements related to environmental factors on which the design of the spaces within it is based. According to Zulu, (2022) these functional requirements are the provision of adequate weather resistance, thermal insulation, sound insulation, light and air, in addition, adequate strength and stability must be provided together with adequate fire protection for the occupants, contents and fabric of the building. The importance of any of these will vary with the particular part of the building and with its primary function

The Nature of Building Structure

Building is concerned with providing in physical form the envelopes to the spaces within buildings and it has been primary activity of man throughout history Sommese, et al (2022). He said, it is now, to a large extent, an erection process in which the products of other industries are assembled, a complex process, more so than for most other products, both organizationally and technically, involving on most of which are carried out on site and subject, therefore, to the hazards of weather.

The basic requirements that a structure must satisfy are:-

- Each and every member of a structural system should be able to resist, without failure of collapse, the applied loads under service conditions. In other words, it must possess

adequate strength. This demands that the materials of the structure must be adequate to resist the stresses generated by the loads and the shape and size of the structure must be adequate.

- Every component of the structure should be able to resist deformation under loading conditions.

Deformation implies a change in size or shape when a body is subjected to stress. Excessive deformations that are deformations exceeding specified acceptable limits will impair the functional performance of a structure and any attached services. This demands that the stiffness of a beam or column is a measure of its resistance to bending or buckling. It should be noted that a component may be strong and not stiff, and vice versa.

- Every component of a structure must be stable otherwise the whole structure is assumed to be unstable.

Structural stability is needed to maintain shape. It is the ability of a structure to retain, under load its original state of equilibrium (Olusola *et al.*, 2011). It can mean anything from resistance to a minor degree of movement to resistance to sliding overturning partial or complete collapse. Any phenomenon (which will be a potential source of load) that can alter the load carrying behavior of structure, if not properly taken care of can lead to instability, a condition in which the support reaction is less than applied load. Thus to ensure stability, loads must be balanced by the moments due to reactions.

Functional Requirement of Building

The primary function of the wall is to enclose or divide space but in addition it may have to provide support. In order to fulfill these functions efficiently there are certain requirements which it must satisfy. They are the provision of adequate:-

Strength and stability: The strength of a wall is measured in terms of its resistance to the stresses set up in it by its own weight, by superimpose load and by lateral pressure such as wind: its stability in terms of its resistance to overturning by lateral forces and buckling caused by excessive slenderness. According to Sanni-Anibire, et al (2020) the mode of failure of a wall by over loading, overturning or by buckling there the provision of adequate thickness and, possibly, lateral support are necessary in order to attain sufficient strength and stability.

In small-scale buildings of solid masonry construction the external wall thickness is rarely determined by strength requirements alone. The load on the wall of two storey domestic building pieced with average size window and door opening quite small and well within the bearing capacity of a normal half brick wall. This results in functional requirement other than that of strength being the determining factors as far as thickness is concerned. The latter is not normally, therefore, calculated in terms of strength for building up to three storeys in height.

Weather resistance: The external walls of a building, whatever their form is required to provide adequate resistance to rain and wind penetration. The actual degree of resistance required in any particular wall will depend largely upon its height and the locality and exposure. Dalibi, (2016) said that wind force and rain fall vary considerably throughout the form of construction adequate for one locality may not be satisfactory in another. Within any locality there can also be variation of exposure for example, a site near the coast is likely to present greater problems of rain execution than one a mile or two in land. Such factors must be borne in mind. Reference to variations in rainfall can be seen from maps of average rainfall over the British Isles.

Fire resistance: A degree of fire resistance adequate for the particular circumstances is an essential requirement in respect of walls which, like upper floors, are often required to act as highly resistance fire barriers. They are used to compartmentalize a building so that a fire is confined to a given area, to separate specific fire risk within a building, to form safe escape routes for the occupants and to prevent the spread of fire between buildings.

The term fire resistance is a relative term applied to elements of structure and not to a material (Gernay, 2019). It is not to be confused with noncombustibility. An element may incorporate a combustible material and still exhibit a degree of fire resistance which will vary with the way in which the material is incorporated in the element. The degree of resistance necessary in any particular case depends on a number of factors.

Thermal insulation: The external walls of a building together with the roof must provide a barrier for the passage of heat to the external air in order to maintain satisfactory internal conditions without a wasteful use of the heating system. They should also serve to prevent the interior heating up excessively during hot weather. According to Ekhuemelo, et al (2016), adequate thermal insulation is attained of normal solid structural masonry and concrete necessitates impractical thickness of wall and it is necessary to incorporate in such consulting values in order to keep the thickness within reasonable limits frame walls of timber, which is a good insulating material by their nature incorporate casualties and with appropriate internal lining they provide good insulation with a relatively small thickness of wall construction.

Sound Insulation: Only in exceptional circumstances are the sound insulation qualities of an external wall a significant factor in its design since the other functional requirements which must be fulfilled usually necessitate a wall which excludes noise sufficiently well in most circumstances. Windows, of course, provide weak points in this respect and in some

circumstances these may have to be treated as double window environment and sciences, in order to attain a satisfactory degree of insulation. Sound insulation is, however, often significant factor in the design of internal walls. Weather exclusion and, generally, thermal insulation are not functional requirements of these walls but the prevention of the passage of sound from one enclosed space to another is often an important function they must fulfil.

2.1.3 Building as an Organizational Process

Organizationally the building process is concerned with the rational and economic use of the resources for building activity-men, materials, machines, money, in order to produce buildings in the quickest and most economic manner. Practically the building process involves two broad and related activities-design and production. Adeniregun (2010) said that, the design process is concerned with the size, shape and disposition of the spaces within the building and defined by its fabric and with the nature and form of the building fabric and its services. The production process is concerned with the nature and sequence of the operations which are involved in the erection of the building fabric and through which the resources for building are deployed.

According to Ruparathna, et al (2016), the design of the building largely determines the nature and sequence of the building operations. These in turn will determine the methods which can be adopted in carrying out the operations, and the operational methods will determine the manner in which the building resources can be deployed. Thus there is a significant relationship between the design of the building and the use of the building resources. The possibility of the rational and economic use of these resources is, therefore, latent in the building design and the implications of every design decision in respect of this must be exposed of the design stage to ensure that such a rational use of resources can be made at the production stage. Such an exposure is often difficult at the present time because

of the separation existing between designer and construction. The former, being separated from actual production activity, is not sufficiently aware of the operational significance of many of his decisions, the latter being divorced from the design process, is not always able to relate his production knowledge and skill to design decisions at a sufficiently early stage. According to Ogunsina, et al (2018) this weakness in the industry is now recognized and attempts to overcome it are being made in building education and in various ways in practice. Building construction in the past as a limited number of available construction materials which resulted to limited number of structural forms and methods of construction which, after a long period, become fully developed and standardized in practice. These could be, and were then used on an empirical basis established on their proved performance in use.

2.1.4 Building Collapse

Building collapse is a state of complete failure, when the structure has literally given way and most parts have called-in, crumbled or buck led, the building can no longer stand as originally built. Yisa, (2013), it can be seen therefore, that collapse is very extreme state of failures. The causes of building collapse can be categorized as that due to natural forces or by the influence of man either due to his negligence or incompetence. Akpabio, et al (2019) said that, professionals in the building industry summarized the major causes of building collapse to include the following. The attitude of the public, professional bodies and governments, Okeke, et al (2020) stated that the absence of soil test before construction, structural designs and details are sometimes defective. He further stated that lack of proper plans, absence of co-ordination between profession bodies and town planning authorities, lack of adherence to specification by contractors, use of unqualified and unskilled personnel, poor or bad

construction practice, use of substandard building materials and inadequate enforcement of existing laws are causes of building collapse.

2.1.5 Causes of Building Collapse

Deficient structural drawing: Building collapse when structural drawings are based on false assumptions of soils strength, they can also collapse as a result of faulty structural details. Muchemi, (2017) identified design defaults accounting for fifty percent of collapse of engineering facilities in Nigeria.

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

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

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

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

Illegal alteration to existing buildings: client at time, on their own, alter existing structures (buildings) beyond and above the original design without any drawings, and relevant town

planning approval. In some instances existing bungalows have been converted to either a storey building or two to threestorey structures without any drawings and supervision by qualified personnel.

Use of substandard materials: substandard materials especially reinforcement rods, steel sections and cement can contribute immensely to failure of buildings. Other substandard materials can also contribute to failure of buildings. The use of low quality materials is one of the major causes of structural failure. Obi, et al (2021) in their study also identified low quality materials as the most important cause of failure of engineering facilities in Nigeria.

Inefficient workmanship (labour): Inefficient and fraudulent labour can also contribute to failure of buildings. When a contractor cannot read drawings or where he refuses to list into the instruction of the consultants anything can happen. Obi, et al (2021) posited that faults on construction sites accounts for collapse of structures.

Use of acidic and salty water: use of acidic and salty water, as sourced from oceans and seas in cities like Lagos and Port Harcourt can affect the strength of concrete. When used to effect the mix of cement, sand and rods.

The activities of quacks: A cursory look at the building industry in Nigeria today reveals that individuals who are ill equipped carry out functions associated with construction. According to Yisa, (2013) the industry has had more than its fair share of the activities of quacks that have nothing at stake whenever problems arise. The unsuspecting public is also at a loss differentiating the real professionals from the quacks until the real harm has been done. Today, it is not strange to find staff of town planning offices who are mainly town planners and site inspectors, even some land surveyors and builders taken architectural commissions, masons have overnight transformed to engineers and builders. This is a major problem of the building industry.

2.1.6 Prevention of Building Collapse

According to Lagomarsino and Cattari (2015) prevention of building collapse will take place if the following measures are been adopted.

Team work

Teamwork is construction work because every person' s contributions are vital to success of the team, whenever one team member is left out, not included in decisions in any way, the work of the team obstructs and the best efforts will not result.

Supervisory Control

Precautionary measures against unintentional or deliberate human errors and negligence include peer reviews and regular and supervisory control should be instituted. Checking, inspection and review procedures, new or unusual features should be reviewed externally by qualified experts. Checking and inspection procedures should be incorporated into each stage of planning, design, and construction for the presence of errors. There should also be an independent (external) assessment of the building design, as for example by the municipal authority.

New or unusual features extra care additional precautions are required in the case of new design or construction methods for which little prior experience exists. In such cases, it is wise to have only one very experienced, senior engineer or architect in charge of the design of the structure Soetanto, et al (2017).

Responsibilities

The responsibilities of all members of the planning, design, and construction teams should be clearly defined orally and in writing. Tasks, responsibilities, and duties of the project manager, site manager, and specialists must be clearly defined and the names of different

persons fulfilling different functions should be drawn up on an organizational chart for easy reference.

Project Documentation

All documents, plans, and drawings should be regularly updated throughout the entire life of the building project from the planning stage to final construction.

Feedback from Failures

Failure reports on causes, types, and consequences of building failure should be collected for categorization and analysis. This information would be used to identify problem areas and to improve quality assurance procedures. Such information on building failures could be obtained from engineers in consulting firms, government departments, insurance companies, building inspectors, and large holding corporations.

Training of Staff

There should be better education and training of staff through technical up grading seminars. All staff, especially supervisory staff, should be trained in interpersonal skills.

Improved Supervision

Supervisors should be educated in interpersonal skills so that they will be better able to better handle instances of individual failure, and so they will be able to recognize signs of impending failure before they occur. Behavioural problems can be reduced by educating supervisors to make them aware of past incidents so that they can recognize them if they occur again. They should also learn how to handle apparent errors or disagreements that arise. There should also be regular job performance reviews to highlight personnel problems.

Motivation

It is important that all those involved in the design and construction of the buildings have adequate motivation to do a good job. Motivation refers to an internal state of the worker, his attitudes and willingness to work well, in addition to external reinforcements such as pay which can activate the individual to do a good job. Adequate worker motivation can be maintained by ensuring that all staff are well paid according to their expertise and job performance, and that there is good working morale among employees, supported by good working conditions and team work.

The provision of section 61 to 63 of the urban and regional planning law is adequate for prevention of building collapse (Gholami *et al.*, 2021). As stated in the (URP) Law, any notice served in connection to a defective structure posing danger or constituting nuisance to the occupiers or public, demolition action on the structure must commence within 21 days.

According to Taiwo and Afodami, (2010), the following preventive measures should take place in order to prevent the building collapse.

- Stringent penalties should be applied for those responsible for collapse of building particularly when loss of lives is involved.
- Town planning authorities should be adequately staffed and equipped with professionals in the construction industry. For effective monitoring of projects during and after construction.
- Continuing professional development should be emphasized by both the professional bodies and the government on modern trends in the building industry. To keep members of the building industry abreast with new trends in construction
- Government should provide an enabling law for the training, and effective control of artisans and craftsmen in the building industry.

- Government should screen those getting involved in housing projects. For any structure more than a bungalow, a structural engineer must be involved.
- Construction work should only be carried out by registered contractors and supervised by registered architects engineers and builders rather than engaging unskilled contractors.
- Clients should obtain approvals before they begin construction. At the same time, they should work with the approved drawings and specifications. Any alterations should be approved before their implementations.
- To promote the safety of buildings therefore, a holistic approach is required where by all relevant outfits and organizations must be involved apart from the recognized professional bodies.
- A regular audit of defective structures must be carried out and such structures marked for demolition should be demolished before it causes havoc on lives and properties.
- Government at all levels should intensify public enlightenment, placing emphasis on how building disasters could be prevented rather than managing situations which might be costlier.

Oloyede (2010) stated that:-

- Government long-term objectives should be to foster a building safety culture among Nigerians so that all stakeholders involved, building owners, occupants, professionals, contractors and workers will possess selfawareness to properly observe building safety. A safety built environment can only be sustained if all concerned in our community responsively play their part.

- Government must embark on proactive steps by mastering enough political will to allow the Town Planning Authorities perform their functions unfettered.
- Government must realize that for the oversight bodies to be effective, they have to be created in a political atmosphere where leaders are honest, civil servants are insulated from political interference, and better incentives are provided to discourage corruption.
- To check the characteristics of erring professionals, members of staff of the town planning authority and individual housing developers, the legal framework should be improved to ensure smoother, less time consuming and less burdensome ways to conduct business in the functioning of law court. Once this is put in place, those who flout the law can be promptly and heavily sanctioned to ensure strict compliance. Un-ending court cases should be discouraged by the judiciary if the present tempo of building collapse is to be prevented.

2.1.7 Construction Management

Construction management is a process in which the interest and effort of all principal parties involved in a construction project are integrated and coordinated by a central control entity. Construction management is capable of assuring the owner, developer, investor, or contractor a more cost effective and higher quality project. All construction projects have common elements Cyphers and Schultz (2019) they must be planned, designed, funded and built. This makes effective integration of all related industries a key factor for successfully completing a project.

This category the owner finds several variations of services rendered (Osuizugbo *et al.*, 2022). The choice depends, on the particular situation. In time of rapid inflation or necessity,

the owner commonly decides to cut the design and construction time. Construction commences before the completion of the working documents referred to as “fast track” sometimes the government for economic reasons, decided to spread the wealth by awarding a number of smaller, more manageable contracts to local firms, instead of one expensive contract to a large international contractor. Usually the time restriction or the magnitude of the project determines the final choice of construction management. Because an owner finances several simultaneous contracts in lieu of one vast project or fast-tracks, creates a number of coordination manager (either an architect, a large contractor, or a construction management specialist) to oversee all the projects. Essentially the owner establishes a team comprising himself, the construction manager, and the architect or engineer who works from the project; inception, through planning to completion.

During the predesigned phase, the construction management contributes to the general planning of the total complex (De Melo *et al.*, 2016). He places special emphasis on optimizing efficient methods and procedures when integrating the individual projects. In the design stage the construction management advises and coordinates the various consultants (A/E's) in the consequences of their designs, the construction management reviews the plans and pieces; he prepares total cost estimates; and, if required, he recommends the purchase of long-lead items. In general he reduces the probability of conflict and confusion among the several contracts. Before and during the prosecution of the contracts, he acts as an agent, advisor, and arbitrator, performing duties similar to those of an architect, but in an overall supervisory capacity, encompassing a number of projects. As stated previously, in the typical project assumed here, the owner usually selects an architect to design the project. With a completed design, the owner must then address himself to the choice of bid proposal.

Management is responsible for planning, organizing and controlling the work according to Dube, et al (2015). If management responsibilities were properly carried out; there would be few cases of workers standing idle waiting for job assignment, tools or instruction. One of the major tools for improving construction productivity is work improvement: that is, the scientific study and optimization of the work methods. Such techniques are also known as work simplification, motion and time study, work study, and methods analysis. Other techniques available to assist the construction manager in improving construction productivity and cost effectiveness include network planning methods, economic analyses, safety programs, quantitative management methods, simulation, and the use of computers.

Groups in Construction Management

In a typical project, the owner (an agency) signs an agreement with an architect for full services (preliminary design phase, working design phase, and supervision phase). According to Campbell, et al (2021), that subsequent to the working design, the agency awards a construction contract (lump sum, complete bid) to the lowest responsible contractor. Legally, the procedure strikes one as extremely precise and professional all in black and white so that, apparently, nothing can go missing furthermore; all these contracts and agreements have weathered years of test and revision. Therefore, one may confidently acknowledge the legal consequences that obligate all parties to duly fulfill all terms of the contract.

Yet people, not documents, build projects, for certain, the legal document defines duties and limitations, but because of expense and time, few construction conflicts wind up in the courts. Instead most problems are resolved in conference rooms. According to Yisa, (2013), that in the clerks trailer on a quasi-legal level, or over the telephone. In accordance personnel

understand and acknowledge defined responsibilities and roles in the course of the project. And ideally, each individual strives to fulfill each and every obligation. Nevertheless, even under the best of conditions and intentions, serious conflicts still arise. Each project yields a unique mixture of obscurities and oversights, surprises and events encountered. The construction team, and not the judges, remedies these conflicts, usually on a face – to-face basis with team members. In fact, sometimes people outside of contractual obligations weasel into the picture. Even though not party to the contract during the project life. Hundreds of individuals, who represent tens of groups, interact with the construction management team.

To be really effective planning must be simple, flexible, balanced and based upon accurate standards of performance determined by systematic analysis of observed and recorded facts. The process of construction management can best be appreciated by review of the three basic elements common to all construction projects and the role of construction management relative to these elements. The elements include planning and design preconstruction and subsequently, construction.

Planning and Design

Traditionally project planning involves many separate entities including real estate brokers, financial institutions, government agencies and architects. Frequently, there is no motivation for the entities to work cooperatively and expeditiously without constant supervision by the owner' s time and energy at the expense of his other commitments. The construction management firm assumes the responsibility for coordination and integration of all effort an input to facilitate professional identification and assessment of key options impacting the individual planning phases including feasibility studies, site selection, schematic design and financing. The owner' s role becomes that of the decision making with the counsel of the construction management firms.

Construction

Construction management provides continuous involvement and full-time supervision during the actual construction phase. Because of the intimate involvement of the construction manager from the project's inception, there is full knowledge and commitment to the owner's needed and desires relative to clarifications of contract plans and specifications. Most questions are resolved and recorded during the planning stage thus providing greater control by the owner to enhance the project progress and insure timely completion. The role of the construction manager eliminates the use of a general contractor, in turn eliminating the opportunity for extra costs and timely delays due to misinterpretation of plans and specification.

Pre-construction

The same opportunities and benefits of construction management apply to the preconstruction phase of project development. Traditionally, an architect/engineer firm performs the function of preliminary design, final drawings, and construction documents along with redesign. These firms frequently are not cognizant of current construction practices being employed in the field. Construction management can insure that state – ofthe-art methods and materials are reflected in plans and specification thus elimination excess costs to the owner because of over specification of procedures and materials or subsequent redesign. This cost saving alone will often exceed the fees charged by a construction management firm.

Project bid analysis follows the same hands on approach. The owner will have all subcontract and material vendor data available through the construction manager at all times. Because construction management services are provided on a fee basis as opposed to a percentage of project cost, there is no incentive for the cost to be anything but favorable to the owner. This is one of the most important concepts being conveyed through the construction management

approach, stressing the owner's control over his construction project with the use of a construction manager.

2.18 Skills needed in Construction management

Skill is the ability to do something. It is the capacity, systematic and sustained effort to smoothly and adaptively carry out complex activities or job functions involving ideas Zungu, (2022). He stated that skill is the ability to put into use acquired competencies, attitude and behavior after an exposure to theories and practical's inherent in a field of study. Hall in Carr, (2018) stated that skills are well established, that skills are needed for performing certain tasks in work situation, because skills are practical activities which individual perform for work to be done effectively. Construction managers should possessed different types of skills which are required for the construction work. Boswell, (2004) stated that, to possessed a skill, is to demonstrate the ability of acting, thinking and behaving in a specific activity in such a way that the process becomes natural to the individual through repetition or practice, is also the leaned capacity to carry out predetermined results often with the mini-out lay of time, energy or both. It also includes the ability to recognize and define problems, invent and implement solution, and evaluate results.

The basic skills required for a construction work involves good supervision and co-ordination. Hajian, (2019) These skilled works can be done successfully if, there is good supervision from the construction management especially to technical college graduates with the necessary skills to be able to work effectively and efficiently with other professionals in the building industry, based on the building practical's acquired in technical colleges.

Construction Planning Skill Needed

Planning is the administrative process that translates policy into a method of reaching objectives. It lays down strategies on how a project will be carried out. Planning helps to

determine materials, staff and machines that will be needed; and other necessary details that will help in carrying out the project, according to Gupta, (2019) planning results from the proceeding processes of forecasting, it is the most important of the processes in management. It is within this process that instructions are issued for action to be taken.

Construction planning is generally concerned with completing a contract in the shortest possible time compatible with economy. According to Griffin, et al (2022) stated that, prior consideration must be given to the plan of campaign so that the client can be given the intended completion or handing over dates, and suppliers and sub-contractors may be notified when their goods or services will be required. Moreover, the contractor himself must know what his future commitments will be for staff, labour and plant Islam & Hoque (2022) stated that, it is of the greatest importance that an adequate period, before starting site operation is made available for the proper planning of equipment and methods, ordering of materials, and preparation of a balanced programme. Obviously the time necessary will vary with the size and nature of the project, but this essential preliminary can affect the whole course of the job.

Site Organization Skill Needed

Site organization is the process of arranging for a project work to be executed by acquiring land for the construction work, initial project preparation, site study and recruitment of work men. The planned design of the company structure, showing the relationships between all employees and the functions each should perform to make the organization work effectively towards given objectives Dunne, (2018). Organizing provides the framework of management, the basic structure upon which the succeeding executive and supervisory functions can build in accordance with the policy principles determined by the directors. This is the other aspect of administration complementary to planning, and concerned with the more general selection of the people for the discharge of managerial responsibilities.

The process of organizing or preparing comprises

- The definition and nominal distribution of the responsibilities and duties of the various executive and supervisory personnel forming the establishment of the enterprise.
- The recording of the types of formal relationship existing between individual appointments, the pattern of accountability and theoretical paths of contact,

The formulation and installation of standard procedures, preferred methods of working and operating instructions for standard techniques.

Safety Skill Needed

Safety implies freedom from occupational hazards industrial pollution, injuries and damage to materials, tools and equipment or even death of personnel in the construction industry. Therefore, conditions which reduce the possibility of injuries to personnel, damage to materials. Ibidapo, (2021). Stated that safety at work means thinking and acting responsibly at all times and in every activity, and requires the co-operation of all, safety is the effort by management to prevent and eliminate the causes of accidents.

2.2 Related Empirical Studies

James (2013) conducted a study on construction management skills needed by technical college graduates for prevention of building collapse in FCT Abuja. The study adopted a survey research design. The population of the study consists of four hundred and thirty- three (433) subjects. The sample for the study comprised all 60 registered builders and 30 site supervisors in Federal Capital Territory, Abuja. Five research questions and five null hypotheses were developed and formulated respectively to guide the study. Instrument of for

data collection was a structured questionnaire. The instrument was subjected to face validation. Data collected were analyzed using the mean and standard deviation for the research questions while t test statistic was used for testing the null hypotheses. It was found from the study that thirty eight construction planning skills, six organization skills, nineteen controlling skills, six safety skills and thirty two site supervision skills were needed by technical colleges graduates to prevent building collapse. There was no significant difference between the mean responses of registered builders and site supervisors on the construction planning skills, organization skills, controlling skills, construction safety skills and site supervision skills needed by technical college graduates for prevention of building collapse in federal capital territory Abuja. The findings of this study revealed that these skills include: ability to work with trained professional bodies for prevention of building collapse, ability to plan with building designers for prevention of building collapse, ability to test materials to ascertain its quality for prevention of building collapse. It was recommended that identified construction management skills should be used to retrain building construction graduates at skills acquisition centers. It was also recommended that identified construction management skills should be integrated into the curriculum of building construction of technical colleges.

Salihu (2016) conducted a study on Resultant Effects of Poor Supervision in Building Construction Projects in Nigeria. Construction activities, tasks in every project phase are only achievable by adhering to the project Documents and by extension adequate supervision. This is much needed due to the millions of labourers working directly and indirectly within the Nigeria' s construction industry. However, most of them work as unqualified, unskilled and untrained labourers. As a result, extra coordination and supervision is surely needed to ensure good project delivery. Adequate supervision leads to quality job but comes with additional cost for the effective supervision. Project supervision covers monitoring, evaluative review, reporting, and technical assistance activities to identify project challenges,

ascertain, prepare and recommend solutions to at the earliest possible time. Adequate project supervision during the construction stage is vital as it may provide the necessary indicators to other factors that may cause collapse of buildings; without which a lot of activities will go unnoticed, unchecked, un-approved and not to specification or standards. The absence of which breeds other resultant effects which will harm the project and the stakeholders. The aim of this paper is to evaluate the resultants effects of poor supervision in building construction projects with a view of identifying, understanding, assessing and ranking the impacts of such effects on the finished projects at the construction and post occupancy stages in Nigeria. A total of twenty one resultant effects of poor supervision in construction projects were identified from the literature reviewed and were directed at various professionals in the industry. A total 165 questionnaires were randomly administered; 112 responses were received, 12 were incomplete and deemed invalid while 53 were not returned. Civil Engineers with 42.31% have the highest responses followed by Building Engineers with 34.62% while Construction Managers have the least with 17.31%. Among the respondents, professionals with experience of 10years and below have 59.82% of the responses while those with above 10years of experience have 40.18% of the total response. The result shows that 10 of the resultant effects of poor supervision were strongly agreed by the respondents (representing 47.62%), 7 were agreed (representing 33.33%) while 4 remain undecided or Neutral (representing 19.05%). However, the result shows that each category of the respondents' years of experience perceives the resultant effects of poor supervision differently based on their ranking. The testing of the research hypotheses was carried out using Chi-square statistical test, and the Alternative hypothesis was accepted since the value of χ^2 Calculated is greater than the value of χ^2 Tabulated. The Alternative hypothesis stated that " there are resultant effects of poor supervision in building construction projects at the construction and the post occupancy stages" .

Boating (2016) Factors That Lead To Building Collapses in Ghana. Over the years construction has seen some factors that do not in any way contribute to the successes to be achieved by the construction industry. Typical example was MELCOM, the Achimota department store which collapsed on Wednesday, November 7, 2012. The main aim of this study was to identify the factors that lead to building collapses in Ghana. In achieving this aim, the following objectives were put forward; to identify factors that lead to building collapses in Ghana; to identify the effects of building collapses on stakeholders in the building construction industry; and to suggest solutions to help solve these problems. The methodology employed quantitative approach where questionnaires were administered through simple random technique in selecting the various professionals needed for this study. The target population was 48 respondents basically the building construction professionals which included the contractors; project managers; architects and other building professionals in the D1K1 construction firms. Due to certain limitations and circumstances, only 34 questionnaires were able to be retrieved. The data analysis was then analyzed using descriptive statistics while RII ranking technique was used in ranking the various determinants. The findings depicted that, the critical determinants which come into play that lead to building collapses in Ghana such as; Lack of proper supervision, inspection and monitoring of construction works; corruption; engagement of ill-equipped, incompetent contractors; engagement of inexperienced personnel to take charge of construction works; and the use of substandard materials by contractor etc. needed to be critically be taken into consideration. The research recommended that, management in the construction field; contractors; project managers etc and a number of departments who are mandated with responsibilities in the construction field take into account the factors identified and with respect to the suggested solutions provided by the researcher ensure that, the issue of building collapses are brought under control. Similar researches can be done on construction

management in Ghana to bring out diversity in the study so that building collapses can be under control.

Chiemezie (2021) carried out a research on Buildings collapse in the Nigerian major urban cities continues to engender an excessive number of fatalities, injuries and property damage. The collapse of building infrastructure, though prominent in developing economies, is a worldwide issue. Building developments collapse at the construction stages and in some cases after commissioning. Examples abound in recent times in Abuja and Lagos. The major problem is the unquantifiable resources wasted when building construction development collapses. If the answer to this endemic problem is proper project management, it becomes imperative to institutionalize its activities in Nigeria. Building Collapse is an occurrence that has been notorious over the decades. It is caused by many factors which have their great impact on the lives and properties of man. This study reviews current causes in the building industry. In view of this development, this study is aimed at demonstrating how real estate project management strategy helps in building collapse. Data from the primary source were basically from the designed instrument, which were distributed to the population of 100 professionals in the building industries. In this paper, it was concluded that the key causes of building collapse are weak/faulty foundations, inefficient stringent quality control in material utilization, and management, boycotting the professionals, the absence of proper site investigation and the engagement of inexperienced personnel. The aim of the study was to identify the factors influencing the occurrence of construction disasters in Nigeria in order to prevent them in the future. However, the analysis of the results gathered, reveal that, there was variance in opinions, as to the causes of building collapse among professionals in an attempt to exonerate themselves from the blame for building collapse. These were classified as the areas in the building sector that were prone to building collapse. Therefore, this study

claims that the above-listed causes of building collapse are predominant in the Nigerian construction industry.

2.3 Summary of Review of Related Literature

The related literature reviewed by this study was in the following areas: Technical Colleges in Nigeria, Building Construction, Building as an Organizational Process, Building Collapse, Causes of Building Collapse, Prevention of Building Collapse, Construction Management, Skills needed in Construction management. The literature reviewed on construction management helped the researcher to develop questionnaire items for collecting data in order to identify construction management skills. Adequate and relevant literatures were reviewed in the study.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Design of the Study

The study adopted the descriptive survey research design used to determine construction management skills needed by Technical College Graduates to prevent building collapse in Minna metropolis Niger state. Survey design according Nworgu (1991) is aimed at collecting data on and describing in a systematic manner, the characteristics features or facts about a given population. Osuala (2005) said that it is a design which studies the characteristics of people, the vital facts about people and their beliefs, opinions, attitude, motivation and behavior.

3.2 Area of the study

The study was carried out in all technical colleges in Niger state. Niger state falls on the land mass area of about 76,363km² and with the population of about 3,950,349 (NPC, 2006) and the study was carried in out Niger state in order to determine the construction management skills needed by Technical College Graduates of Building to prevent building collapse in Minna metropolis Niger state.

3.3 Population for the Study

The population for the study consists of 100 respondents comprising 80 building students in six technical colleges and 20 technical teachers.

3.4 Sample and Sampling Technique

There will be no sampling since the population was small and manageable.

3.5 Instrument for Data Collection

The researcher designed a structured questionnaire as an instrument that was used in collecting data for the study. The questionnaire will made up of 5 sections (A, B, C, D, E and F). Section ‘ A’ contains items on personal information of the respondents. Section ‘ B’ seeks construction planning skill needed by Technical College Graduates of building to prevent building collapse. Section ‘ C’ find out the organization skill needed by Technical College Graduates of building to prevent building collapse. Section ‘ D’ find out controlling skill needed by Technical College Graduates of building to prevent building collapse. While Section ‘ E’ construction safety skill needed by Technical College Graduates of building to prevent building collapse. Section ‘ F’ seeks to site supervision skill needed by Technical College Graduates of building to prevent building collapse. The questionnaire items were based on four points scale types. Items for section ‘ B’ , ‘ C’ , ‘ D’ , ‘ E’ and ‘ F’

contain four responses category each. The response categories for section 'B', 'C', 'D', 'E' and 'F' are strongly Agree (SA), Agree (A), and Disagree (D) and strongly disagree (SD). These response categories will be assign numerical values of 4, 3, 2 and 1 respectively. Respondents were require checking (✓) against the response category that best satisfies their opinion.

3.6 Validation of instrument

The instrument was validated by three lecturers in the department of Industrial and Technology Education, Federal University of Technology, Minna and contributions on the appropriateness of the instrument was considered in the production of the final copy of the research instrument.

3.7 Reliability of instrument

In order to determine the reliability of the research instrument, a pilot test was conducted using fifteen in other locations. During the test, the questionnaires were distributed by the researcher. The questionnaire was filled by the respondents and then returned to the researcher. The data collected was analyzed using Crombach Alpha

3.8 Administration of instrument

The instrument that was used for the data collection was administered to the respondents by the researcher and three research assistant in the study area.

3.9 Method of data analysis

Data collected was analyzed using mean and standard deviation for the research questions while t-test was used to test the hypothesis at the 0.05 level of significant. A four (4) point rating scale was to analyze the data as shown below.

- Strongly Agree (SA) = 4points (3.5 – 4.0)
- Agree (A) = 3points (2.5 - 3.49)
- Disagree (D) = 2points (1.5 – 2.49)
- Strongly Disagree (SD) = 1point (1.0 – 1.49)

Therefore, the mean value of the 4 point scale is:

$$\bar{X} = \frac{4+3+2+1}{4} = \frac{10}{4} = 2.5$$

3.10 Decision Rule

The cutoff point of the mean score of 2.50 was chosen as the agreed or disagreed point. This was interpreted relatively according to the rating point scale adopted for this study. Therefore, an item with response at 2.49 and below was regard or consider as disagreed while an item with response at 2.5 and above was regarded or considered as agreed.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.1 Research Question 1

What are the construction planning skill needed by Technical College Graduates to prevent building collapse?

Table 4.1: Mean responses of the technical teachers and building technology students on the construction planning skill needed by Technical College Graduates to prevent building collapse.

		N ₁ = 20	N ₂ =80		
S/N	ITEMS	\bar{X}	SD	Remark	
1	Ability to lay down strategies on how a project will	3.73	.446	Agreed	

	be carried out for prevention of building collapse			
2	Ability to involve craftsmen for a project for prevention of building collapse	3.59	.534	Agreed
3	Ability to work with trained professional bodies for prevention of building collapse	3.54	.540	Agreed
4	Ability to plan with the town planning and housing for prevention of building collapse	3.65	.557	Agreed
5	Ability to plan with building designers for prevention of building collapse	3.59	.534	Agreed
6	Ability to involve effective management on the project for prevention of building collapse	3.67	.551	Agreed
7	Ability to bring together the designer and operatives for prevention of building collapse	3.50	.823	Agreed
8	Ability to test materials to ascertain of its quality for prevention of building collapse	3.65	.539	Agreed
9	Ability to investigate the site properly for prevention of building collapse	3.62	.508	Agreed
10	Ability to distinguish the unskilled from skilled workers for prevention of building collapse	3.69	.563	Agreed
11	Ability to test the nature of the soil before construction for prevention of building collapse	3.65	.479	Agreed
12	Ability to train the staff for prevention of building collapse	3.63	.485	Agreed

N=100

\bar{X} = mean of the respondents

N_1 = No. of technical teachers

N_2 = No. of building technology students

SD = standard deviation of the respondents

Table 4.1 showed that both the technical teachers and building technology students agreed on all items from 1 to 12. This is because none of the mean response was below 2.50 which was the beach mark of agreed on the 4-points response options. The standard deviation score ranged between 0.446 and 0.823. This showed that the responses of the teachers and building technology students on the items were not divergent.

4.2 Research Question 2

What are the organization skill needed by Technical College Graduates to prevent building collapse?

Table 4.2: mean response of the technical teachers and building technology students towards the organization skill needed by Technical College Graduates to prevent building collapse.

		N₁= 20	N₂=80		
S/N	ITEMS	\bar{X}	SD	Remark	
1	Ability to locate plant layouts for prevention of building collapse	3.65	.500	Agreed	
2	Ability to provide exact position for prevention of building collapse	3.65	.479	Agreed	
3	Ability to design temporary offices for prevention of building collapse	3.60	.532	Agreed	
4	Ability to design parking lots for prevention of building collapse	3.47	.611	Agreed	
5	Ability to design surface water drainage for prevention of building collapse	3.39	.777	Agreed	
6	Ability to organize the design of the building structurally for prevention of building collapse	3.09	.818	Agreed	

N=100

\bar{X} = mean of the respondents

N₁ = No. of technical teachers

N₂= No. of building technology students

SD = standard deviation of the respondents

Table 4.2 showed that both the technical teachers and building technology students agreed on all items. This was because none of the mean response was below 2.50 which was the benchmark of agreed on the 4-point response options. The standard deviation score ranged between 0.479 and 0.818. This showed that the responses of the technical teachers and building technology students on the items were not divergent.

4.3 Research Question 3

What are the controlling skill needed by Technical College Graduates to prevent building collapse?

Table 4.3: mean responses of the technical teachers and building technology students on the controlling skill needed by Technical College Graduates to prevent building collapse.

		N₁= 20	N₂=80		
S/N	ITEMS	\bar{X}	SD	Remark	

1	Ability to control the design errors for prevention of building collapse	3.70	.659	Agreed
2	Ability to control substandard materials for prevention of building	3.71	.656	Agreed
3	Ability to control the compromising attitude of some workers of the town planning community for prevention of building collapse	3.12	.988	Agreed
4	Ability to control the compromising attitude of proportion of cement ratio for prevention of building collapse	3.57	.700	Agreed
5	Ability to control operational errors for prevention of building collapse	3.61	.634	Agreed
6	Ability to control leakage of water due to bad plumbing installation or blockage for prevention of building collapse	3.69	.662	Agreed
7	Ability to control the poor attitude of professional ethics for prevention of building collapse	3.55	.783	Agreed
8	Ability to control inferior building materials delivered to site for prevention of building collapse	3.69	.598	Agreed
9	Ability to control economic pressure on a project for prevention of building collapse	3.66	.572	Agreed
10	Ability to control poor and bad construction practice for prevention of building collapse	3.60	.492	Agreed

N=100

\bar{X} = mean of the respondents

N₁ = No. of technical teachers

N₂ = No. of building technology students

SD = standard deviation of the respondents

Table 4.3 showed that both the technical teachers and building technology students agreed on all items from 1 to 10. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score ranged between 0.492 and 0.988. This showed that the responses of the technical teachers and building technology students on the items were not divergent.

4.4 Research Question 4

What are the construction safety skill needed by Technical College Graduates to prevent building collapse?

Table 4.4: mean responses of the technical teachers and building technology students on the construction safety skill needed by Technical College Graduates to prevent building collapse.

		N₁= 20		N₂=80
S/N	ITEMS	\bar{X}	SD	Remark
1	Ability to promote the safety of building for prevention of building collapse	3.57	.700	Agreed
2	Ability to provide staff to produce a stable and healthy building for prevention of building collapse	3.61	.634	Agreed
3	Ability to provide equipment to produce a stable and healthy for prevention of building collapse	3.69	.662	Agreed
4	Ability to provide money to produce a healthy building for prevention of building collapse	3.55	.783	Agreed
5	Ability to provide safety helmets, shoes be given to the workers to avoid the cause of injuries for prevention of building collapse	3.69	.598	Agreed
6	Ability to implement law with respect to safety for prevention of building collapse	3.66	.572	Agreed

N=100

\bar{X} = mean of the respondents

N₁ = No. of technical teachers

N₂= No. of building technology students

SD = standard deviation of the respondents

Table 4.4 showed that both the technical teachers and building technology students agreed on all items from 1 to 6. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score ranged between 0.572 and 0.783. This showed that the responses of the technical teachers and building technology students on the items were not divergent.

4.5 Research Question 5

What are the site supervision skill needed by Technical College Graduates to prevent building collapse?

Table 4.5: mean responses of the technical teachers and building technology students on the site supervision skill needed by Technical College Graduates to prevent building collapse.

		N₁= 20		N₂=80
S/N	ITEMS	\bar{X}	SD	Remark
1	Ability to supervise structural designs and details handled by quacks for prevention of building collapse	3.44	.808	Agreed
2	Ability to coordinate between the between the professional bodies and the local town planning authority for prevention of building collapse	3.58	.622	Agreed
3	Ability to supervise the work of unskilled personnel for prevention of building collapse	3.61	.549	Agreed
4	Ability to supervise poor and bad construction practice for prevention of building collapse	3.65	.592	Agreed
5	Ability to supervise the use of building materials for prevention of building collapse	3.62	.508	Agreed
6	Ability to supervise other professionals for prevention of building collapse	3.63	.485	Agreed
7	Ability to supervise the inadequate enforcement of the existing building regulations for prevention of building collapse	3.59	.494	Agreed
8	Ability to supervise illegal conversion of buildings which often lead to structural deficiencies for prevention of building collapse	3.64	.482	Agreed
9	Ability to supervise flagrant disobedience of town planning regulations by developers and landlords for prevention of building collapse	3.65	.479	Agreed
10	Ability to sanction against erring professionals and landlords for prevention of building collapse	3.63	.485	Agreed

N=100

\bar{X} = mean of the respondents

N₁ = No. of technical teachers

N₂= No. of building technology students

SD = standard deviation of the respondents

Table 4.5 showed that both the technical teachers and building technology students agreed on all items from 1 to 10. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score

ranged between 0.479 and 0.808. This showed that the responses of the technical teachers and building technology students on the items were not divergent.

4.4 Hypothesis 1

There is no significant difference between the mean responses of technical teachers and building technology students on construction planning skill needed for prevention of building collapse.

Table 4.4 T-test construction planning skill needed for prevention of building collapse.

N₁ = 20 AND N₂ = 80

Respondents	N	X	SD	Df	Tcal	P-value	Remark
Technical teachers	20	3.45	.510	98	1.317	0.023	NS
Building technology students	80	3.63	.537				

N=100

\bar{X}_1 = mean of technical teachers

\bar{X}_2 = mean of building technology students

N₁ = technical teachers

N₂= building technology students

SD₁ = standard deviation of technical teachers

SD₂ = standard deviation of building technology students

NS=Not Significant

Table 4.6 showed that there was no significant difference in the responses of technical teachers and building technology students on all the items as construction planning skill needed for prevention of building collapse; therefore the null hypothesis of no significant difference was upheld at 0.05 level of significance.

Findings of the study

The following are the main findings of the study; they are prepared based on the research questions and hypothesis tested.

What are the construction planning skill needed by Technical College Graduates to prevent building collapse

- Ability to lay down strategies on how a project will be carried out for prevention of building collapse
- Ability to involve craftsmen for a project for prevention of building collapse
- Ability to work with trained professional bodies for prevention of building collapse
- Ability to plan with the town planning and housing for prevention of building collapse
- Ability to plan with building designers for prevention of building collapse
- Ability to involve effective management on the project for prevention of building collapse
- Ability to bring together the designer and operatives for prevention of building collapse
- Ability to test materials to ascertain of its quality for prevention of building collapse
- Ability to investigate the site properly for prevention of building collapse
- Ability to distinguish the unskilled from skilled workers for prevention of building collapse
- Ability to test the nature of the soil before construction for prevention of building collapse
- Ability to train the staff for prevention of building collapse

What are the organization skill needed by Technical College Graduates to prevent building collapse

- Ability to locate plant layouts for prevention of building collapse
- Ability to provide exact position for prevention of building collapse

- Ability to design temporary offices for prevention of building collapse
- Ability to design parking lots for prevention of building collapse
- Ability to design surface water drainage for prevention of building collapse
- Ability to organize the design of the building structurally for prevention of building collapse

What are the controlling skill needed by Technical College Graduates to prevent building collapse

- Ability to control the design errors for prevention of building collapse
- Ability to control substandard materials for prevention of building
- Ability to control the compromising attitude of some workers of the town planning community for prevention of building collapse
- Ability to control the compromising attitude of proportion of cement ratio for prevention of building collapse
- Ability to control operational errors for prevention of building collapse
- Ability to control leakage of water due to bad plumbing installation or blockage for prevention of building collapse
- Ability to control the poor attitude of professional ethics for prevention of building collapse
- Ability to control inferior building materials delivered to site for prevention of building collapse
- Ability to control economic pressure on a project for prevention of building collapse
- Ability to control poor and bad construction practice for prevention of building collapse

What are the construction safety skill needed by Technical College Graduates to prevent building collapse

- Ability to promote the safety of building for prevention of building collapse
- Ability to provide staff to produce a stable and healthy building for prevention of building collapse
- Ability to provide equipment to produce a stable and healthy for prevention of building collapse
- Ability to provide money to produce a healthy building for prevention of building collapse
- Ability to provide safety helmets, shoes be given to the workers to avoid the cause of injuries for prevention of building collapse
- Ability to implement law with respect to safety for prevention of building collapse

What are the site supervision skill needed by Technical College Graduates to prevent building collapse

- Ability to supervise structural designs and details handled by quacks for prevention of building collapse
- Ability to coordinate between the between the professional bodies and the local town planning authority for prevention of building collapse
- Ability to supervise the work of unskilled personnel for prevention of building collapse
- Ability to supervise poor and bad construction practice for prevention of building collapse
- Ability to supervise the use of building materials for prevention of building collapse
- Ability to supervise other professionals for prevention of building collapse
- Ability to supervise the inadequate enforcement of the existing building regulations for prevention of building collapse

- Ability to supervise illegal conversion of buildings which often lead to structural deficiencies for prevention of building collapse
- Ability to supervise flagrant disobedience of town planning regulations by developers and landlords for prevention of building collapse
- Ability to sanction against erring professionals and landlords for prevention of building collapse

Discussion of findings.

The result from table 4.1 shows the findings on the construction planning skill needed by Technical College Graduates to prevent building collapse. The findings of the study revealed the Ability to lay down strategies on how a project will be carried out for prevention of building collapse, Ability to involve craftsmen for a project for prevention of building collapse, Ability to work with trained professional bodies for prevention of building collapse, Ability to plan with the town planning and housing for prevention of building collapse, Ability to plan with building designers for prevention of building collapse, Ability to involve effective management on the project for prevention of building collapse, Ability to bring together the designer and operatives for prevention of building collapse, Ability to test materials to ascertain of its quality for prevention of building collapse, Ability to investigate the site properly for prevention of building collapse, Ability to distinguish the unskilled from skilled workers for prevention of building collapse, Ability to test the nature of the soil before construction for prevention of building collapse, Ability to train the staff for prevention of building collapse. The findings of the study is inline with Metzger *et al.* (2017) that ability of someone to plan with building designers and ability to bring together the designer and operatives are the activities for preventing building collapse in major cities.

The result of the hypothesis on the construction planning skill needed for prevention of building collapse shows that there was no significant difference in the responses of building students and technical teachers on construction planning skill needed for prevention of building collapse.

Table 4.2 shows the result of the findings on organization skill needed by Technical College Graduates to prevent building collapse. The findings of the study revealed the Ability to locate plant layouts for prevention of building collapse, Ability to provide exact position for prevention of building collapse, Ability to design temporary offices for prevention of building collapse, Ability to design parking lots for prevention of building collapse, Ability to design surface water drainage for prevention of building collapse, Ability to organize the design of the building structurally for prevention of building collapse. The findings of the study is inline with Hay *et al.* (2019) that ability to design temporary offices and ability to design parking lots are necessary for the prevention of building collapse in cities where high raising and gigantic buildings are erected.

The result from table 4.3 reveal the findings on controlling skill needed by Technical College Graduates to prevent building collapse. The findings of the study reveal the Ability to control the design errors for prevention of building collapse, Ability to control substandard materials for prevention of building, Ability to control the compromising attitude of some workers of the town planning community for prevention of building collapse, Ability to control the compromising attitude of proportion of cement ratio for prevention of building collapse, Ability to control operational errors for prevention of building collapse, Ability to control leakage of water due to bad plumbing installation or blockage for prevention of building collapse, Ability to control the poor attitude of professional ethics for prevention of building collapse, Ability to control inferior building materials delivered to site for prevention of

building collapse, Ability to control economic pressure on a project for prevention of building collapse, Ability to control poor and bad construction practice for prevention of building collapse. The findings of the study is inline with Osegbo *et al.* (2021) that controlling skills in building construction include ability to control the compromising attitude of some workers of the town planning community and control inferior building delivered to site for prevention of building collapse in any geographical area.

The result from table 4.4 reveal the findings construction safety skill needed by Technical College Graduates to prevent building collapse. The findings of the study revealed the Ability to promote the safety of building for prevention of building collapse, Ability to provide staff to produce a stable and healthy building for prevention of building collapse, Ability to provide equipment to produce a stable and healthy for prevention of building collapse, Ability to provide money to produce a healthy building for prevention of building collapse, Ability to provide safety helmets, shoes be given to the workers to avoid the cause of injuries for prevention of building collapse, Ability to implement law with respect to safety for prevention of building collapse. The findings of the study is inline with Montano *et al.* (2020) that one of the safety skills needed to prevent building collapse anywhere is the ability to put on safety helmets, shoes and hand gloves. The author added that this will avoid or stop the causes of injuries in work place.

The result from table 4.5 reveal the findings on site supervision skill needed by Technical College Graduates to prevent building collapse. The findings of the study Ability to supervise structural designs and details handled by quacks for prevention of building collapse, Ability to coordinate between the between the professional bodies and the local town planning authority for prevention of building collapse, Ability to supervise the work of unskilled personnel for prevention of building collapse, Ability to supervise poor and bad construction

practice for prevention of building collapse, Ability to supervise the use of building materials for prevention of building collapse, Ability to supervise other professionals for prevention of building collapse, Ability to supervise the inadequate enforcement of the existing building regulations for prevention of building collapse, Ability to supervise illegal conversion of buildings which often lead to structural deficiencies for prevention of building collapse, Ability to supervise flagrant disobedience of town planning regulations by developers and landlords for prevention of building collapse, Ability to sanction against erring professionals and landlords for prevention of building collapse. The findings of the study is inline with González-Navarro *et al.* (2018) that structural design and details handled by quacks supervision are necessary in building construction to prevent building collapse.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Study

The main focus of this research study was to find out the construction management skills needed by Technical College Graduates to prevent building collapse in Minna metropolis Niger state.

Chapter 1 of the study discussed the background of the study, the statement of problem, purpose, significance, scope and the research questions were all stated and discussed for the conduct of this research.

The review of related literature looked into The Technical Colleges in Nigeria, Building Construction, Building as an Organizational Process, Building Collapse, Causes of Building Collapse, Prevention of Building Collapse, Construction Management, Skills needed in Construction management. Various views of different authors concerning the topic were harmonized in a comprehensive literature review and empirical studies.

A survey approach was used to developed instrument for the study; the respondents identified as the population of the study were the building students and technical teachers. The entire respondents were used. A number of 100 questionnaires were administered. The instrument used was analysed using frequency count, and mean scores. The research questions were discussed base on the findings from the responses and results of the instrument used.

Implication of the study and conclusions were also drawn from the findings discussed. Recommendations and suggestions for further study were formulated and stated according to the findings of the study.

5.2 Implication of the Study

The findings of the study had implication for administrators of technical colleges, governments, building construction teachers. Teachers will write textbooks on construction planning, organizing, controlling, safety and site supervision skills needed by technical college graduates to prevent building collapse. The government through National Board for Technical Education will integrate construction management skills into programme of technical colleges in Nigeria. The government or technical college administrators will then

organize workshops, seminars, conferences and short time courses for teachers of building construction based on the newly introduced skills.

5.3 Contribution to Knowledge

The study will enhance the knowledge of technical college student in the skills need in building constructions in order to prevent building collapse. Also the study will enable the construction sectors to be to update their knowledge on various approaches to building constructions.

5.4 Conclusion

Based on the findings of the study, the following conclusions were drawn: Based on the findings of the study, the following conclusions were drawn: the identified construction management skills should be included into the curriculum of building construction of technical colleges. Inclusion of the identified skills into the curriculum will benefit the students and the graduates in many ways. It will prepare them for self employment after graduation and therefore reduce their unemployment.

5.5 Recommendations

Based on the findings of the study, the following recommendations were made:

1. Identified construction management skills should be integrated into the curriculum of building construction of technical colleges
2. Qualified teachers should be employed to teach building construction to students in technical colleges.
3. Identified construction management skills should be used to retrain building construction graduates at skills acquisition centres.

5.6 Suggestion for Further Study

The following are suggested for further studies:

1. Construction management skills needed by technical college graduates of building to prevent building collapse in other states.
2. Capacity building needed of teachers for effective teaching of building construction in technical colleges of Niger state.

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Appendix A

QUESTIONNAIRE

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE

SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

**A QUESTIONNAIRE ON CONSTRUCTION MANAGEMENT SKILLS NEEDED BY
TECHNICAL COLLEGE GRADUATES TO PREVENT BUILDING COLLAPSE IN
MINNA METROPOLIS NIGER STATE**

INTRODUCTION: Please kindly complete this questionnaire by ticking the column that best present your perception about the topic. The questionnaire is for research purpose and your view will be confidentially and strictly treated in response to the purpose of the research work.

SECTION A

PERSONAL DATA

Building technology students:

Technical teachers:

Note: A four (4) point scale is used to indicate your opinion, tick the options which best describe your agreement as shown below:

Strongly Agree (SA) = 4points

Agree (A) = 3points

Disagree (D) = 2points

Strongly Disagree (SD) = 1points

Section B: What are the construction planning skill needed by Technical College Graduates of building to prevent building collapse?

S/N	Items	Scales			
		SA	A	D	SD
1	Ability to lay down strategies on how a project will be carried out for prevention of building collapse				
2	Ability to involve craftsmen for a project for prevention of building collapse				

3	Ability to work with trained professional bodies for prevention of building collapse				
4	Ability to plan with the town planning and housing for prevention of building collapse				
5	Ability to plan with building designers for prevention of building collapse				
6	Ability to involve effective management on the project for prevention of building collapse				
7	Ability to bring together the designer and operatives for prevention of building collapse				
8	Ability to test materials to ascertain of its quality for prevention of building collapse				
9	Ability to investigate the site properly for prevention of building collapse				
10	Ability to distinguish the unskilled from skilled workers for prevention of building collapse				
11	Ability to test the nature of the soil before construction for prevention of building collapse				
12	Ability to train the staff for prevention of building collapse				

Section C: What are the organization skill needed by Technical College Graduates of building to prevent building collapse?

S/N	Items	Scales			
		SA	A	D	SD
1	Ability to locate plant layouts for prevention of building collapse				
2	Ability to provide exact position for prevention of building collapse				
3	Ability to design temporary offices for prevention of building collapse				
4	Ability to design parking lots for prevention of building collapse				
5	Ability to design surface water drainage for prevention of building collapse				
6	Ability to organize the design of the building structurally for prevention of building				

	collapse				
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Section D: What are the controlling skill needed by Technical College Graduates of building to prevent building collapse?

S/N	Skill Items	Scale			
		SA	A	D	SD
1	Ability to control the design errors for prevention of building collapse				
2	Ability to control substandard materials for prevention of building				
3	Ability to control the compromising attitude of some workers of the town planning community for prevention of building collapse				
4	Ability to control the compromising attitude of proportion of cement ratio for prevention of building collapse				
5	Ability to control operational errors for prevention of building collapse				
6	Ability to control leakage of water due to bad plumbing installation or blockage for prevention of building collapse				
7	Ability to control the poor attitude of professional ethics for prevention of building collapse				
8	Ability to control inferior building materials delivered to site for prevention of building collapse				
9	Ability to control economic pressure on a project for prevention of building collapse				
10	Ability to control poor and bad construction practice for prevention of building collapse				

Section E: What are the construction safety skill needed by Technical College Graduates of building to prevent building collapse?

S/N	Skill Items	Scale			
		SA	A	D	SD

1	Ability to promote the safety of building for prevention of building collapse				
2	Ability to provide staff to produce a stable and healthy building for prevention of building collapse				
3	Ability to provide equipment to produce a stable and healthy for prevention of building collapse				
4	Ability to provide money to produce a healthy building for prevention of building collapse				
5	Ability to provide safety helmets, shoes be given to the workers to avoid the cause of injuries for prevention of building collapse				
6	Ability to implement law with respect to safety for prevention of building collapse				

Section F: What are the site supervision skill needed by Technical College Graduates of building to prevent building collapse?

S/N	Skill Items	Scale			
		SA	A	D	SD
1	Ability to supervise structural designs and details handled by quacks for prevention of building collapse				
2	Ability to coordinate between the between the professional bodies and the local town planning authority for prevention of building collapse				
3	Ability to supervise the work of unskilled personnel for prevention of building collapse				
4	Ability to supervise poor and bad construction practice for prevention of building collapse				
5	Ability to supervise the use of building materials for prevention of building collapse				
6	Ability to supervise other professionals for prevention of building collapse				
7	Ability to supervise the inadequate enforcement of the existing building regulations for prevention of building collapse				
8	Ability to supervise illegal conversion of buildings which often lead to structural				

	deficiencies for prevention of building collapse				
9	Ability to supervise flagrant disobedience of town planning regulations by developers and landlords for prevention of building collapse				
10	Ability to sanction against erring professionals and landlords for prevention of building collapse				