MAKERERE UNIVERSITY

COLLEGE OF ENGINEERING DESIGN, ART AND TECHNOLOGY

SCHOOL OF BUILT ENVIRONMENT

DEPARTMENT OF CONSTRUCTION ECONOMICS AND MANAGEMENT

ASSESSING THE COLLAPSE OF BUILDINGS ON THE INVOLVEMENT OF PROFESSIONALS IN KAMPALA METROPOLITAN CITY

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A RESEARCH REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF THE BACHELOR OF SCIENCE IN CONSTRUCTION MANAGEMENT

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DECLARATION

I, Benjamin Kyazze, do hereby declare that this project report titled *"Collapse of building on the involvement of professionals in Kampala City"* in its entirely is purely a product of my synthesis and analytical interpretation of limited engagement of professionals as one of the malaises responsible for failure and collapse of high-rise buildings in Kampala City. The dissertation has never been submitted to Makerere University as well as other institutions of higher learning either in bit or full for any award. The dissertation is built on related views of other scholars. However, their works have been duly annotated and paraphrased and consequently listed down in the section for references towards the close of this manuscript.

Signature .....

Date 19th/06/2023

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APPROVAL

I certify, that this project report titled *"Collapse of building on the involvement of professionals in Kampala City"* has been duly complied by Benjamin Kyazze and is now ready for submission for the award of the degree of Bachelor of Science in Construction Management of Makerere University.

Signature ..... Date 25/06/2023

Mr. Grace Arinaitwe (MRICS)

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A journey worth travelled must successfully come to an end, goes an old adage. So is my three-year journey that I embarked on in the year 2021 at CEDAT. This project being the last straw, has successfully been accomplished, courtesy of the invaluable support of a score of people. Top of the list is my supervisor, Mr. Grace Arinaitwe for his selfless support. Despite the national, institutional and international obligations that divide his work time apart, he immensely supported the processes leading to the final accomplishment of this project by among others providing me prompt feedbacks, guiding me on how to correct any digressions that arose in my work from time to time and above all, ensuring that I stayed focused to completing it in time. Mr. Grace, you are a gem. I actually relish an opportunity of furthering my career and siphoning more knowledge from your intellectual store.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

KCCA - Kampala City Council Authority

HVAC - Heating, Ventilation and Air Conditioning

EIA – Environmental Impact Analysis

TPA – Town Planning Authority

ERB - Engineering Registration Board

ISU - Institution of Surveyors Uganda

SRB – Surveyors Registration Board

ARB – Architects Registration Board

UIPE - Uganda Institution of Professional Engineers

MoWT – Ministry of Works and Transport

CEDAT – College of Engineering, Design, Art and Technology

MLHUD – Ministry of Lands, Housing and Urban Development

NBRB – National Building Review Board

ABSTRACT

Kampala is the premiere city in Uganda, a status it has possessed since independence in 1962. Given this strategic advantage as well as historical fame during colonial period, it has continued to be a magnet of Uganda as well as a preferred center for expatriates. This has led to shortage of land and housing units compelling investors to establish high rise buildings. However, in the last one decade, many high-rise buildings have collapsed and caused loss of lives and property. While there are many contributory factors, limited engagement of professionals could be among. No studies have been carried out to provide this linkage. Thus, the purpose of the study was to assess collapse of high-rise buildings and the involvement of professionals in Kampala city. The study was guided by the following specific objectives, to assess: To identify the roles and responsibilities of different professionals in the construction of buildings in Kampala City, assess the causes of building collapse in Kampala City and establish the potential consequences of the absence of construction professionals in the construction of buildings in Kampala City. The study collected both primary data that was both quantitative and qualitative. Primary data were collected using questionnaires and interviews. Questionnaires were administered to staff of selected institutions and companies while interviews were administered to top management of KCCA, UIPE, USA, ERB and MoWT as well as contractor companies. Quantitative data were analysed at univariate levels using SPSS while qualitative data were analysed using narrative text. Findings of the study established various roles and responsibilities of different professionals on construction sites. The study equally established the causes of building collapse selection inexperienced customers, limited engagement of professionals, construction without building permits among others. Consequently, the effects of the absence of professionals were also established and potential building collapse was fronted to be the greatest consequence. The study concluded that limited engagement of professionals is very common on high rise buildings in Kampala city and yet they are not given emphasis as prime causes of building failure and collapse in high rise constructions. The study recommended the need for line ministries to offer management support to KCCA in the form of project management training services, careful screening of design engineers, invest in improving the quality and relevance of professional education and training programs. \

CHAPTER ONE: INTRODUCTION

1.1 Background

The building and construction industry is one of the most important in modern economies. It provides the buildings and infrastructure on which virtually every other sector depends. It contributes an average of 1253.01 UGX Billion to the country's GDP which is about 12% of Uganda's GDP. However, despite its clear economic benefits, the construction industry globally has a poor safety record and it is one of the most dangerous industries on basis of accident frequency (Lubega, et al., 2004) even with facing the challenge of demand for infrastructure as exhibited in the low level of adequate shelter for its citizens which is amplified by the population growth that is registered at 3.04%. In Europe, the construction industry contributes 30% of fatal industrial accidents, yet it employs only 10% of the population (Peckit, et al., 2004). Construction fatalities account for 30-40% of industrial fatal accidents in Japan and 50% in Ireland (Peckit, et al., 2004). In Kampala, the capital of Uganda, about 4% of construction workers suffer workplace injuries and the resultant fatality rate is 84 in every 100000 workers (Irumba, 2014).

Many divisions of Kampala city, including Buziga, Makerere Hill, Makindye, and the Kampala Central Business District, have been plagued by building failures and collapses since 2010 (Manishimwe, 2017; Masaba et al., 2016, Ngwomoya, 2020). The growing number of occurrences of falling buildings has created a slew of issues, pushing stakeholders in the building industry and the government to investigate the root reasons (Masaba et al., 2016; Ngwomoya, 2020).The past three years have shown that this vice whilst having probable prevention measures, it cannot easily be phased as evidenced by past tragedies that are on, 11th October 2019, one person died and several others injured after a building collapsed in Bakuli, Rubaga division, 9th January 2020, a building collapsed in Kansanga, Makindye killing six people, 15th January 2020, a two-storeyed building located on Plot 17 Gokhale road caved in killing three people, May 2020, a five-floor building collapsed killing 13 people,16th march, 2021, Fido Dido building on Kampala road caved in killing two people and finally with the recent being in Kisenyi 2 on the 5th September 2021 were five people were killed and several others injured (Kamurungi and Sserugo, 2022).

A building construction contract involves several parties, including the client, the general contractor, the subcontractors, and the professionals, the architect, engineer, builder, and quantity surveyor. Each of these parties has a stake in the building's construction. The local

government is also involved in the oversight to make sure that the building is being constructed per the necessary laws and regulations. The architect, engineer, and quantity surveyor are the most accountable individuals for a construction project (Abdul and Adelnaser, 2009). The management of the construction processes to fulfill the client's request within a suitable price range is another duty of the specialists. According to their obligations and professional standards, these construction professionals have a fiduciary duty to apply all reasonable skill, care, and diligence. They must also show competence and expertise in accordance with their obligations and professional standards.

Since it is evidenced from records that there is a continued rise in building collapse it gives rise for the need to investigate whether these professionals are truly involved in the construction of these buildings and if so, what is their level of involvement and if not, what are the hindrances to their performance and involvement?

1.2 Problem Statement

The collapse of buildings is a major safety issue that can lead to loss of life, property, and infrastructure. The involvement of professionals such as architects, engineers, and builders are critical in ensuring that buildings are designed, constructed, and maintained to the required safety standards. While studies have revealed the reasons for building failure and collapse, such as negligence, inadequate or faulty steel reinforcing, greed, failure to carry out soil tests, poor supervision and non-adherence to the building codes, none has laboured to provide extensive analysis on the collapse of these buildings and the involvement of professionals during construction. The lack of empirical data about the extent to which the failure of involving professionals has caused building failures and collapse in Kampala city has motivated the researcher to conduct this study and fill the knowledge gap.

1.3 Objectives

1.3.1 Main Objective

To assess the collapse of buildings on the involvement of professionals in Kampala Metropolitan City.

1.3.2 Specific Objectives

i. To identify the roles and responsibilities of different professionals in the construction of buildings in Kampala City.
ii. To assess the causes of building collapse in Kampala City.
iii. To establish the potential consequences of the absence of construction professionals in the construction of buildings in Kampala City.

1.4 Research Questions

i. What are the roles and responsibilities of different professionals in the construction of buildings in Kampala City?
ii. What are the different collapsed buildings and the roles that professionals played in each instance during their construction in Kampala City?
iii. What are the potential consequences of the absence of construction professionals in construction of buildings in Kampala city?

1.5 Significance

There is a lax public understanding of the need to have all professionals while carrying out construction. The study will contribute to the existing body of knowledge on building failures and the factors that contribute to them. It will also provide insight into the role that building professionals play in the design, construction, and maintenance of buildings, and how their actions or inactions can affect the performance and durability of these structures. This can be useful for students and researchers in the fields of architecture, engineering, construction, and related disciplines, as they can learn about best practices and avoid common mistakes that can lead to building failures.

1.6 Scope

1.6.1 Academic scope

This study assessed the level of involvement as far as the collapse of buildings is concerned. Content-wise, the study is also identifying the common causes of building collapse in Kampala city and also the effects of absence of professionals on construction projects.

1.6.2 Geographical scope

The study was conducted in Kampala City because most of the collapsed buildings are located in its divisions. The divisions are Nakawa, Lubaga, Central, Kawempe and Makindye Divisions.

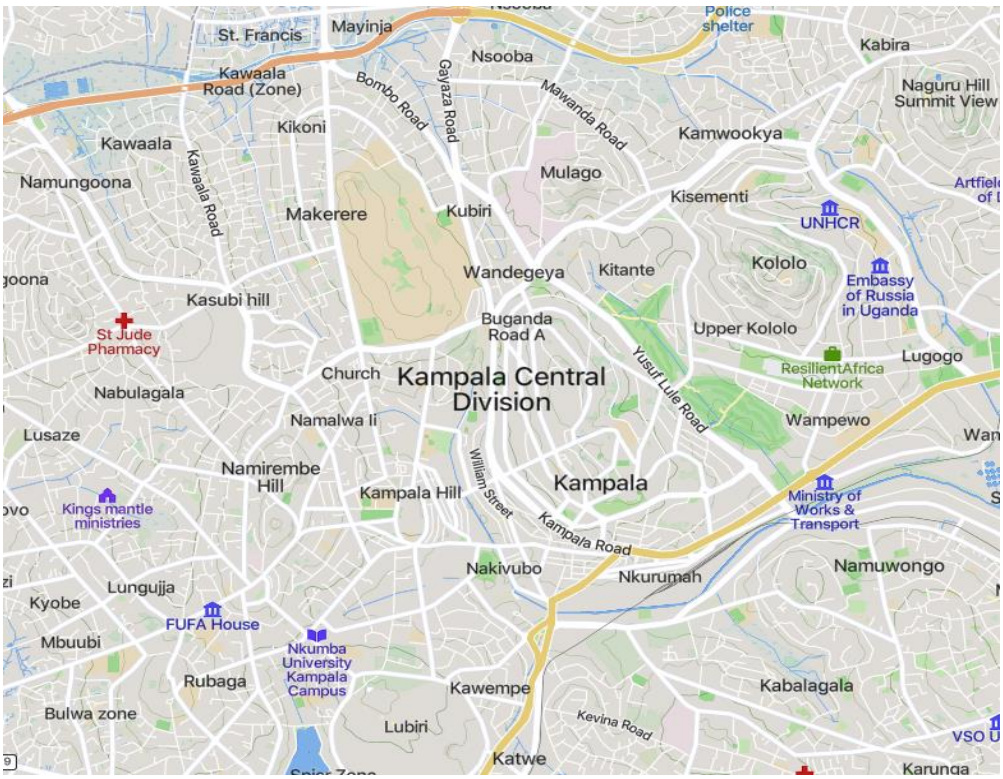

Figure 1-1: Location of the five divisions of Kampala District

1.6.3 Time scope

The research was conducted for four months from which started from topic formulation to the data analysis stage.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature related to the level of involvement of professionals, the stages of construction and the causes of building collapse. Specifically, emphasis is placed on how these professionals are involved in each stage of construction and how their involvement is effective in those stages. The review of literature is made under themes that were developed from specific objectives of the study relayed in Chapter one.

2.2 Construction Team Members

There are different types of construction projects an organization can engage in and the aspect of construction determines the specialists or professionals to be involved in the construction process. Construction projects range from building constructions to heavy engineering work. Ochieng and Price (2009) stated that integrated teamwork is the key to construction projects that personify good whole-life value and performance. (Rowlinson and Phua, 2004) Integrated teams deliver greater process efficiency and by working together over time can help drive out the old-style adversarial culture and provide safer projects using a qualified trained workforce (Rowlinson and Phua, 2004).

It was further argued by (Oke A. E., 2013) that teams that only construct one project team at the client's expense would never be as efficient, safe, productive or profitable as those that work repeatedly on similar projects.

A construction team is a group of people responsible for the planning, designing, and construction of a project. The professionals in the industry include Architects, Quantity Surveyors, Engineers (Civil, Mechanical, Structural, and Electrical) Building Contractors, Artisans, and suppliers. All these professionals perform different roles to enhance the success of any construction project.

2.2.1 Construction Team Members and their Responsibilities

2.2.1.1 Architect

An architect is a professional who is involved in the planning, designing, and oversight of a building 's construction which means he or she is a person who translates the user 's needs into the builder 's requirements.

Oloyede(2008) sees an architect as the person who directly communicates with the client and that he is the first professional who is contacted by the client for the translation of his desires or needs into drawings and specifications.

Architects must understand the various methods available to the builder for building the client ‘s structure to realistically negotiate with the client to produce the best possible compromise of the results desired within explicit cost and time boundaries (Septelka, 2013).

2.2.1.2 Engineers

Engineers involved in building constructions can be classified into four parts. The structural engineers provide design drawings that show the locations, sizes, reinforcement, and details of structural elements at their appropriate scales, to enable the fabrication, installation, and connection of the elements in a reasonable sequence by a reasonably competent general or subcontractor who is familiar with the techniques of construction for the specified materials.

Planning and carrying out plans created by engineers in the fields of transportation, site development, hydraulic environmental, structural, and geotechnical engineering are all part of civil engineering.

Civil engineers, according to Oke (2013), have a wide range of duties. To get the job done appropriately, a few chores must be completed each day. One of the key responsibilities of their position is report analysis. Engineers must examine topographical data such as maps, designs, drawings, aerial photographs, and more. To make sure that the structure can handle stress, engineers must compute the necessary load and grade requirements, liquid flow rates, and material stress points. The construction engineer is responsible for maintaining the site's cleanliness and sanitization in addition to safety. Another duty of the building industry is to survey the land before development begins.

Mechanical engineers provide comprehensive, contract drawings that illustrate all necessary mechanical services and their locations at the same size as the building layout. Plumbing, drainage, heating, ventilation, air conditioning, fire protection, process piping and equipment, and other essential special systems are all included in the mechanical services (Melo et al., 2019)

The electrical engineers prepare complete, contract drawings using the same scale as that of the building layout drawings showing the electrical services needed and their location.

2.2.1.3 Construction Manager

According to Ebenezer. O., (2020), construction managers are professionals who are responsible for overseeing and coordinating the various aspects of construction projects. They work with a team of professionals, including architects, engineers, and contractors, to ensure that the construction process runs smoothly and efficiently.

Construction managers are involved in all stages of the construction process, from planning and design to execution and completion. They are responsible for setting project goals and budgets, developing schedules, and managing the construction team. They also work with contractors and suppliers to secure materials and equipment needed for the project.

Construction managers are responsible for ensuring that the project stays on track and is completed on time and within budget. They also play a critical role in ensuring that the construction meets all necessary standards and regulations and that the project is safe for workers and the public.

2.2.1.4 Quantity Surveyor

Quantity surveying according to (Shayan.S et al., 2019) was pioneered by Britain. The quantity surveyor is professionally trained, qualified, and experienced in dealing with problems relating to construction cost, management, and communication in the construction industry (R. Murphy, 2011). The role of the quantity surveyor is, in general terms, to manage and control costs within construction projects and may involve the use of a range of management procedures and technical tools to achieve this goal.

The methods employed, however, cover a range of activities, which may include cost planning, value engineering, feasibility studies, cost-benefit analysis, lifecycle costing, valuation, and cost estimation. Quantity surveyors can also be known as construction economists, cost engineers, or construction managers.

Quantity surveyors control construction costs by accurate measurement of the work required, the application of expert knowledge of costs and prices of work, labour, materials, and plant required, and an understanding of the implications of design decisions at an early stage to ensure that good value is obtained for the money to be expended (Shayan.S et al., 2019). The technique of measuring quantities from drawings and specifications prepared by designers principally architects and engineers to prepare tender or contract documents is known in the industry as taking off.

2.2.1.5 Building Contractors

A building contractor is someone who plans, develops, and coordinates operations associated with the construction of structures. A building contractor's general tasks include the individual planning and carrying out all relevant actions connected to the construction of a residence, building, or other structure (Olatunji et al., 2014).

Furthermore, the contractor is associated with supervising employees; implementing a plan in which to carry out the construction project, obtaining materials for the project, and must also do his/her research regarding relevant regulations and laws akin to the construction process. Olatunji et al., (2014) elaborated that there are many laws that state when, where, and how a building contractor and his crew should build in certain areas. These must be recognized and followed by building contractors to complete the project in a law-abiding manner.

Lastly, the building contractor is the individual who deals with all emergencies and surprises which relate to the project and occur on-site and sometimes off-site as well.

2.3 Stages of construction

2.3.1 Planning stage

The planning stage involves a variety of activities that are essential for the successful design and execution of a construction project. Some of the tasks that are typically performed at this stage include: Identifying the project scope and objectives, conducting site analysis and selection, designing the project, obtaining permits and approvals, and establishing a budget and timeline.

The professionals involved in the planning stage of construction typically include architects, engineers, and project managers. Architects are responsible for designing the appearance and layout of the building or infrastructure being constructed, while engineers are responsible for designing the structural and mechanical systems of the project. Project managers are responsible for coordinating all of the different aspects of the project, including planning, budgeting, and scheduling.

2.3.2 Design stage

The design stage of construction involves the development of detailed plans and drawings that outline the layout, appearance, and systems of the building or infrastructure being constructed.

This stage is an important part of the overall construction process, as it helps to ensure that the project meets the requirements and specifications and that it is feasible and cost-effective to build. During the design stage, the following tasks are typically performed: developing the concept design, refining the design, creating the construction document, and performing structural and mechanical calculations.

The professionals involved in the design stage of construction typically include architects, engineers, and other design professionals, such as interior designers, landscape architects, and urban planners. Architects are responsible for designing the appearance and layout of the building or infrastructure, while engineers are responsible for designing the structural and mechanical systems. Other design professionals may be involved in the design of specific elements of the project, such as the interior spaces or the surrounding landscape.

2.3.3 Execution stage

The execution stage of construction involves the physical work of building the project, according to the plans and specifications developed during the design stage. This stage typically involves a wide range of tasks and activities that include: site preparation, foundation work, structural work, enclosure, mechanical, electrical and plumbing systems and finishes.

The professionals involved in the execution stage of construction typically include a wide range of skilled tradespeople, such as carpenters, electricians, plumbers, and HVAC technicians, as well as laborers who assist with various tasks and activities. Project managers and supervisors may also be involved in overseeing the construction process and ensuring that it is being carried out according to schedule and budget.

2.3.4 Completion stage

The completion stage of construction involves the final steps required to prepare the building or infrastructure for use and occupation. This stage typically involves the following tasks: cleaning and touch-up work, testing and commissioning, final inspections and finally occupancy. The professionals involved in the completion stage of construction typically include engineers and other technical professionals who are responsible for testing and commissioning the various systems and components of the building, as well as building inspectors who conduct the final inspections to ensure that the building meets all requirements. Project managers may also be involved in overseeing the final stages of the construction process and ensuring that the building is ready for occupancy.

2.4 Building Structure Collapse

2.4.1 Causes of building collapse

Over the years, the causes of building collapse have been the subject of inquiry by many researchers. Table summarizes some of the most important factors leading to the collapse of buildings by the different researchers.

Table 2-1: Summary of causes by various researchers.

	AUTHORS											
CAUSES	Oloyede et al. (2010)	Madu (2005)	Adebayo (2000)	Ayinuola et al. (2004)	Obodoh et al. (2019)	Adewolu et al. (2018)	Agwu '(2014)	Mhand et. Al. (2017)	Adewale et. al. (2019)	NBRB '(2022)	**TOTAL**	**RANK**
Corruption and bribery	✓	✓	✓		✓	✓	✓	✓	✓		8	4
Building design variations	✓	✓		✓		✓	✓	✓	✓	✓	8	4
Poor quality materials												
Poor design and construction			✓	✓	✓		✓	✓	✓	✓	7	7
Negligence in soil investigation												
Use of sub-substandard and untested local materials	✓	✓	✓	✓		✓	✓	✓	✓	✓	9	2
Poor workmanship	✓				✓		✓				3	18
Use of deficient structural drawings		✓		✓	✓	✓					4	15
Alteration of approved drawings	✓		✓		✓	✓		✓	✓		6	8
Engagement of non-professionals	✓		✓	✓	✓					✓	5	10
Non-enforcement of building codes by regulating agencies	✓				✓						2	19
Excessive loading	✓		✓		✓	✓	✓	✓			6	8
Absence of site investigation	✓	✓		✓	✓		✓	✓	✓	✓	8	4
Poor supervision	✓		✓		✓		✓		✓		5	10
Lack of proper supervision and management on construction sites	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10	1
Foundation failure	✓	✓	✓	✓	✓	✓		✓	✓	✓	9	2
Poor maintenance culture	✓		✓					✓	✓	✓	5	10
Lack of experienced contractors		✓		✓	✓					✓	4	15
Limited engagement of professionals		✓		✓			✓	✓	✓		5	10
Design and construction faults		✓	✓		✓				✓	✓	5	10
Illegal alterations of designs	✓		✓	✓			✓				4	15

Source: Document review (2022)

2.4.2 Explanation to the Selected Causes

2.4.2.1 Limited engagement of qualified professionals

According to Alabi (2017), efficiency in skill and expertise is critical in producing valuable craftsmanship in building construction. Architects, Quantity Surveyors, Land Surveyors, Builders/Contractors, and Engineers (Structural, Civil, Mechanical, Electrical, and Geotechnical) are among the professions (stakeholders) in the building sector, yet their skills are rarely required for one reason or another (Amadi et. al., 2012).

Consider the story of a building that collapsed in Lukuli, Makindye 2020 killing 13 people, where the builder's only qualification was a certificate in bricklaying to handle the construction of a five-floor-storeyed building (Kamurungi, 2022).

Having said that, Oloyede et al. (2010) attributed building failures to human negligence in some critical areas of construction, such as emphasizing soil investigation, incorporating design for extra loads, erecting stress shields from winds, using substandard building materials, poor monitoring, and overall poor workmanship.

It has been noticed that due to the high cost of consultancy fees required to engage the services of these specialists, most building proprietors prefer to save money by engaging the services of nonprofessionals (quacks) who lack the necessary experience in the construction field.

2.4.2.2 Poor design and ineffective construction methods

The majority of collapsed buildings have been related to poor design and ineffective construction methods. Architects and structural engineers in the design stage should be cautious to ensure that critical elements such as the nature of the soil and the kind and sizes of materials supplied are taken into account (Alinaitwe and Ekolu, 2014). Most contractors' failure to build according to specifications and blueprints frequently leads to structural anomalies in structures.

2.4.2.3 Use of sub-standard and untested local materials

One of the leading reasons for building structural failure is the use of substandard (inferior) materials in building construction. According to Wright (2015), the usage of poor materials has caused building failure. Substandard materials, particularly reinforcement bars, steel sections, and cement, can significantly contribute to construction failure. Wright further

claimed that in some cases, when inferior materials are or have been utilized, the stakes are great, and structures can crumble.

Clients' overreliance on contractors for decision-making rather than advisors has resulted in building failure. This is because most contractors are friends, relatives, or friends of friends. As a result of this connection, clients rely on contractors for decision-making rather than consultants.

Poor concrete aggregate mixing, poor quality steel reinforcing, and the use of substandard blocks from some block factories all contribute to building collapse in Uganda. Some of these construction materials did not fulfill stated standards, nor were any quality control tests performed on them before use in construction.

2.4.2.4 Foundation Failure

All engineering projects begin with the foundation (Oloyede et. al., 2010). A foundation aims to transfer the structure's load to the ground without allowing the ground to respond to unequal or excessive movement.

Weak foundations of structures have resulted in the structural collapse of buildings while a stable foundation can cost nearly half the cost of the entire construction, particularly in swampy areas. As a result, a building structure can fail if it is built on poor subsoil or is not uniformly loaded. Asingwire et al., (2021) contend that if a proper foundation was not specified based on soil type or owing to soil erosion or earth movement beneath the foundation, the possibilities of building failures occurring are high.

2.4.2.5 Selection of inexperienced contractors

According to Alinaitwe and Ekolu (2014), selecting inexperienced contractors means that they may not have the necessary skills or knowledge to carry out the construction project to the required standards. For example, they may not know how to ensure that the foundation is strong enough to support the building or how to install critical systems such as electrical or plumbing systems. As a result, the building may be structurally weak, and even a minor fault could lead to a catastrophic collapse. Asingwire (2021) further complements that, inexperienced contractors may not be aware of the relevant building codes, regulations, and safety standards required for the construction project. This can result in the use of substandard materials, improper installation techniques, and inadequate safety measures. For

instance, if the contractors do not follow the required building codes, the building may not be able to withstand external forces such as wind, earthquakes, or floods, leading to its collapse.

Furthermore, inexperienced contractors may not have access to the necessary equipment or tools needed for the construction project. This can result in a compromise in the quality of the materials used or the methods employed. For example, if the contractor uses substandard materials or tools, the structural integrity of the building may be compromised, leading to potential collapses.

2.4.2.6 Lack of Proper Supervision and Management

Schweier, (2016) revealed that inspections should be done at regular intervals, based on a risk assessment that takes into account the structure's condition, environmental factors and length of time the bracing has been in place. In increasing the inspection, the workers will be forced to employ professional ethics, an inspection should occur as soon as possible after the occurrence of an extreme weather event or another incident that could affect the durability of the structure has occurred.

Obodoh et. al., (2019) added that a competent person should regularly assess the stability of the structure while temporary bracing is required and without the right supervision team in place, any strategy and plan has the potential of completely falling apart and because of this, the core project staff, expert resources, suppliers and all stakeholders should be part of the dynamic team. Palmer (2018) added that, all of those involved must have commitment to the groups, share similar visions for the projects and strive for overall success. Poor construction supervision leads to unsustainable building construction practices (use of substandard designs, materials, manpower and procedures) consequently leading to building failures (Agwu, 2014).

2.4.2.7 Construction without building permits

Construction without building permits is a major cause of building collapse due to lack of oversight and regulation in the construction process. Building permits are a must for every construction site as indicated in the Buildings Control Act (2013) to ensure that the construction process meets safety standards and building codes. When construction is done without proper permits, it often means that the construction was not inspected by a building inspector to ensure that it was up to code and this can result in subpar construction and

building materials, leading to weakened structures that may collapse under the weight of normal use or in the event of a disaster (Ademiluyi & Adeyemo, 2020).

The importance of building permits is highlighted by a study that analyzed the causes of building collapses in Lagos, Nigeria. The study found that "a significant number of buildings that collapsed did not have building permits" (Awoyera, Afolayan, & Oluwadare, 2019). In another study conducted in India, researchers found that "lack of permits was identified as one of the major causes of building collapses" (Jain & Sinha, 2018).

2.4.2.8 Corruption and bribery

Buildings have failed due to insincerity, fraud, and corruption. Alamu and Gana (2014) give evidence to support this claim, claiming that failures in construction projects may be simply characterized as fraudulent actions and corruption. The contractor is often the facilitator, but on occasion collaborates with consultants and other client representatives on the project to defraud the customer.

Corruption or fraud has become a popular means to make money in both the public and private sectors of the economy. On November 2, 1997, the collapse of a suspended floor slab of a two-story structure at Buziga, 8 kilometres along the Kampala-Ggaba Road, was caused by corruption between the contractor and the consultants (Lubega et al., 2000).

2.5 Case Study

Collapse of a four-storeyed building in Kisenyi on 5th September, 2021

On 5th September, 2021 at around 2 P.M, the collapse of a building located along Mengo-Kisenyi Road, Kisenyi Parish, Central Division, Kampala District was reported in the media. This accident, at a building allegedly owned by a one Mr. Haruna Sssentongo resulted in the death of six people while five people sustained injuries.

Figure 2-1: Collapsed Kisenyi Building

The NBRB an agency under the MoWT carried out an investigation into the collapsed building as mandated by Regulation 41 (2) (e) of the Building Control Regulations,2020. The NBRB through its investigations department constituted and led a multi-institutional taskforce to investigate the collapse. The other institutions of government that participated in this task were; The Directorate of Forensic Services, Uganda Police Force and Ministry of Gender, Labour and Social Development.

Figure 2-2: Investigation team

From the investigation, the task force concluded that the building collapse was caused by the damage that was caused by a truck which was delivering sand. When the truck fell in the foundation pit, it must have damaged the foundation base thereby causing a localised plastic hinge and loss of support. When the extra load in form of the slab construction was introduced, it caused rotation at the created hinge resulting into the collapse of the entire building.

2.6 Effects of the Absence of Professionals on Construction of Buildings.

2.6.1 Poor Design and Faulty Construction

The absence of professionals in construction projects can lead to poor design, resulting in inefficient use of space and materials, compromised safety, reduced value, and limited functionality of buildings. Professionals such as architects and engineers are trained and experienced in designing buildings that are structurally sound, aesthetically pleasing, and functional, and their absence can result in buildings that are not optimized for their intended use. It is essential to have professionals with the necessary expertise involved in the design process to ensure that buildings meet safety requirements, are aesthetically appealing, and are optimized for their intended purpose.

2.6.2 Non-Compliance with the Building Codes and Regulations

Professionals in the construction industry are well-versed in the regulatory requirements of their work. The absence of professionals in the construction of buildings can result in non-compliance with building codes and safety regulations. This can lead to legal issues, fines, and project delays.

The NBRB emphasizes that building codes and regulations were established to ensure the safety, structural integrity and functionality of buildings, as well as to address environmental concerns and ensure public health. It further emphasizes that failure to comply with building codes and regulations can have serious repercussions such as penalties, fines or even legal actions against the building owner, developer, or contractor.

2.6.3 Safety Risks

The absence of professionals in the construction of buildings can increase the risk of accidents. Without professionals, there is a higher likelihood of mistakes, such as improperly installed wiring or weakened support beams. This can lead to potential hazards such as fires, electrocution, and collapses that could endanger the lives of construction workers and future occupants.

2.6.4 Potential Building Collapse

The absence of professionals in a construction project can lead to potential building collapse due to inadequate support, weakened structural components, and oversight of critical building elements. Professionals such as architects, engineers, and builders play crucial roles in

ensuring the structural integrity of the building and identifying potential issues before they become critical. The risk of potential building collapse underscores the importance of having professionals oversee the construction process to ensure that buildings are constructed safely, to code, and with adequate support and stability to withstand the test of time.

2.6.5 Substandard Project Management

The absence of professionals can lead to delays in the construction process as workers may lack the necessary skills and knowledge to complete tasks effectively and efficiently. Additionally, without professionals to coordinate the work, projects may be delayed due to miscommunication, incorrect ordering of materials, and other factors that can contribute to construction time extensions.

These delays can result in significant cost overruns, as additional labour and materials may be required to complete the project. In some cases, delays may also result in the need to redo work that was done incorrectly leading to further expenses. Without professionals, the project may also lack proper cost management, resulting in overspending and budget overruns.

2.6.6 Poor Communication and Coordination

Construction projects require a high level of coordination between different teams, including architects, engineers, builders, and subcontractors. Without professionals, communication and coordination can break down, leading to a lack of clear direction and understanding of what is expected. This can lead to misinterpretation of plans, increased costs, and errors in the construction process.

2.7 Summary

Each collapse has enormous consequences that cannot be readily forgotten by any of its victims. The effects are typically economic and societal in nature. These include loss of human lives, injuries, economic waste in the form of lost assets, investments, jobs, and incomes, loss of trust, dignity, irritation among stakeholders, and environmental disaster.

The involvement of experts and their responsibility as a result of building collapse has been studied to educate professionals about their obligations in the construction business. Building collapses are becoming a major source of concern for all stakeholders around the world, particularly in Uganda. There is a great deal of anxiety that if construction industry specialists are doing their tasks successfully, the occurrence of building collapse should be kept to a minimum. The greater society is likewise concerned that any construction industry

professional who fails to perform his duties should suffer the full wrath of the law if found accountable. However, no one has examined the fact that all of the causes of these building collapses can be traced back to the failure to incorporate these professionals in the construction process.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

According to Okesina (2020), a methodology is a comprehensive term that encompasses the philosophical approach, design, method, and methods utilized to carry out an inquiry, such as data collection, participant selection, instrument use, and data analysis. The methods used in this investigation are described in this chapter. The research design, study population, sample size and selection strategies, data collection methods, data collection tools, data quality control, variable measurement, data processing, analysis methodologies, and ethical issues are all covered in this chapter.

3.2 Research Design

A research design is an overall plan or strategy for conducting research. It is a master plan specifying the methods and procedures for collecting, analysing and interpreting the data to get the desired information.

A case study research design was used in this investigation. A case study is a research design and empirical investigation that analyses phenomena in their natural environment. Case studies are focused on an in-depth analysis of a single person, organization, or event to

investigate the reasons for underlying principles (Yin, 2014). One of the most popular methodologies for case study analysis is pattern-matching logic. Such reasoning compares an empirically grounded pattern, that is, one based on case study findings, with a predicted one produced before data collection (Yon 2014: 143). Fiss (2009) states that the extensive description and analysis of a single case study can help get a better knowledge of "how" and "why" things happen.

The study also used triangulation method with qualitative and quantitative techniques. The qualitative method was employed in this study to investigate the different perspectives of stakeholders in Kampala. Quantitative methodologies was utilized to collect cross-sectional data from several institutions responsible for operations in Kampala.

3.3 Study Population

Population refers to an entire group of persons or elements targeted in a study. The population for this study will include the KCCA physical planning department, Contractor companies, Architects Registration Board (ARB), Engineers Registration Board (ERB), Institution of Surveyors of Uganda (ISU), Uganda Institution of Professional Engineers (UIPE) and Surveyors Registration Board (SRB).

3.4 Types of Data to be Obtained

Both primary and secondary data information shall be collected during the course of the study. The study will be conducted following the objectives. Particular attention is to be paid to objectively verifiable indicators depending on the level of factual, quantitative, and statistical information available and the degree to which it is possible to quantify and extrapolate conclusions from field investigation and observation.

3.5 Sampling Techniques and Sample Size

Kumar (2019) defines a sample as part of the target population that has been procedurally selected to represent it. In this study, purposive sampling techniques were used. A sample size of about 76 respondents was drawn.

3.6 Data Collection Methods

An interactive approach was used together with a question-and-answer approach with respondents to enhance the quality and also achieve the sample population. The methods to be used are described below;

3.6.1 Structured questionnaire

The choice of this method was informed by Bryman (2011) that the questionnaire method facilitates the cheap collection of relevant data. A questionnaire survey was administered because it provides efficient means of collecting data on a large-scale basis (Hyman et.al, 2018). Besides, data collected using closed-ended questionnaires is easy to code and analyse (Kumar, 2019; Odiya, 2009) and the method also enables the collection of primary data from a big number of respondents at a very cheap cost (Kronenberger et.al, 2018). This tool was used to interview different stakeholders that are involved in the construction and management of buildings in Kampala. It contained both closed and open-ended questions.

3.6.2 Key Informant Interviews

Face-to-face interviews with key personnel, contractors, and professional bodies that are involved in construction was used. According to Kumar (2019), interviews are a better method of collecting data from a small section of the entire population and yield detailed data.

3.6.3 Document Review

This was used by the researcher to source secondary data useful in understanding the causes of failure of buildings and its impacts. The study analyzed documents on buildings that have collapsed in Kampala city from the National Building Review Board Offices, Uganda Police reports on the different collapsed buildings in Kampala and newspapers in the periodicals section of CEDAT Library at Makerere University. According to Creswell (2014), document review is a good source of background information and as well provides a “behind the scenes” look at a program that may not be directly observable hence enabling a researcher to come up with key and relevant issues that could not have been noticed through other means.

3.6.4 Procedure for Data Collection

The researcher obtained a cover letter from CEDAT, Makerere University allowing him to proceed to collect data and process the dissertation thereafter. Questionnaires were

administered to the respondents. Regarding face-to-face interviews, the researcher contacted the key informants and provided them with an overview of what the study is about and thereafter, request for their consent to participate in the study. Arrangements were made and interviews administered as planned. The researcher was meticulous to capture all the proceedings of the interviews by opting to make notes during the process of interviews. The interviews were later transcribed before actual data analysis begins.

3.7 Data Analysis

3.7.1 Quantitative data

The obtained data was organized by the researcher in appropriately labelled spreadsheet tables created with Microsoft Excel. Since the data is qualitative and quantitative, all the unnecessary outliers and missing data points had to be removed. The cleaned data was then summarized using statistical measures such as mean, median and mode to identify any trends or patterns which was used to create graphs for comparing different data sets. In-depth analysis was done using SPSS (Statistical Package for Social Scientists) to derive the relationship between different variables. The contribution of each statement was examined with the ranking of the attributes in terms of their criticality as perceived by the respondents. This was done by use of Relative Importance Index (RII). The five-point Likert scale (that ranged from 1 to 5) was adopted and transformed to relative importance indices (RII) for each statement using the RII formulae below;

$$\mathrm{RII} = \frac{\Sigma \mathrm{w}}{\mathrm{A} \times \mathrm{N}} \; (0 \leq \mathrm{RII} \leq 1)$$

Where;

W= weighting given to each factor by the respondents (ranging from 1 to 5),

A = highest weight (5 in this case)

N = total number of respondents.

Following the equation by Khaleel and Nasser (2018) ;

$$RII\ \% = \frac{5 \times n_5 + 4 \times n_4 + 3 \times n_3 + 2 \times n_2 + 1 \times n_1}{5 \times (n_5 + n_4 + n_3 + n_2 + n_1)}$$

Where n1, n2, n3, n4 and n5= number of respondents who selected:

n1= the number of respondents who selected “Strongly Disagree”

n2= the number of respondents who selected “Disagree”

n3= the number of respondents who selected “Not sure”

n4= the number of respondents who selected “Agree”

n5= the number of respondents who selected “Strongly Agree”

According to Akadiri (2011), five important levels are transformed from RII values: high (H) ($0.8 \leq RII \leq 1$), high-medium (H–M) ($0.6 \leq RII \leq 0.8$), medium (M) ($0.4 \leq RII \leq 0.6$), medium-low (ML) ($0.2 \leq RII \leq 0.4$) and low (L) ($0 \leq RII \leq 0.2$). In this study, two major labels were used in interpreting the findings as borrowed from Muhwezi et.al. (2014) and Khaleel and Nassar (2018). These are: significant for statements with $RII > 0.599$ and insignificant for statements with $RII < 0.599$.

3.7.2 Qualitative Data

Processing of qualitative data will involve familiarization with the data through review, reading, identification of themes, re-coding and exploration of relationships between categories after data has been collected. Content analysis will be used in analysing qualitative data and involved interpretation of the underlying contexts. The collected data will be categorized into themes and then analysed basing on the research objectives.

3.8 Ethical Consideration

The study followed a series of research ethics protocols. It started with obtaining a letter of authorization from CEDAT after successfully presenting and defending the proposal before the department panel. The researcher had to seek consent from the targeted respondents for questionnaire administration. The review of literature involved annotations and paraphrasing to avoid plagiarism. To encourage the respondents to answer questions with comfort and freedom, the questionnaires clearly stated that all the collected data was for research purposes only and will remain entirely anonymous.

3.9 Gender Consideration

Gender influences how people perceive themselves, each other and the various roles they occupy. Concerning this research study, gender was not discriminated against during sampling. Respondents were only chosen on a purposive sampling technique spearheaded by the experience of the respondent in the field of study

CHAPTER 4: ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

The chapter presents, analyzes and discusses the findings of the study in the gist of the four objectives set in Chapter One. The findings are analyzed and discussed under themes developed from the specific objectives and cross referenced with the literature reviewed in Chapter Two. The beginning sections of the chapter present the demographics of the respondents. This is followed by actual findings relating to the study objectives.

4.2 Response rate

Response rate is an important factor in determining the quality of a study (Krishnan and Poulose, 2016). It is the ratio of the number of targeted respondents to those interviewed or engaged in the study (Odiya, 2009; Morton et. al., 2012). Unless an interview or any other research instrument is compulsorily administered to a captive audience, rarely does it achieve a 100 per cent response rate (Krishnan and Poulose, 2016). The response rate for this study is shown in the Table 4-1.

Table 4-1: Results of respondent participation in the study.

Research instrument	**Questionnaires distributed**	**Questionnaires returned**	**Response rate**
Questionnaires	91	72	80.0%
Interviews	4	4	100%
Total	**95**	**76**	
Overall response rate			**80.0%**

Source: Field data, (2023)

The study initially targeted 95 respondents out of which 76 were fully engaged. The response rate for this study thus, was 80.7% (76/95*100). The response rate was high implying that the findings are representative and accurate. This inference is supported by the observations of Morton et al. (2012) who established that studies with a much lower response below 50% of the sample are often only marginally less accurate than those with much higher described response rates, say 70% and above.

The inference made is also in line with the findings of Krishnan and Poulose (2016) that high response rates indicate that the sample is representative of a population hence improving the acceptance and credibility of the research findings amongst key stakeholders. It is indicative that the participants are interested in the study hence providing a possibility that the findings generated represent their objective opinions.

4.3 General information about the respondents

Questionnaires were administered to respondents. The study among the demographic information, sought to establish the respondents' sex, age, highest education attained and profession.

4.3.1 Description of the Respondents by Gender

The respondents were asked to indicate their gender on the questionnaire and the findings are presented in Figure 4-1.

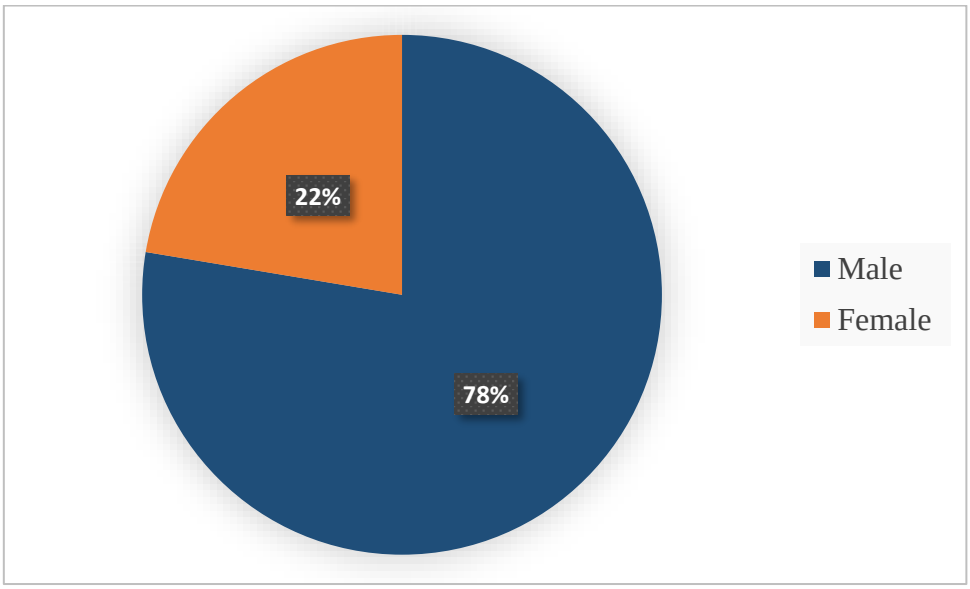

Figure 4-1: Gender of respondents

Figure 4.1 shows that majority of the respondents, 78% were males as compared to females, 22%. This implies that there are more male employees in the sampled institutions concerned with management of buildings in Kampala City as compared to females. However, the slightly reasonable number of females could be attributed to increased emphasis on women emancipation and thrust on girl child education for the last decades that has paved way for increased access of women to education that has led to raising numbers of women civil servants.

4.3.2 Description of the Respondents according to Age

The collection of data from the different age groups intended to establish whether the opinion of the study participants varied between different age groups. The respondents were asked to indicate the age bracket in which they fell and the findings are presented in Figure 4-2.

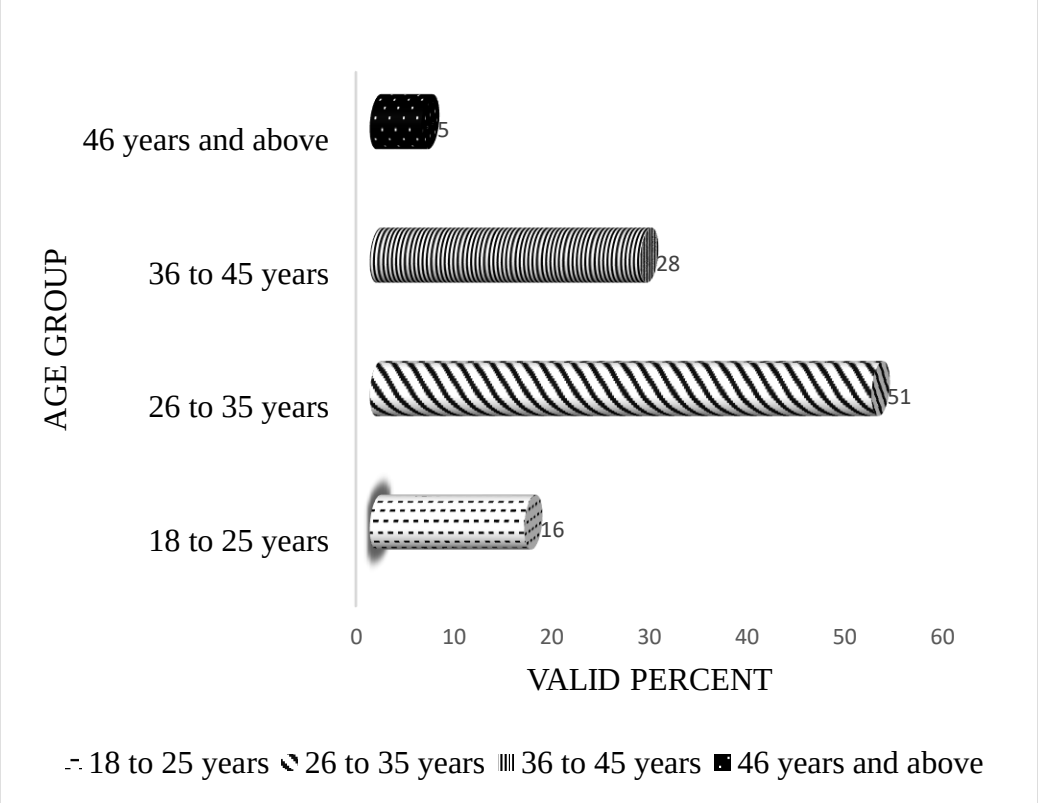

Figure 4-2: Age groups

Results in figure 4.2 shows that majority of the respondents were of the age group 26 – 35 years and 36 - 45years. This finding implies that respondents from the selected institutions have more middle-aged staff than junior and adult staff. Data on age of the respondents indicate that those between 26 – 45 years constituted the core and decision-making crew of the respective institutions.

4.3.3 Description of the Respondents by Level of Education

The respondents were asked to indicate their highest level of education and the findings are presented in the figure below.

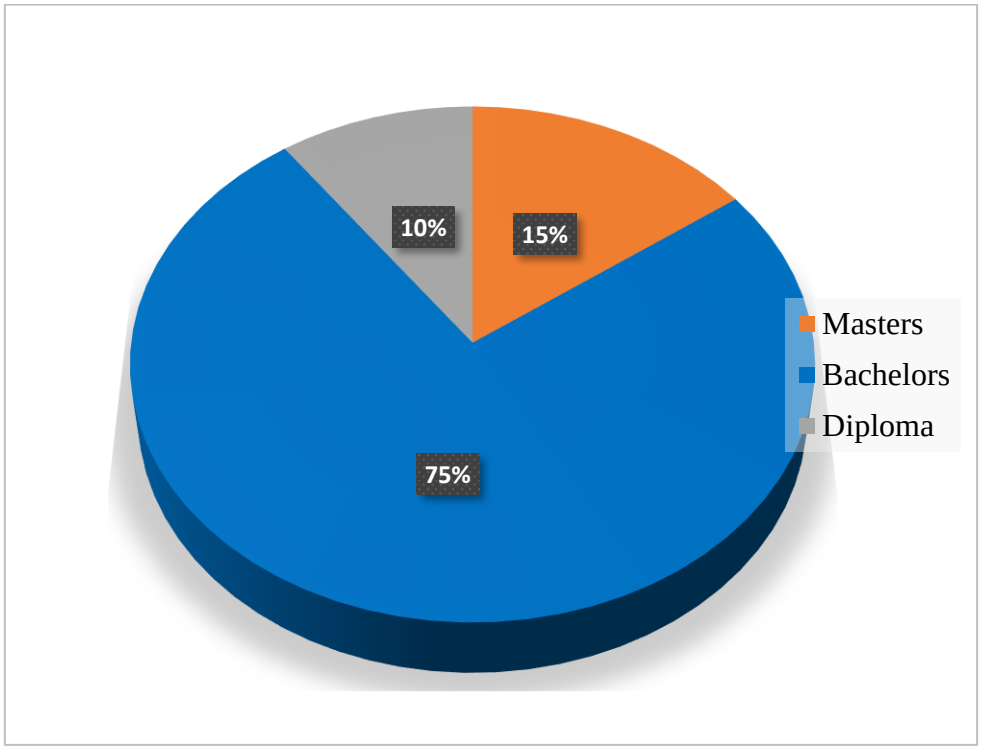

Figure 4-3: Level of Education

Figure 4-3 shows a high level of literacy among the respondents. A very high proportion of the respondents were educated to bachelors' level (75%), (15%) had pursued master's degree and the rest had pursued a diploma (10%). The statistic shows that all the respondents were functionally literate and had a high level of understanding to best interpret the statements used to assess or measure different dimensions of the questionnaire before opining.

4.3.4 Professional Background

The respondents were asked to fill in their professional background and it was intended to find out the numbers in each professional that responded.

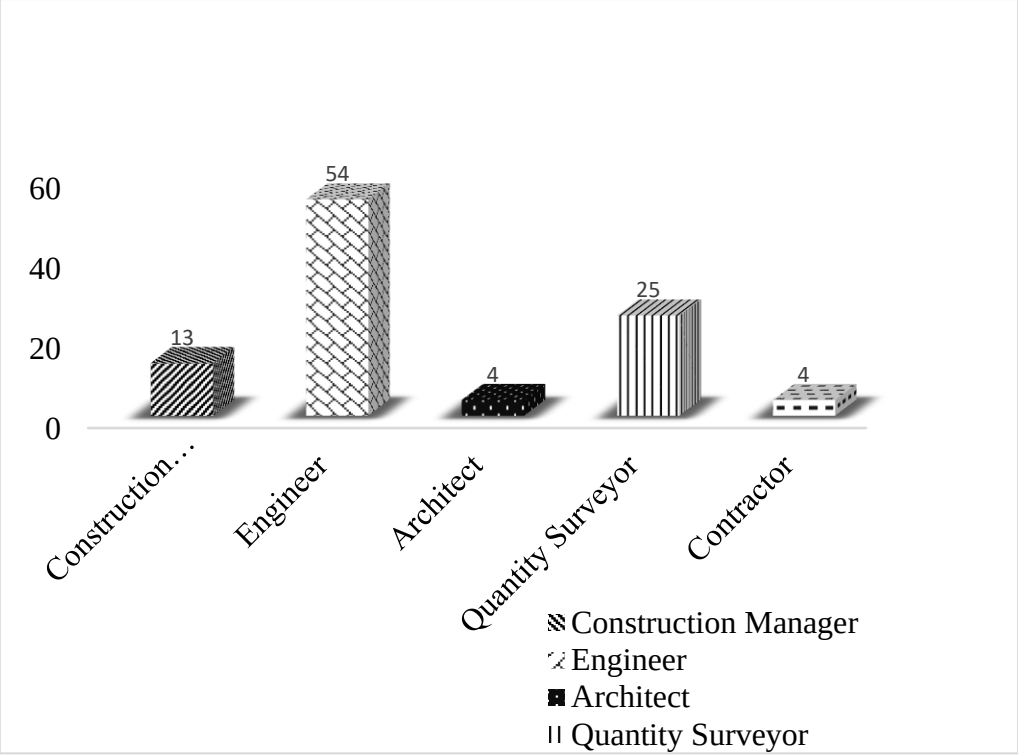

Figure 4-4: Professional Background

The figure 4-4 shows that of the 76 respondents were engineers (54%), quantity surveyors (25%), construction managers (13%) and architects together with contractors both shared 4% with the lowest response rate.

4.3.5 Description of the Respondents by Service Experience

The respondents were asked to indicate the number of years they worked in the corporation and the findings are presented in figure 4.5.

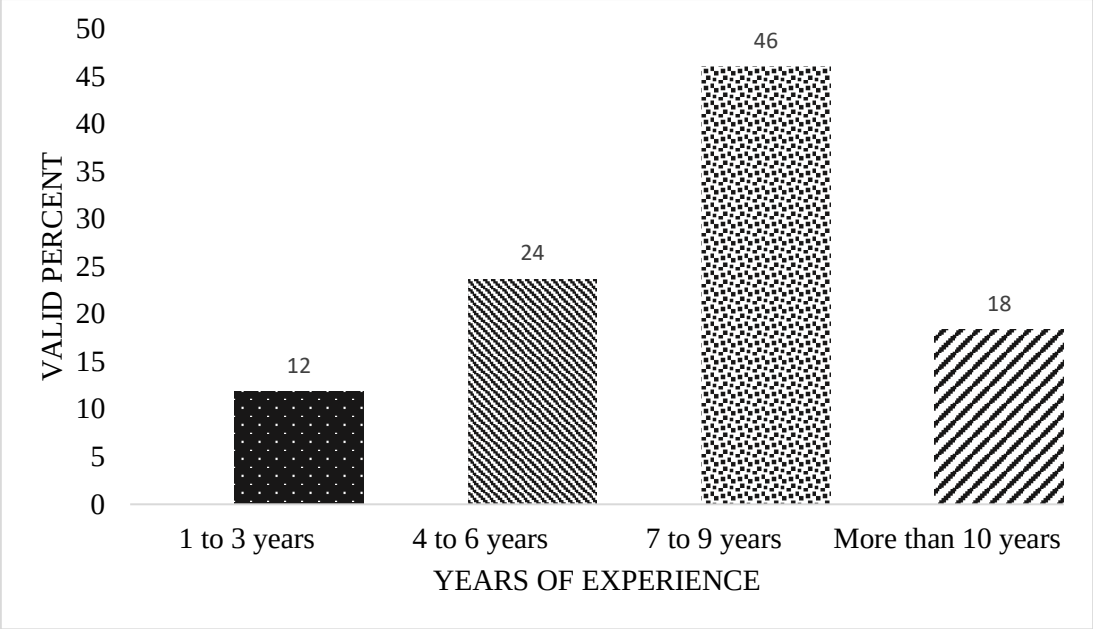

Figure 4-5: Years of Experience

Figure 4-5 shows that majority of the respondents, 64% had worked in their respective institutions for more than 7 years. This finding implies that majority of the respondents had experience on the service levels, service capacity and quality of the services rendered to the building construction sector in Kampala City. The findings of the study therefore are credible because they captured the experience levels of the respondents. These had the capacity to compare what is existing today and what the situation was in the past. Thus, the long experience in these respective areas provided a basis for the accumulation of knowledge about the variables investigated by this study.

4.4 Empirical Findings according to Objectives

4.4.1 Roles and Responsibilities of different professionals

To bring out the relationship between the different construction professionals and their responsibilities, a survey was conducted. The survey aimed to identify the different stages of construction and the roles played by the different construction professionals at each stage. The survey also aimed to identify the most critical stages of construction where each construction professional is needed the most.

4.4.1.1 Construction Manager

Table identified the various roles of a construction manager among the professionals in the construction industry and the ranking of the factors through the use of Relative Importance Index (RII).

Table 4-2: Roles of construction managers.

Roles	SA	A	N	D	SD	Total	Total. Weight	RII	Rank
Overall project coordination and management	45	26	5	0	0	76	344	0.905	1st
Planning and scheduling construction activities	42	28	6	0	0	76	340	0.895	2nd
Budgeting and cost control	40	30	2	4	0	76	334	0.879	3rd
Hiring and managing sub-contractors	37	28	11	0	0	76	330	0.868	4th
Ensuring compliance with building codes and regulations	29	31	14	2	0	76	315	0.829	5th

Source: Primary data (2023)

The survey from table 4-2 revealed that Overall project coordination and management ranked first with RII value of 0.905 among the roles of construction manager on construction projects. Planning and scheduling construction activities ranked second with RII value of 0.895. Budgeting and cost control ranked third with RII value of 0.879. These are followed by Hiring and managing subcontractors (0.868), and Ensuring compliance with building codes (0.829). The result also showed that all the roles are significant with the least role having 0.829 percent importance.

4.4.1.2 Engineers

Table 4-3 identified the various roles of an engineer among the professionals in the construction industry and the ranking of the factors through the use of Relative Importance Index (RII).

Table 4-3: Roles of engineers

Roles	SA	A	N	D	SD	Total	Total. Weight	RII	Rank
Structural analysis and design	46	24	6	0	0	76	344	0.905	2nd
Developing engineering drawings and specification	49	26	1	0	0	76	352	0.926	1st
Supervising construction activities	30	27	18	2	1	78	317	0.834	5th
Conducting site inspections and quality assurance	38	32	5	1	0	76	335	0.882	3rd
Providing technical support and problem-solving	34	35	7	0	0	76	331	0.871	4th

Source: Primary data (2023)

The survey revealed that developing engineering drawings and specifications ranked first with an RII value of 0.926 among the roles of engineers on construction projects. Structural analysis and design ranked second with an RII value of 0.905. Conducting site inspections and quality assurance ranked third with an RII value of 0.882. These are followed by providing technical support and problem-solving (0.871) and supervising construction activities (0.834). The result also showed that all the roles are significant with the least role having 0.834 percent importance.

4.4.1.3 Architect

Table 4-4 identified the various roles of an architect among the professionals in the construction industry and the ranking of the factors through the use of Relative Importance Index (RII).

Table 4-4: Roles of architects.

Roles	SA	A	N	D	SD	Total	Total Weight	RII	Rank
Designing building layouts and structures	45	20	5	4	2	76	330	0.868	4th
Creating architectural drawings and plans	53	23	0	0	0	76	357	0.939	1st
Collaborating with clients and contractors	43	25	8	0	0	76	339	0.892	3rd
Ensuring compliance with aesthetic and functional requirements	47	26	3	0	0	76	348	0.916	2nd
Overseeing construction and addressing design issues	40	24	7	2	3	76	324	0.853	5th

Source: Primary data (2023)

This analysis revealed that creating architectural drawings and plans ranked first with an RII value of 0.939 among the roles of architects on construction projects. Ensuring compliance with aesthetic and functional requirements ranked second with an RII value of 0.916. Collaborating with clients and contractors ranked third with an RII value of 0.892. These are followed by designing building layouts and structures (0.868) and overseeing construction and addressing design issues (0.853). The result also showed that all the roles are significant with the least role having 0.853 percent importance.

4.4.1.4 Quantity Surveyors

Table 4-5 identified the various roles of a quantity surveyor among the professionals in the construction industry and the ranking of the factors through the use of Relative Importance Index (RII).

Table 4-5: Roles of quantity surveyors.

Roles	SA	A	N	D	SD	Total	Total Weight	RII	Rank
Supervising construction activities and materials procurement	37	25	8	4	2	76	319	0.839	4th
Preparing bills of quantities and tender documents	40	35	1	0	0	76	343	0.903	1st
Evaluating and negotiating contracts	39	32	2	3	0	76	335	0.882	2nd
Managing project finances and cost control	35	23	5	6	7	76	301	0.792	5th
Conducting valuations and final account settlements	42	20	11	3	0	76	329	0.866	3rd

Source: Primary data (2023)

This analysis revealed that preparing bills of quantities and tender documents ranked first with an RII value of 0.903 among the roles of quantity surveyors on construction projects. Evaluating and negotiating contracts ranked second with an RII value of 0.882. Conducting valuations and final account settlements ranked third with an RII value of 0.866. These are followed by supervising construction activities and materials procurement (0.839) and managing project finances and cost control (0.792). The result also showed that all the roles are significant with the least role having 0.792 percent importance.

4.4.1.5 Contractors

Table 4-6 identified the various roles of a contractor among the professionals in the construction industry and the ranking of the factors through the use of Relative Importance Index (RII).

Table 4-6: Roles of contractors.

Roles	SA	A	N	D	SD	Total	Total Weight	RII	Rank
Managing construction site operations	51	23	2	0	0	76	353	0.929	2nd
Implementing construction plans and schedules	60	16	0	0	0	76	364	0.958	1st
Coordinating labor, materials, and equipment	44	25	7	0	0	76	341	0.897	3rd
Ensuring compliance with project specifications	39	27	6	4	0	76	329	0.866	4th
Managing subcontractors and resolving issues	40	12	21	3	0	76	317	0.834	5th

Source: Primary data (2023)

This analysis revealed that implementing construction plans and schedules ranked first with an RII value of 0.958 among the roles of contractors on construction projects. Managing construction site operations ranked second with an RII value of 0.958. Coordinating labour, materials and equipment ranked third with an RII value of 0.897. These are followed by ensuring compliance with project specifications (0.866) and managing subcontractors and resolving issues (0.834). The result also showed that all the roles are significant with the least role having 0.834 percent importance.

4.4.2 Causes of Building Collapse

Objective two (2) assessed the factors leading to an increase in the occurrence of building collapse in Kampala city. The findings of the study on the 5- point Likert scaled statements used in the assessment were condensed using RII. The findings are shown in Table 4-7 below;

Table 4-7: Causes of building collapse in Kampala City.

Causes of building collapse	SA	A	N	D	SD	Total	Total Weight	RII	Rank
Poor design and ineffective construction methods	48	19	5	4	0	76	339	0.892	1st
Foundation failure	40	31	4	1	0	76	338	0.889	2nd
Limited engagement of professionals	39	28	4	5	0	76	329	0.866	3rd
Use of substandard and untested local materials	28	39	7	2	0	76	321	0.845	4th
Lack of proper supervision and management	33	27	8	6	2	76	311	0.818	5th
Construction without building permits	37	16	13	9	1	76	307	0.808	6th
Selection of inexperienced contractors	17	26	27	4	2	76	280	0.737	7th
Corruption and bribery	12	28	22	9	5	76	261	0.687	8th

Source: Primary data (2023)

Item 1 from Table 4-7 shows that majority of the respondents agreed that most of the buildings that have collapsed in the different parts of Kampala City have resulted from the failure of the building proprietors and their contracted companies to follow approved structural designs and poor construction methods (RII = 0.892) as one of the causes of the collapse of buildings in Kampala. An insignificant number disagreed and showed ambivalence implying that over the time scope selected for the study, one of the prominent causes of structural failures has been caused by disregard for approved structural drawings. The key informants from NBRB and UIPE during interviews revealed that this was the most and frequently reported causes of collapse of high-rise buildings in Kampala City especially those whose construction has been suspended after whistleblowing from the communities. The same views were shared by respondents from contractor companies and SRB who revealed that in events where a structure especially high rise is commissioned basing on incomplete drawings, the stakes are high that requests for information and change orders are made most of the time when the work starts on site consequently leading to illicit alterations and hence collapse.

Item 2 also indicates a large part of respondents agreed that foundation failure (RII = 0.889) is also a root cause of building collapse in Kampala City. The integrity of a building's foundation is crucial for structural stability but also can be compromised by various factors. A key informant further stressed that failure for building committees to assign people to inspect ongoing works on sites causes the rise for negligence on certain important aspects that require much attention when constructing and he also discussed other problems that would cause foundation failure which include the soil such as expansive or weak soils, as well as other factors like poor design and construction practices, insufficient site investigation, environmental factors like earthquakes or floods, and aging with a lack of maintenance also contribute to foundation failures. Inadequate building codes and regulations further to exacerbate the problem.

Item 3 shows that the majority of the respondents agreed that building collapse normally occurs in Kampala City largely because some construction projects have limited engagement of qualified professionals thus enroll and allow unqualified technicians or engineers to become part of the technical construction teams. As further proved by the RII = 0.866, this practice predisposes buildings to failure which exposes big numbers of people who throng these places to be exposed to unnecessarily higher risks for generations.

The findings mirror Oloyedde et. al., (2010) that the skill, experience and personal ability of the workmen involved in the building construction is of utmost importance in creating value and has a multiplier effect on the quality of constructions. Not only does it become a necessity at the construction sites, but also in the phases preceding the actual construction itself.

Oloyede and colleagues for example cite the example of the decision by construction companies to use the so-called ready-made hollow sandcrete blocks sold by some block-making industries that at times, do not measure up to standard as a result of anticipated abnormal profits. Once these lapses are tolerated intentionally or otherwise, the quality of the sub-structure or super-structure cannot be guaranteed. The quality of the workmen is a measure of their effectiveness and efficiency at all times during construction while the level of building maintenance after its occupation depends on the performance of workmen. In addition, he must be willing to deliver high quality building materials to site in required quantities coupled with strict supervision of workmen by the Site Supervisor.

Responses on Item 4, revealed that suggested that the frequent collapse of buildings in Kampala City is due to the use of substandard building materials either knowingly or unknowingly. The substandard building materials range from poorly constituted cement, low tensile iron bars and substandard aggregates and sand among others. In instances when high rise buildings are planned, testing of such materials would be mandatory to guarantee the stability of concretes used, strength of the pillars, beams and columns among other parts. The RII = 0.845 confirms the observation that in most buildings that have collapsed, the quality of materials used has always been candidates of investigation as has been observed on site visits of collapsed buildings with police and other law enforcement officers collecting samples of the building materials from the rubble.

Item 5 shows that at most of buildings in Kampala city, failure and consequently collapse has been precipitated by limited or lack of proper supervision and management by professionals. As opined by majority respondents (RII = 0.818), in situations when the contracting engineers and construction crews are left to operate on their own without any form of evaluation or supervision, stakes are high that there is a likelihood of deviations which become more costly in the long run in the wake of buildings appearing in trouble leading to collapse.

The finding rhymes Schweier, (2016) who revealed that inspections should be done at regular intervals, based on a risk assessment that takes into account the structure's condition, environmental factors and length of time the bracing has been in place. In increasing the inspection, the workers will be forced to employ professional ethics, an inspection should occur as soon as possible after the occurrence of an extreme weather event or another incident that could affect the durability of the structure has occurred.

These findings are also in line with Obodoh et. al., (2019) who added that a competent person should regularly assess the stability of the structure while temporary bracing is required.

The findings are also in line with Palmer (2018) whose findings revealed that without the right supervision team in place, any strategy and plan have the potential of completely falling apart. Because of this, the core project staffs, expert resources, suppliers and all stakeholders should be part of the dynamic team. Palmer (2018) added that, all of those involved must have commitment to the groups, share similar visions for the projects and strive for overall success. Poor construction supervision leads to unsustainable building construction practices (use of substandard designs, materials, manpower and procedures) consequently leading to building failures (Agwu, 2014).

Similarly, results in Table 4.6 for item 6 show that the majority of the respondents, agreed that the construction without building permits has become a major vice in the divisions of Kampala has equally contributed to collapse. The RII = 0.808 provides a confirmatory signal that the majority of the respondents across the different institutions that participated in the study likened that increasing cases of collapse of buildings in Kampala to the abstractness of the use of building permits. This provides compelling evidence established earlier that some construction sites allow unqualified personnel to work on the building sites as engineers, use of substandard materials, poor design and construction methods while in actual sense they lack the acumen and know-how.

Item 7 from Table 4-7 agreed that the collapse of buildings in Kampala City is commonly caused by poor selection criteria by the owners of construction projects, making them a prey for inexperienced contractors. The RII = 0.737 also provides additional evidence that for the last decade or more, buildings have continued to collapse due to poor choice of engineers.

In line with this observation, were the views of all the key informants who unanimously revealed that people intending to invest in building construction fail for example to carry out due diligence exercises while selecting contracting firms.

Equally, the blame could be put on KCCA for its failure to carry out routine sensitization exercises that are capable of making the public more aware of the criteria they would follow to detect and identify with a competent contracting firm. Consequently, this has led to collapse of buildings.

Further confirmation was obtained from the NBRB report (2021 – 2022) in which it was underlined that the failure of parties intending to construct high rise buildings in Kampala City is partly attributed to use of inexperienced and at times incompetent construction companies that are not glued by ethics in their activities. The findings aligned with Mhand et. al., (2017) who accused developers of cutting costs by employing unskilled workers who are cheaper than trained builders on sites. This is done as an attempt to reduce costs.

Item 8 shows that 58 (60.4%) of the respondents associated the increasing cases of collapsed buildings to the blazing levels of corruption that have bedeviled many sectors had swamped almost every professional worker in the city in a bid to hide all the factors talked about. This finding attracted a lot of attention from the key informants who also revealed that the increasing cases of structural failures emanating from corruption which has both directly and indirectly eroded the good will among actors. Consequently, the factor has weathered through the hitherto competent committees in the supervision, compliance and enforcement wings leading to compromised standards.

4.4.3 Effects of Absence of Construction Professionals on Construction Projects.

Objective three (3) sought to establish the effect of the absence of professionals during construction buildings in Kampala city. As earlier noted in Chapter one, the problem of collapse of high-rise buildings has become a perennial problem in Kampala City. Based on this observation, the respondents were asked to provide opinion on the extent to which absence of professionals observed in the preceding sections contributed to the problem of collapse of buildings and building failures with emphasis on high rise ones. The results obtained are shown in Table 4-8 below;

Table 4-8: Effects of absence of professionals

Effects of absence of professionals	**SA**	**A**	**N**	**D**	**SD**	**Total**	**Total Weight**	**RII**	**Rank**
Potential building collapse	42	23	6	4	1	76	329	0.866	1st
Non-compliance with the building codes and regulations	39	28	7	1	1	76	311	0.871	2nd
Substandard project management	34	31	8	3	0	76	324	0.853	3rd
Safety risks	23	27	21	5	0	76	296	0.779	4th
Poor designs and faulty construction	19	24	30	2	1	76	286	0.753	5th
Poor coordination and miscommunication	12	23	12	24	5	76	241	0.634	6th

Source: Primary data (2023)

Item 1 from Table 4-8 shows that the majority of the respondents (RII = 0.871) attributed the major effect of the absence of professionals to potential building collapse in Kampala City. The officials from ERB, UIPE and ARB considered the fact that skilled architects and engineers play a crucial role in ensuring the structural integrity and stability of a building and their expertise allows them to design buildings that can withstand the forces they will be subjected to such as gravity, wind, seismic activity, and other environmental factors.

They further explained the different issues of non-compliance within the country are being ignored by the respective bodies yet collapse is still occurring. These findings concur with Palmer (2018) who revealed that there is a higher likelihood of design flaws, inadequate structural calculations, and improper construction practices and these factors can weaken the building's structure and compromise its overall stability. Weakened foundations, poorly installed structural component and subpar workmanship could lead to catastrophic failures hence risking the lives of construction workers and occupants, as well as causing significant property damage.

Item 2 from Table 4-8 shows that respondents agreed that non-compliance with building codes and regulations is a significant consequence that arises from the absence of professionals on construction sites (RII = 0.866). The NBRB emphasize that building codes and regulations were established to ensure the safety, structural integrity and functionality of buildings, as well as to address environmental concerns and ensure public health. It further emphasizes that failure to comply with building codes and regulations can have serious repercussions such as penalties, fines or even legal actions against the building owner, developer, or contractor. In some cases, non-compliance may result in the closure or condemnation of the building, preventing its use until the necessary corrections are made. Respondents from the major bodies emphasized that professionals play a crucial role in navigating and interpreting building codes and regulations. They have the knowledge and expertise to ensure that designs and construction practices align with the required standards. They are familiar with the latest updates and changes in regulations and can provide guidance on how to achieve compliance. When professionals such as architects, engineers, and construction managers are not involved in the construction process, there is a higher likelihood of overlooking or disregarding these important standards.

Item 3 shows that the respondents agreed is a major effect on construction projects (RII =0.853). The respondents reveal that the lack of experienced project management can result in poor coordination and inefficient workflow. Respondents from UIPE, ERB and ARB also in complement reasoned that with poor project management, there is higher likelihood of delays, cost overruns, increased disputes and conflicts resulting from claims and also breakdown in communication. Officials from the bodies emphasized that project managers are responsible for setting realistic timelines, allocating resources efficiently, and coordinating different teams and subcontractors involved in the project. Their expertise ensures that the project progresses smoothly and according to plan.

Item 4 shows that the absence of professionals on construction sites leads to increased safety risks (RII = 0.779). According to KCCA, NBRB, and UIPE officials, skilled experts, such as architects, engineers and construction managers, ensure compliance with safety standards and implement appropriate measures. Without their oversight, hazards can go unnoticed, jeopardizing the well-being of workers and the public due to inadequate safety protocols and the mishandling of hazardous materials become prevalent. These safety issues can result in injuries, fatalities, legal liabilities, and damage to reputation. Officials from the ARB, also provided that engaging professionals mitigates risks, promotes a safer working environment and protects all stakeholders since their expertise in construction safety management ensures adherence to regulations and industry best practices.

Item 5 shows that respondents were of the same mind that the absence of professionals in the construction industry leads to improper or poor designs for buildings (RII = 0.753). The key informant from CIOB provided that expertise and consider functionality, aesthetics, and structural integrity. Without their input, designs lack efficiency and effectiveness plus resulting in inefficient use of space, compromised structural integrity and dissatisfaction for occupants. He further complemented that, poor designs waste resources, lead to unnecessary expenses, contribute to cost overruns, and impact the visual appeal of the building and its integration with the environment. Overall, the absence of professionals in design compromises usability, safety, and long-term value.

Item 6 shows that poor the absence of professionals in construction leads to poor communication and coordination among stakeholders (RII = 0.634). Respondents for UIPE chimed in and revealed that miscommunication between the stakeholders on construction sites is a major effect on projects and it hinders project implementation and increases the risk of delays and conflicts m or misunderstandings which can arise causing errors and rework. The officials from ARB, ERB and ISU complemented that this causes decision making to become fragmented, delays in delivering instructions and delayed problem solving which results into rough workflow throughout construction.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study investigated the collapse of buildings on the involvement of professionals in Uganda, a case study of Kampala City. This chapter presents a summary of the findings, conclusions and recommendations.

5.2 Summary of the study

The assessment of building collapses in Kampala City reveals the critical role of professionals in ensuring the structural integrity and safety of buildings in Kampala city. Emphasis was on high rise buildings. The motivation for the study was basically the increased spate of building collapse in different parts of Kampala city and more so, the high-rise buildings which has cause unspeakable property loss, grievous body injuries and to the worst death of both construction crew members and neighboring homesteads and passersby. The involvement of professionals, such as architects, engineers, and construction supervisors, is crucial at every stage of the building process, from design to construction and maintenance. The research findings highlight several key factors contributing to building collapses including inadequate supervision, poor quality materials, substandard construction practices, and a lack of adherence to building codes and regulations. These factors often arise due to the absence or insufficient involvement of qualified professionals who possess the necessary expertise and knowledge. Given this research gap, the study aimed to come up with evidence about limited engagement of professionals and its effects common on high rise buildings in Kampala city in relation to the causes of building collapse in Kampala City.

5.3 Conclusion

The assessment of building collapses in Kampala City reveals the critical role of professionals in ensuring the structural integrity and safety of buildings. The involvement of professionals such as architects, engineers, and all the necessary professionals is crucial at every stage of the building process from planning, design and construction.

5.4 Recommendations

i. Ministries in charge should offer management support to KCCA in the form of project management training services. This is necessary in order to ensure that whatever is done by KCCA in the supervision and planning as well as approval of structures is in line with the plans and strategies at hand formulated by the line ministries.

ii. KCCA should work hand in hand with the professional bodies and construction and building unions in order to address the problem of deployment of non-professionals at sites of high-rise buildings in the city. The professional bodies are necessary in this strategy as they will help to enforce standards by favoring only certified groups but again through competitive bidding processes.

iii. Premier higher institutions of learning (such as Makerere University, Kyambogo University, Busitema University, Gulu University and Mbarara University of Science and Technology) can invest in improving the quality and relevance of professional education and training programs in construction. The government can collaborate with universities, vocational institutions, and industry experts to develop curriculum updates that align with current industry practices and emerging technologies. The involvement of these resourceful people will help to fill the gaps in the planning, monitoring and assessment activities.

iv. KCCA should ensure that there is tight coordination with line ministries. These are MoWT, MLHUD and Minister in charge of Kampala City. This is necessary in order to lay grounds for synergies and collective action which will strengthen the planning, tracking and monitoring systems for high rise constructions in all parts of Kampala. This will fill the gap identified in the field study of lack of a gel between KCCA and line ministries which has overwhelmed KCCA with a lot of administrative work leading to various gaps.

v. There is need for periodic refresher courses on safe building planning and management practices for staff in the construction sector. Capacity building is necessary because it will enable the personnel in the construction industry to keep abreast with best practices in the management of buildings. To make the trainings comprehensive, the study recommends KCCA to integrate professionals from all relevant bodies concerned or related to building construction so that a full dose of necessary and relevant information is disseminated and fed to the concerned groups in the construction industry.

vi. Professional bodies should foster collaboration and networking among professionals by supporting and empowering existing professional associations in the construction sector to offer professional development programs like, workshops, seminars and certification courses to enhance their skills, knowledge and expertise while encouraging them to pursue certifications from reputable international bodies.

5.5 Limitations

The research study was an exploratory research due lack of abundant previous literature in the construction field regarding the level of involvement of professionals which obstructed the researcher from hypothesizing potential relations of variables and their strengths and the time scope of one month allocated to data collection for this study was unlikely not enough to cater for all the targeted population.

5.6 Areas of further research

Although the findings reported in the study are informative, they are not conclusive. Specifically, they are tied to only Kampala city. Other urban centres such as municipalities and town councils where cases of collapsed buildings such as Wakiso, Jinja and many others are not reported in this study, which makes the findings to lack a comparative and comprehensive coverage. To draw more valid generalizations, this study should be extended to cover other urban settings in Uganda. Specifically, the study should be broadened to cover the entire building process in Uganda as a means of unraveling other proximate and underlying causes of structural failure of buildings. Equally there is need for a longitudinal study in order to qualify and corroborate some of the causes and implementation failures reported in this study.

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APPENDICES

Appendix 1: Activity Schedule

No.	ACTIVITY	NOV	DEC	JAN	FEB	MARCH	APR	MAY	JUN
1	Literature review								
2	Proposal development and submission								
3	Proposal presentation								
4	Data collection								
5	Data analysis								
6	Final project presentation								
7	Final report submission								

Appendix 2: Proposed Budget

No.	**ITEMS**	**QUANTITY**	**RATE**	**AMOUNT**
1	Stationery	Item	70000	70000
2	Travel	Item	80000	80000
3	Communication services	Item	50000	50000
4	Flash disc	1	40000	40000
	Subtotal			240000
	Contingency (5% of subtotal)			12000
	Total			252000

Appendix 3: Research Methodology Summary

OBJECTIVES	Data collection			Data analysis tool
	Data type	**Data form**	**Data collection tool**	
Specific objective 1 To identify the roles and responsibilities of different professionals on construction projects.	Secondary data and Primary data	Qualitative data/ Quantitative data	Document-review Questionnaires	Ms word and Ms Excel
Specific objective 2 To examine the key causes of building collapse in Kampala City.	Secondary data	Qualitative data Quantitative data	Document-review Questionnaires	Ms Word and Ms Excel
Specific objective 3 To establish the possible consequences of absence of professionals in the construction of buildings in Kampala city.	Primary data	Quantitative data	N/A	Computer software ' IBM SPSS Statistics

Appendix 4: Questionnaire

Dear respondent,

My name is Kyazze Benjamin, a student of Makerere University, College of Engineering, Design and Technology pursuing a Bachelor of Science in Construction Management. As part of the requirements for this course award, I am obliged to carry out a research study. I am undertaking a study on "Involvement of professionals and their impact on building failure and collapse in Uganda: A case study of Kampala City".

Your participation is voluntary. There are no monetary benefits. The responses obtained from you are strictly required for academic purposes. At any one moment, they can never be used against you.

Part 1: General Information of the respondents; (Tick Where appropriate)

1. What is your gender?

Male ☐

Female ☐

2. What is your age bracket?

18 to 25 years ☐

26 to 35 years ☐

36 to 45 years ☐

46 years and above ☐

3. What is your profession in the construction industry?

Project manager ☐

Engineer ☐

Architect ☐

Quantity surveyor ☐

4. What is your experience in the construction field?

Less than a year ☐

1 to 5 years ☐

6 to 10 years ☐

More than 10 years ☐

5. Which construction body are you registered with in Uganda?

Surveyors Registration Board (SRB) ☐

Architects Registration Board (ARB) ☐

Engineers Registration Board (ERB) ☐

Uganda Institute of Professional Engineers (UIPE) ☐

Institution of Surveyors Uganda (ISU) ☐

Other (Please specify)

……

Part 2: Roles and Responsibilities of each Professional.

6. On a scale of 1-5, what would you describe as the major roles of construction professionals? Please tick appropriately all that apply in the spaces provided.

1= Strongly disagree, 2= Disagree, 3= Not sure, 4= Agree, 5=Strongly agree.

i. Construction Managers

Roles	**1**	**2**	**3**	**4**	**5**
Overall project coordination and management					
Planning and scheduling construction activities					
Budgeting and cost control					
Hiring and managing subcontractors					
Handling project communication and reporting					

ii. Architect

Roles	**1**	**2**	**3**	**4**	**5**
Designing building layouts and structures					
Creating architectural drawings and plans					
Collaborating with clients and contractors					
Ensuring compliance with aesthetics					
Overseeing construction and addressing design issues					

iii. Engineers

Roles	**1**	**2**	**3**	**4**	**5**
Structural analysis and design					
Developing engineering drawings and specifications					
Supervising construction activities					
Conducting site inspections and quality assurance					
Providing technical support and problem solving					

iv. Quantity Surveyors

Roles	**1**	**2**	**3**	**4**	**5**
Supervising construction activities					
Prepare BOQs and tender documents					
Evaluate and negotiate contracts					
Managing project finances and cost control					
Conduct valuations and final account settlements					

v. Contractors

Roles	**1**	**2**	**3**	**4**	**5**
Managing site operations					
Implementing plans and schedules					
Coordinating labour, materials and equipment					
Ensuring compliance with project specifications					
Managing subcontractors and resolving issues					

Part 3: Main Causes of Structural Failure of Buildings

7. On a scale of 1-5, what would you describe as the agreed causes of building collapses? Please tick appropriately all that apply in the spaces provided.

1= Strongly disagree, 2= Disagree, 3= Not sure, 4= Agree, 5=Strongly agree.

Possible causes of structural Failure of buildings	**1**	**2**	**3**	**4**	**5**
Poor design and construction					
Use of sub-substandard and untested local materials					
Absence of site investigation					
Foundation failure					
Building design variations					
Lack of proper supervision and management on construction sites					
Corruption and bribery					

8. Have you worked on or read about a building project that collapsed?

Yes ☐

No ☐

9. Where all professionals involved at each stage of the project during construction?

Yes ☐

No ☐

10. If NO, which professionals did not participate during construction?

Project manager ☐

Engineer ☐

Architect ☐

Quantity surveyor ☐

Part 4: Effects of the absence of professionals in the construction of buildings

11. On the scale of 1-5, what would you describe as the effects of the absence of professionals or certain professionals during the construction of buildings? Please tick appropriately all that apply in the spaces provided.

1= Strongly disagree, 2= Disagree, 3= Not sure, 4= Agree, 5=Strongly agree

Possible effects	**1**	**2**	**3**	**4**	**5**
Improper design					
Non-compliance with the building codes and regulations					
Safety issues					
Potential building collapse					
Substandard project management					
Poor communication and coordination					

Thank you very much for your cooperation and time. May the Almighty God bless you.