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DEPARTMENT OF CONSTRUCTION TECHNOLOGY MANAGEMENT

M.SC IN CONSTRUCTION TECHNOLOGY MANAGEMENT

Assessment of occupational safety management practice: The case of Ayat SC real estate projects

BY

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Addis Ababa, Ethiopia

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A Thesis Submitted to Addis College, Department of construction technology management in Partial Fulfillment of the requirements for the degree of Master of Science in construction technology management

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Declaration

This is to declare that the thesis entitled "**Assessment of occupational safety management practice: The case of Ayat SC real estate projects**", submitted in partial fulfillment of the requirements for the degree of Master of Science in construction technology management under department of Construction Technology Management, Addis College , is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

SERKALEM TAMIRAT	Signature	Date

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I hereby certify that I have supervised, read, and evaluated this thesis titled "**Assessment of occupational safety management practice: The case of Ayat SC real estate projects**" prepared by **SERKALEM TAMIRAT** under my guidance. I recommend the thesis to be submitted for oral defense.

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As members of the board of examiners, we examined this thesis entitled "Assessment of occupational safety management practice: The case of Ayat SC real estate projects" By Serkalem Tamirat.

This thesis work is original and suitable for the submission in partial fulfilment of the requirements for the award of Master of Science in construction technology management.

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Acronyms and Abbreviations

BC	Building Contractor
GC	General Contractor
GDP	Gross Domestic product
ILO	International Labor Organization
MoLaSA	Ministry of Labor and Social Affair
MoUWD	Ministry of Works and Urban Development
OHS	Occupational health and safety
OSHA	Occupational Safety and Health Administration
PM	Project Management
PMP	Project Management Performance
PPE	Personal Protective Equipment
SMS	Safety management system
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

Abstract

In construction industry, many of the accidents and hazards are obvious. Meanwhile, as the construction sector grows, the number of serious injuries and fatalities on the site has increased. Therefore, the objective of this study is to evaluate safety management practices in Ayat SC real estate projects that are built by different contractors, with a focus on the methods used for safety management. The study focuses on determining the fundamental cause of construction site accidents, which occur often. The research was conducted using a mixed method that included the use of a questionnaire and interview to collect primary data. A total of 83 questionnaires were given to different professionals for this study, with 75 complete responses were gathered for analysis. The data was analyzed quantitatively using descriptive statics method in SPSS—20 and qualitatively using verbal description. Overall, the study's findings demonstrated that The main root causes of occupational accidents are "Lack of training and knowledge", "Carelessness" & "Being struck by falling object". 'Injured workers receive prompt medical attention.' & Actions are taken to prevent similar accidents in the future was major emergency management method in real estate projects. project's safety-related work being audited on a regular basis while it's being built; building project site equipped with first aid kit and first responders; Is the layout of the site safe for workers; Proper supervision by staff trained in safety get carried out on the project; follow-up or contribution from a governmental or non-governmental entity to improve safety in building projects; are not well practiced by the company. The critical challenge in implementing effective occupational safety management practices are lack of effective communication about safety procedures and regulations among employees & lack of adequate safety equipment and resources with lack of sufficient training on occupational safety management for employees.

Keywords: Safety management practice, root causes of accident

CHAPTER ONE

1. INTRODUCTION

1.1 Introduction

Safety Management practice is the management functions connected with the carrying on of an industrial undertaking that relate to the safety of personnel in the duty, including planning, organizing, and implementing safety policy; and the measuring, auditing/ reviewing of the performance of those function (Todd, 2004). In this section, the researcher presented introduction of the subject under study. To begin with, the researcher present background of the study and statement of the problem that drives this study. In addition, the researcher described the objectives and research question of the research. Finally, significance, scope and Limitation of the study are presented.

1.2 Background of the study

In the developed as well as developing part of the world, construction industry is considered to be one of the most significant industries in terms of its impact on health and safety of the working population. Construction industry is both economically and socially important. However, the construction industry, at the same time, is also recognized to be the most hazardous. Although dramatic improvement has taken in recent decades, the safety record in the construction industry continues to be one of the poorest (Farooqui, 2008). The building sector has a major impact on the economy, the environment, and society around the world. The industry provides high employment opportunities, probably only second to agriculture (Ofori, 2008).

Construction industry is an important part of the economy in many countries and often seen as a driver of economic growth especially in developing countries. Typically, construction industry

contributes to 11% of gross domestic products (GDP) in most developing countries (Giang and Pheng, 2010). However many construction activities are inherently health and safety risks such as working at height, working underground, working in confined spaces and close proximity to falling materials, handling load manually, handling hazardous substances, noises, dusts, using plant and equipment, fire, exposure to live cables, poor housekeeping and ergonomics.

Construction in developing countries, such as Ethiopia, requires more labor than construction in developed countries. Many of the employees are low wage & unskilled. In Ethiopia, there is little discernible difference between large and small contractors in safety, and practically most of them lack a proper safety program. Most contractors, on the other hand, are preoccupied with increasing their profit margins. On both large and small construction sites, unsafe conditions exist, and personnel are exposed to a variety of construction dangers. There are no training programs for staff and workers on many sites, therefore there is no orientation for new employees or workers, no dangers are identified, and no safety briefings are held. Employees are expected to learn from their own experiences and failures. There are also a shortage of medical services, adequate restrooms, and poor cleanliness (Adane, Gelaye, Sharma, & Beyera, 2013).

From many reasons that the researcher choose to do research on real state, developing country such as Ethiopa have Citizens of this country capital is increasing .The process of purchasing properties in order to increase wealth, diversify investments, or produce income is referred to as real estate investing. It is distinct from other investment categories like bonds and stocks because it deals with real assets. Investing in real estate entails buying residential or commercial real estate with the goal of making money via property appreciation, rental income, or both. Real estate investments, in contrast to stocks and bonds, are material possessions that can be

physically used, maintained, and enhanced. In addition to this Country development,Citizens need for home, Countries policy help investors for initiating in constructing real state.

Construction projects present enormous problems in terms of not only finishing on time and on budget, but also eliminating and minimizing negative environmental repercussions. The natural environment is significantly impacted by construction. Working at heights, underground, in confined spaces, and in close proximity to falling materials, handling loads manually, handling hazardous substances, noises, dusts, using plant and equipment, fire, exposure to live cables, and so on are all inherent health and safety risks in the construction industry (Hendrickson and Horvath, 2000).

1.3 Statement of the problem

This research is designed to assessment of safety management practice: The case of real estate projects in Addis Ababa. In today's world, the construction industry is considered to be the backbone of every nation's development and plays a significant role in economic progress (Ofori, 2008). But this industry is one of the most hazardous industry sectors with many thousands of workers being killed and seriously injured each year. Worldwide occupational injury rates in construction are highest for all major industries. Construction is always risky because of outdoor operations, work-at height, complicated on-site plant machinery and equipment operation coupled with worker’s attitudes and behaviors towards safety (Choudhry, Fang and Mohamed, 2007).

Based on Mbuya (2004) in most poor nations, health and safety are not prioritized in the delivery of building projects, and implementing safety measures during construction is seen as a burden. The reason for not prioritizing occupational safety management is a lack of knowledge and

experience limits the intervention process aimed at improving the health and safety of construction workers. The construction industry is indeed considered hazardous due to various factors, as evidenced by secondary data and personal observations. This is due to the high rate of fatalities and injuries, exposure to hazardous materials, working at heights, heavy machinery usage, unpredictable working conditions, electrocution hazards, and noise and vibration exposure. Secondary data, like statistics from OSHA and BLS, along with personal observations of safety practices at construction sites show its hazardous nature.

According to recent data given by the International Labour Organization (ILO), 2.78 million emp loyees die each year from industrial accidents and diseases (2.4 million of which are disease relat ed) and another 374 million people suffer from nonfatal occupational accidents around the world. Lost work days due work related accidents are projected to account for over 4% of global GDP, with some nations accounting for as much as 6% or more (Kiat, Jin, Remes & Takala, 2017). According to a data from the Ethiopian Ministry of Labor and Social Affairs (MOLSA, 2016), a total of 4535 work-related incidents were reported in 2015/16, with 100 (2.21%) being deadly and 4435 (97.79%) being non-fatal. Due to these safety issues, a medical bill of 3,787,430.76 ETB was incurred, as well as a loss of 11,466 working days due to injured employees' absence. The construction business, after manufacturing and mining, is regarded as the third most dangerous sector.

However, the fact that Ethiopia has a number of laws, rules, regulations, and work standards relating to workplace safety, their practical application is minimal. As a result, accidents in the construction industry are on the rise at an alarming rate. These issues, in turn, have a huge influence on the personnel, the project, the project stakeholders, and the country as a whole, in a variety of ways. The researcher expect the problem can be solved by implementing standard

effective safety management system practice using managerial commitment to safety, employee involvement in workplace safety, Hazard identification & control and Education and Training methods.

1.4 Objective of the study

1.4.1 General objective

The general objective of this study is to assess the occupational safety management practice of real estate building construction projects.

1.4.2 Specific objectives

1. To assess the current level of adherence of occupational safety management practice used in real estate projects.
2. To assess the root causes of occupational accidents in real estate projects.
3. To assess the emergency management method in real estate projects.
4. To assess the challenges of implementing effective occupational safety management practices by real estate projects.

1.5 Research Questions

Based on the identified research problem & objective, the research questions are formulated as follows and the study will try to provide answers for the following major questions:

1. What is the current level of adherence of occupational safety management practices used in real estate projects?
2. What are the main root causes of occupational accidents in real estate projects?
3. Which emergency management method do you implement in real estate projects?

4. What are the primary challenges of implementing effective occupational safety management practices in real estate projects?

1.6 Significance of the study

This study will be helpful to the country in suggesting actions to be taken at all stages of the project in order to ensure the presence of satisfactory safety standards within the construction projects, to provide every employee in the company with a platform that allows them to have an in-depth discussion about safety issues, to reduce the number of accidents, and to provide an accident-free workplace. This study will also be significant in analysis, and implementation of policies and strategies to ensure and improve the safety, health, and well-being of employees in the construction site. Evaluating and improving policies: From a policy standpoint, research in occupational safety management practices enables lawmakers, government agencies, and industrial organizations to assess existing regulations, policy frameworks, and guidelines related to worker safety and well-being. It provides logical evidence and feedback for adapting and aligning policies with emerging workplace trends, technological advancements, and changing socio-economic scenarios. This helps develop more effective and comprehensive policies, which significantly reduce workplace accidents and promote a culture of safety.

In addition, from an academic point of view, this study can also be used as a guide to Addis College students and other researchers as reference for future study by showing gaps where other possible future study can be conducted. By investigating and understanding factors that contribute to workplace safety, researchers can advance knowledge and develop innovative theories, models, and tools that are applicable to diverse industries and settings. Such research provides vital insight for educators, practitioners, and decision-makers striving to create safe and productive work environments.

1.7 Scope of the study

Thematic scope: The research focuses on the assessment of safety management in real estate projects. Despite the fact that workplace safety management is a broad topic, the focus of this study is entirely on construction site safety management.

Geographic scope: This research focused on assessing safety management practices in real estate building construction projects located in Addis Ababa, Ethiopia. Addis Ababa will be chosen due to the availability of appropriate data and the researcher's convenience.

Temporary scope: This research will employ a cross-sectional research design, and its data collection will involve the use of various methods such as structured questionnaires, interviews, site visits, and the review of secondary data, including relevant reports and statistical information.

The scope of the study cover real estate projects at different stages of development (construction, and completion), involving residential real estate buildings in Addis Ababa. The study targets a variety of stakeholders, including but not limited to project managers, safety officers, construction workers, and experts in the field of occupational safety management.

1.8 Limitation of the study

The research address only real estate building construction projects and the finding of the result may not represent as a general representation in the construction industry. Conducting extensive research on the main root causes of occupational accidents in real estate projects may require a significant amount of time. Gathering data, conducting interviews, analyzing information, and drawing conclusions can be time-consuming. Researchers faced constraints in terms of meeting deadlines and completing the study within a specific timeframe. Financial limitations were also

pose a challenge. However in order to overcome these limitations, the researcher considered efficient planning, data availability & Prioritization and focus where the researcher identifyed key aspects or specific areas within the research topic that are most critical and allocate resources accordingly.

1.9 Definition of Terms

Safety is concerned with external threats, and the perception of being sheltered from threats. According to the business Dictionary, safety is defined as a relative freedom from danger, risk, or threat of harm, injury, or loss of personnel and/or property, whether caused deliberately or by accident. According to Lingard (2005) safety is defined as absence of danger & a state of protection and condition not involving risk

Safety in construction site means freedom from danger, harm, and injury to the person who is involved in construction activities & taking precautions measures to protect the lives of the workers against fatal injuries and death (Pouliakas and Theodossiou, 2010).

Safety Management is the management functions connected with the carrying on of an industrial undertaking that relate to the safety of personnel in the duty, including planning, organizing, and implementing safety policy; and the measuring, auditing/ reviewing of the performance of those functions.

1.10 Organization of the Study

This research has the following broad categories. Chapter I describes the research overview, its initiation, and purposes. It also indicates the research objectives, how the research process is conducted and the contents of the research. Chapter II covers the Review of related literatures part of the research; the literature review includes general information about safety measures, causes of safety risk and their overall effects. Chapter III covers the research methodology. The methodological approach consists of the overall research strategy; the research design, the

analysis of the data and writing of the research paper. Chapter IV contains the discussion and analysis part. It contains the findings on causes and challenges of safety measures; the rate of accidents/ injuries in real estate construction projects. Chapter V in this part, the research summery of findings, conclusions and recommendations are presented. This may serve as an action guideline to stakeholders in the construction industry.

CHAPTER TWO

2. Review of related literature

2.1 Introduction

In this section the researcher presents review of related literature which focuses on occupational safety management. To begin, the researcher reviews the Concepts and important terms of construction safety management, as well as the subject's importance and ramifications for the construction industry. The researchers look at the current state of construction safety and the procedures that are being used. In addition, there is an information about construction safety and accidents in the construction industry. Other literature relevant to the topic and demonstrating empirical results are also evaluated and regarded as a source of evidence and for ensuring the accuracy of the research findings.

2.2 Concepts and important terms

Safety generally refers to recognizing and learning about potential risks that may be avoided before they materialize. Risk to human life, property damage, and the environment, which includes wildlife, plants, and biodiversity, are a few of the things that need to be considered when it comes to safety. (NIOSH, 2016).

Safety is concerned with external threats, and the perception of being sheltered from hazards. According to the Business Dictionary, safety is described as a state of relative freedom from danger, risk, or threat of harm, injury, or loss of employees and/or property, whether intentionally or accidentally created. Safety, according to Lingard (2005), is defined as the absence of danger, a state of protection, and a condition that does not involve risk.

Safety on a construction site refers to the absence of danger, harm, or injury to anyone involved in building activities, as well as taking care to protect workers' lives from serious injuries and death. The increased competition associated with the globalization era and modernization, the dominance of service-oriented industries, and the rising job insecurity associated with labor market flexibility all emphasize the importance of safety, according to Pouliakas and Theodossiou (2010).

An accident, according to Zekri (2013), is a "sudden, unplanned, and unintentional" event that can cause physical harm to people and/or property damage. The term "accident" is used in this study to refer to an incident that results in physical harm or damage to the body as a result of an interchange of mechanical, chemical, physical, or other environmental energy that exceeds the person's tolerance.

2.3 Theoretical/Conceptual literature

2.3.1 Root causes of occupational accidents

Any avoidable action by workers or failure of apparatus, tools, or other devices that interrupts production and has the potential to injure people or damage property is referred to as an accident. Construction projects are a major source of workplace accidents in many nations. The construction industry has a reputation for being a high-risk environment for accidents. (Oglesby et al. 1989).

Because of the open space, exposure to weather, involving many unskilled labors, tight schedule of short targeted public project duration, workers turn over due to market discrepancy, and working at height, in confined space, and psychologically and physically vulnerable working environment, the nature of construction projects themselves has potential hazards and accidents. (Imriyas et al., 2007).

Falling from scaffolds and ladders, falls from working height, and other falling of construction accidents are among the most common. Falling into a manhole and excavation as a result of being struck by falling objects, falling from machines, stumbling or crashing against things Excavation collapse (crush injuries), receiving injuries from hand tools, electric contact Fires and Explosions, Exposure to dangerous substances (chemical and biological), Moving heavy loads, Bad working positions, often in confined spaces, struck or crushed by a workplace vehicle and Structural Failure on Construction Site (Fasil, 2017).

Construction Site Falls: Scaffolding falls, roof related falls, falls arising from gaps in flooring, crane falls, shaft falls, and falling objects are all common construction site falls.

Crane Accidents: Deaths from crane accidents can be caused by a variety of circumstances, including lightning, high winds, malfunctioning cranes, electrocution, and other hazards involved with building at heights.

Scaffolding Accidents: Scaffolding is a temporary framework used to support people and materials during the construction or maintenance of big structures such as buildings. 65 percent of the construction sector is believed to work on scaffolds on a regular basis. Scaffolding is a requirement in the construction sector. Scaffolds were used to construct some of the most spectacular constructions ever constructed by humans. Many construction workers who were hurt in scaffolding accidents blamed the incident on planking or support faults that allowed them to slip or be struck by a falling object.

Run Over by Operating Equipment: Construction sites are extremely active work environments, with a constant flow of cars and personnel. Construction workers are run over or hurt by working machinery in the past. Accidents like these can happen at any site, but the hazards are amplified while operating with heavy equipment on highways or near busy roads.

Electrical Accidents on Construction Sites: According to the Occupational Safety and Health Administration (OSHA), over 350 construction workers are killed in electrical accidents each year. Electric shock, power line contact, and steam accidents are some of the causes of these fatalities. The dangers of these hazards are amplified for people who work on scaffolding or in cranes near power lines.

Trench or Excavation Collapses: Building trenches is a crucial operation during underground construction. A trench is a long & narrow with a depth that is greater than its width. When

trenches are built, measures must be in place to protect employees from falling into the trench if it collapses.

Fires and Explosions in Construction Site: According to the Occupational Safety and Health Administration, workplace fires and explosions kill over 200 people each year and injure over 5,000 more.

Structural Failure on Construction Site: A structural failure occurs when a building or other structure fails in such a way that it can no longer handle the same amount of weight as it did before it failed. Structure failures can be devastating, resulting in serious damage and even death. These kinds of accidents happen when the public's safety is jeopardized for financial gain, or when bad design leads to building failure. The designer and the contractor should be held accountable for their job.

According to the studied literature, the building and construction business has a higher rate of work accidents than other industries. Falls from height, from roofs, scaffolding, or ladders are the most prevalent accidents in the building and construction sector.

Many fall injuries and accidents involve heavy lifting and tools. Safety is a crucial aspect of construction work, and it is a major contractual obligation for those in charge of and doing it. Effective contractor safety programs support this goal by supporting contractors in methodically identifying and evaluating potential dangers so that controls may be established in advance and accidents can be avoided. Interactions established through these programs also bring plenty of other advantages, including higher safety awareness, better communication, better recordkeeping, and cost savings.

The construction and housing business has a high incidence of attrition and numerous major workplace accidents. To prevent job-related accidents and other health concerns among employees, it is critical that both employers and employees work together to ensure the safety of their workplace. The employer is responsible for the overall working environment, but employees also have a role to play, such as following employer instructions and using the employer's non-public protective equipment.

2.3.2 Emergency management in real estate projects

Here are some of the emergency management strategies for construction site accidents:

1	Have an emergency response plan in place and train all workers. This should include procedures for responding to different types of accidents, evacuation plans, and roles and responsibilities. Workers need to know what to do in case of an emergency.
2.	Designate emergency response team members. This should include first aid personnel, safety officers, and supervisors who will take charge during an emergency. They should receive advanced training. (McCabe 2001)
3.	Have emergency contact numbers readily available. This should include numbers for emergency services (fire, ambulance, police), hospital, poison control, and utility companies. Have the numbers posted prominently at the site. (OSHA 2002)
4.	Identify assembly areas where workers should gather during an evacuation. These areas should be away from the construction site and any hazard. Practice emergency drills periodically. (OSHA 2017)
5.	Have first aid kits and emergency supplies on site. This includes items like bandages,

	gloves, eye wash, fire extinguisher etc. Check supplies regularly to ensure they are stocked. (NIOSH 2006)
6.	Report all accidents immediately to management and emergency services as required. Record details of the accident to aid any investigation. (HSE 2010)
7.	Have a clear command and communication structure in place. Designate who will communicate with emergency responders, manage the site, and inform workers of what is happening. (Lee et al. 2010)

2.3.3 Challenges of Safety management Practice

An extensive literature review has been conducted to identify the challenges which affect the safety management in construction projects

Project Cost: Since professional fees are tied to the project's final cost under the typical building procurement system, there's a good reason to look into alternative materials, techniques, and safety measures. However, under such procurement and contractual arrangements, the cost of time spent seeking substitutes may not be recovered from the owner (Zekri, 2013).

Safety and Health Policy: A policy is an administrative belief that is used to direct an organization's course. It can be a series of acts or a well-thought-out decision. Zekri (2013) addressed a number of factors that influence construction site safety. The findings suggest that variables related to organizational policy are the most important category of factors affecting safety performance in the construction industry in the United Kingdom. Furthermore, the study found that (69 percent) of construction enterprises in the UAE had a poor knowledge of the necessity of safety and health policies. Furthermore, all small construction companies, as well as

80% of medium construction companies, lack a defined safety and health policy (Shibani, et al., 2012).

Accidents / Incidents / Near Miss Report: According to literature, managers in large organizations can rely on accident and incident reports split down by particular projects, which allows for project comparisons based on accident frequency or any other measure of accident rate. Managers are constantly informed about where accidents occur in this fashion, allowing them to focus their response time on problem regions (Hassanein & Hanna, 2008).

Evacuation Plan / Fire drill: Evacuation plans are created to ensure that all expected residents of a structure are evacuated in the safest and most orderly manner possible. A fire drill, on the other hand, is a method of practicing the evacuation of a structure in the event of a fire or other emergency. Prior to the start of building, the contractors must assess the potential dangers that may develop on the construction site. Contractor's fire marshals should be knowledgeable with the firefighting equipment on site and how to operate it (Zekri, 2013).

Safety and Health Training: In the construction industry, it is well acknowledged that training plays an important role in improving worker safety and health. Worker orientation is frequently the first step in training, and it continues as workers need to learn more about specific aspects of their jobs. For example, the training provided to certify those who are responsible for installing or managing scaffolding, which is considered to be the most dangerous work on construction sites. These training sessions can be delivered using a variety of methods, including worker orientation, safety induction, toolbox presentations, and communication programs. It may cover topics such as worker rights and responsibilities, falls from heights, hot work, electrical safety, personal protective equipment, first aid and emergency procedures, confined space entry, and a

variety of other topics, whether updated information is being presented or a refresher on a subject is being provided (Hinze & Gambatese, 2003). Furthermore, education and training programs assist workers in performing a variety of tasks effectively. It also promotes a positive attitude toward safety by incorporating it into production and quality objectives (Kartam, et al., 2000).

Personal Protective Equipment (PPE): PPE is divided into two groups. The first is that a safety helmet, safety shoes, and proper apparel must be worn. The second category includes eye protection, protective gloves, ear protectors, and a safety harness, depending on the type of job (Jannadi & Bu-Khamsin, 2002).

Safety and Health Inspections: Safety and health inspections are a method by which management can become familiar with the nature of safety and health conditions on sites. Workplace safety and health inspections by competent persons are useful in terms of reducing work injuries (Hinze & Gambatese, 2003). Further, companies who implement safety and health inspections have fewer accidents than companies that do not perform inspections (Reese, 2003).

Safety Signals, Signs and Barricades: To avoid hazard, all construction sites must have a uniform signaling system that is understood by all parties. Signal symbols should be displayed in appropriate locations and also be available in a safety guide. It is the contractor's job, however, to ensure that all stakeholders are aware of all signals that they should be aware of (Tam, et al., 2003).

Work environment: Authority rules, in most cases, successfully address the work environment and procedures in order to provide a higher level of protection. It is not, however, just a matter of adhering to the authority's basic norms and guidelines. It necessitates stakeholders going further

and establishing their own standards, as well as increasing the duties and participation of all parties (Zekri, 2013).

Role of Government and Engineering Societies: The government and engineering organizations should play a vital role in ensuring that safety and health rules are followed by approving standards and norms that safeguard workers and property. The corporations should be legally obligated to follow these rules, with appropriate stiff penalty for non-compliance. The government will perform a site check on a regular basis using expert safety engineers, and will issue warnings or fines to contractors if unsafe circumstances or hazards are found on the job. Furthermore, engineering organizations will aid in the expansion of engineering knowledge by raising engineer awareness of safety and health issues (Fang, et al., 2004).

2.3.4 Ooccupational safety management practice in Ethiopia Construction

Construction in underdeveloped in countries like Ethiopia which necessitates more manpower than construction in rich ones like the United States. The majority of the workers are low-wage and unskilled. There is little difference in safety between large and small contractors in Ethiopia, and almost all of them lack a solid safety protocol. (Adane et al., 2013)

On the other hand, most contractors are focused on boosting their profit margins. Unsafe conditions exist on both large and small construction sites, and workers are exposed to a number of construction hazards. On many locations, there are no training programs for employees and workers, therefore there is no orientation for new employees or workers, no hazards are recognized, and no safety briefings are held. Employees are expected to learn from their mistakes and successes. In addition, there is a lack of medical services, sufficient facilities, and poor sanitation. Workers are at danger while at work, and the following issues are common:

1. There is no sufficient shoring or bracing while excavating in deep pits.

2. Laborers undertake the majority of the concrete work, and cement burns are common due to a lack of personal protective equipment (PPE) (protective gloves and boots are common).

3. Because of inadequate scaffolding and a lack of safety belts, workers fall from considerable heights.

4. Workers suffer damage to their heads, fingers, eyes, feet, and faces as a result of a lack of personal protection equipment.

Construction workers in Ethiopia labor under deplorable conditions. This is due to a lack of safety procedures and bad working relationships. Workers are exposed to a range of work-related mishaps because most safety controls are lacking on construction sites. The majority of the injured workers were not compensated due to triangular employment arrangements between the building contractors and subcontractors, which blurred lines of responsibility (Limenih, 2010).

2.4 Empirical Review

Construction is a vast and an active economic sector, which is also considered as backbone of the world's economy in general (Mekuanent, 2021). Particularly in Ethiopia, this sector mobilizes an enormous amount of various resources and budgets that embraces huge manpower of different professions by creating a large job opportunity (Fekele, Quezon, & Macarubbo, 2016). This is involved in the planning, execution, and monitoring (monitoring) of all forms of civil works. Building, communication, and energy-related construction projects, as well as water supply and sewerage civil works, are just a few of the important projects / programs in the construction industry.

The findings of Vinodkumar and Bhasi's (2010) study can help researchers and practitioners figure out how to improve workplace safety by identifying mechanisms. According to their findings, safety training is the most important safety management strategy that predicts the outcomes of safety knowledge, compliance, motivation, and involvement.

Over 2.7 million people die annually from work-related illnesses and accidents, according to the most recent global estimate from the International Labor Organization (ILO). Compared to affluent countries, the death rate from occupational injuries is roughly 10–20 times greater in developing nations like Africa.

While research on the effects of occupational injuries in Ethiopia's construction industry is still lacking, studies have been done on the prevalence of these injuries and the factors that contribute to them among construction workers. On the other hand, the prevalence varies from 30% to 84.7%, suggesting a significant degree of variation throughout the results. (Occupational injury and associated factors among construction workers in Ethiopia,2021)

Management commitment, employee involvement, communication, audits/observations, goal-setting, and a good safety culture were all demonstrated to reduce injuries in construction safety study (Hinze and Wilson, 2000) The expenditures involved with employee training and enforcement were the most significant barriers to safety (Todd, 2004)

Falling material and objects, electrical risks, transportation, and mobile plants, and other were the categories utilized to classify fatal accidents. Most fall-related accidents happen while working on roofs, scaffolds, or ladders. A substantial percentage of fatalities are caused by structural collapses and falling materials. Many of the safety hazards are unique to trades, and construction employees frequently underestimate the risks in their own work, which reduces

motivation to follow safe work rules. Establishing and enforcing safety standards and regulations can help to avert a huge number of these mishaps (Helander, 1991).

The research conducted in UK by Manu, Ankrah, et. al. (2010) on the causal factors in construction accidents by collecting data from 100 construction companies found that:

- Problems arising from worker actions or behavior, as well as worker capabilities, were shown to be responsible for more than two-thirds (70%) of the accidents. This indicates a lack of education, training, and supervision.
- Equipment shortcomings flaws, including personal protective equipment (PPE), were found in more than half of the cases (56 %).

A local research in Addis Ababa City construction projects by (Fasil, 2017) found that The majority of health and safety (HS) practice indicates an average value of greater than 60% for Chinese international contractors and less than 50% for local grade one contractors, implying that projects constructed by international Chinese contractors have better HS management practices than projects constructed by local grade one contractors. similarly (Betelehem, 2019) founds that Accidents that respondents identified as frequently occurring in Addis Ababa Road construction projects include falling into an excavated pit, falling into hot asphalt (leg or hand burn), falling from scaffolding, nail piercing, car/truck overturning, being hit by equipment/machinery, rock/soil slide, and machinery accidents in loading and unloading.

To assist the researcher in answering the research question, the above examined literatures describe the knowledge field of safety management. The following are the conclusions of the researcher's review of several safety management literatures: construction building safety legislation, construction hazards and injuries, empirical findings on frequent accidents, and

accident root causes. Accordingly, it has been observed that most of the articles focus on different construction accidents.

2.5 Policy Review

2.5.1 General Safety Rules for Construction

Table: Summary of general safety rules recommended by ILO and OSH safety manuals.

NO	**Safety rules**
1)	Always keep materials in a safe place. To prevent heaps from toppling, rolling, or moving, secure or support them if necessary.
2.	Allowing shavings, dust fragments, oil, or grease to enter the system is not a good idea. Housekeeping will be required as part of the job. Garbage and garbage should be removed as soon as feasible.
3)	Any nails that have been utilized or removed from a Structure, as well as any loose materials from stairwells, walkways, ramps, platforms, and other locations, should be removed or bent over.
4)	Use ramps, stairs, walkways, ladders, and other methods to avoid taking shortcuts. Aisles, traffic lanes, fire exits, gangways, and staircases should not be blocked. Standard guardrails must be provided in all floor holes, and excavations must be walled.
5)	Remove or destroy any warning banners or danger signs, as well as any protective equipment or practice supplied for your or other workers' use.
6)	To avoid injury to yourself / material damage, get help with weighty or bulky materials.

7)	Platforms, scaffolding, shaft openings, and other sharp edges should be kept away from all tools. And only use tools for the purpose for which they were created.
8)	Hand and power tools should be used carefully, and tools with split, broken, or loose handles should be avoided. Make certain you're using the appropriate tool for the job.
9)	In the event of a fire, know where to look for firefighting equipment and how to activate a fire alarm. Flammable liquids should only be used in small amounts on the job site and under the supervision of certified safety officers.
10)	Protection or shields must be provided before utilizing any power tool. Power tools and extension cords must be properly insulated and grounded. Damaged cords must be removed and replaced as soon as possible. If you haven't been trained how to use or approach a power tool or piece of equipment, don't use it.

Source: (ILO, 2001)

2.5.2 OSH in the Ethiopian Construction Industry

Construction is a sector with particular hazards, like work at heights, work with power tools, more than one trade, and more than one employer working on a single site with a lack of coordination. Studies revealed that various factors are mainly associated with a work-related injury. In Ethiopia, statistical information regarding construction injuries is rare, & minimal attempts have been made to investigate the frequency and associated factors. The bad news of construction site accidents in Ethiopia is a day to day happening (Sebsibe & Dagnachew 2016; ECPMI, 2017).

Similarly, in Ethiopia, the working conditions of construction sites for the workers are found to be very poor. It is mainly due to improper employment relationships and a lack of safety

measures. Many workers are exposed to different kinds of work-related accidents. The majority of injured workers did not receive compensation. Also, most of the employees on construction sites in Ethiopia have done their work without PPE (Gojjam Limineh, 2018).

2.5.3 Safety and Health Laws and Enforcement Practice in Ethiopia

The issue of leading SH at work on a legal basis in Ethiopia dates back to the 1940s when the first legal instrument Proclamation No. 58/1945 promulgated. The origin of this law was a result of the advent of development that took place in the country. The country's law framed on the fundamental principles underlined by the notable ILO conventions on labor inspection.

Further, a comprehensive law on OSH management was substituted in 1964, i.e., Proclamation 232/1964. In Ethiopia, all laws are adopted from most European countries, especially France and the UK (Dawit Seblework, 2006). OSH law in Ethiopia was enacted at different times. It is better to start a review of the country's different legal documents as follows:

2.5.3.1 National OSH Policy and Strategy

The Council of Ministers of the Federal Democratic Republic of Ethiopia (FDRE), at its 69th regular session of July 18, 2014, discussed and made amendments to the national occupational SH policy and strategy prepared by the MoLSA. The Council has decided that the policy implemented thereon. The policy approved legitimate protection addresses and guided the implementation of preventive measures to create a safe and healthy working environment in Ethiopia.

This policy guide to developing & implementing effective SH measures at workplaces to identify implementation gaps & propose the parallel remedial actions, to adequately address emerging SH problems associated with industrial development and technology transfer (MoLSA, 2014).

Furthermore, this policy provided basic principles about the prevention and protection of the workplace from occupational accidents and injuries.

Similarly, the policy endorsed the protection of communities residing around industries from environmental pollutants & industrial wastes to ensure and sustain their developmental contribution. To safeguard their social and economic benefits, including the provision of quality products and services as the policy attaches due to the above-stated issues, industrial products, and services are expected to be environmentally friendly & ascertain fundamental rights at work.

This policy is a national tool for OSH services at workplaces. Based on this, sectoral policies & execution programs shall be formulated & implemented accordingly. Also, workplaces & enterprises expected to develop SH policy or programs with similar operation strategies to be fallen from their sectorial policy frameworks to implement at task levels (MoLSA, 2014). The policy aims to address and guide the implementation of preventive measures to create a safe and healthy working environment in Ethiopia to develop and implement effective SH measures at workplaces. However, that lack of commitment was observed in Addis Ababa.

2.5.3.2 Ministry of Labor and Social Affairs (MoLSA) OSH Directive

The MoLSA issued the OSH Directive based on the power vested in it under Article 98(3),102(1), 170(1) (a-c) of Proclamation No 377/2003 has. This directive covers a wide-ranging SH application, covering all employment sectors but with specific provisions for the manufacturing and construction sectors. Without prejudice to the Labor Proclamation, this directive lays down the general duties of employers and the duties and rights of workers, and the need for specific organizational measures such as SH policy and arrangements, and personal protective equipment. It also specifies measures for controlling a wide range of risks, such as

chemicals, noise, radiation, machinery, and working at heights, boilers, and lifting equipment. There are also specific provisions for the recording and notifying of occupational accidents and diseases.

Even though the issue of SH has got due attention and MoLSA prepared and endorsed this directive to make a quiet working atmosphere in the working area to OSH, this directive does not address by the labor inspector and building officer in the construction projects selected for this study.

2.6 Best Experience

To get the best practices of countries, the United Kingdom, France, United States of America (USA) &Singapore selected as follows:

United Kingdom (UK): Construction is one of the major industries in the UK, accounts for 8% of its GDP. It employs 10% of the working population and has an annual turnover of over £250 billion. According to HSE (2010), the industry saw an 11.5% drop in output, followed by a slow return to growth over the preceding few years. However, the construction industry still represents 8.3% of the UK economy, and over 300,000 construction enterprises are hiring more than 2.5 million workers (HSE, 2010).

In the UK, the first law of SH is the HSW Act 1974; this act sets out general duties that employers follow or rely upon in dealing with employees and members of the public (HSE, 2010). The general duties under the Health and Safety Act 1974 rely mainly on the principle of "so far it is reasonably practicable." This part of the law compels employers to assess likely risks in the work-place that could harm the SH of employees and third parties and take sensible measures to tackle them (HSE, 2016). However, a review of SH prosecutions in the UK

construction industry shows that wrongdoings under the HSW Act accounted for 46% of all HSE prosecution cases between 2010 and 2015. Similarly, the HSW Act also accounted for £8,954,043 out of £11,625,312 total fines imposed on organizations for breaching the regulation in the same year (Fidderman, 2015).

Moreover, an organization condemned a breach of SH law and maybe penalizing. Fines and claims for compensation are additional costs of the companies failing to manage risk. So, managing SH and expected risks based on the country's law benefit the company from the financial drain and unnecessary costs (Boyle, 2019).

France: According to ILO (2015), in France, the primary law on OSH is available in Part IV of the Labor Code entitled "Health and Safety at Work" completed by specific and technical decrees placed at the end of the Code. Other parts of the Code supplement SH at work legislation. The French Labour Ministry often produces circulars to provide guidelines on the application of the law. The employer shall take all necessary measures to ensure safety and protect workers' physical and mental health. The Labour Code also incorporates transpositions of European Union legislation.

Most health and work compensation funds have digitalized the details of accidents' claims, determinations about liability, and compensation. However, there are some problems with the French workers' compensation system. First, most of the self-employed workers are not protected by their social insurance again, the work-place and commuting accidents. Second, some work related health problems are under-reported and not reported by a variety of factors. Also, the reports may not include in-group pressure (e.g., the company adopts a "zero accident" plan at the company) and individual factors (e.g., fear of losing one's job). Finally,

each of the social insurance funds functions alone. Data may be inconsistent as there is no point of centralization (Briere et al., 2010).

United States of America (USA): In 1970, the United States Government created the Occupational Safety and Health Administration (OSHA), a national public health agency dedicated to the fundamental proposition that no worker should choose between their life and their job. Passed with mutual support, the creation of OSHA was a historical moment of cooperative national reform. The OSHA law clarifies that the right to a safe work-place is a fundamental human right (OSHA, 2018).

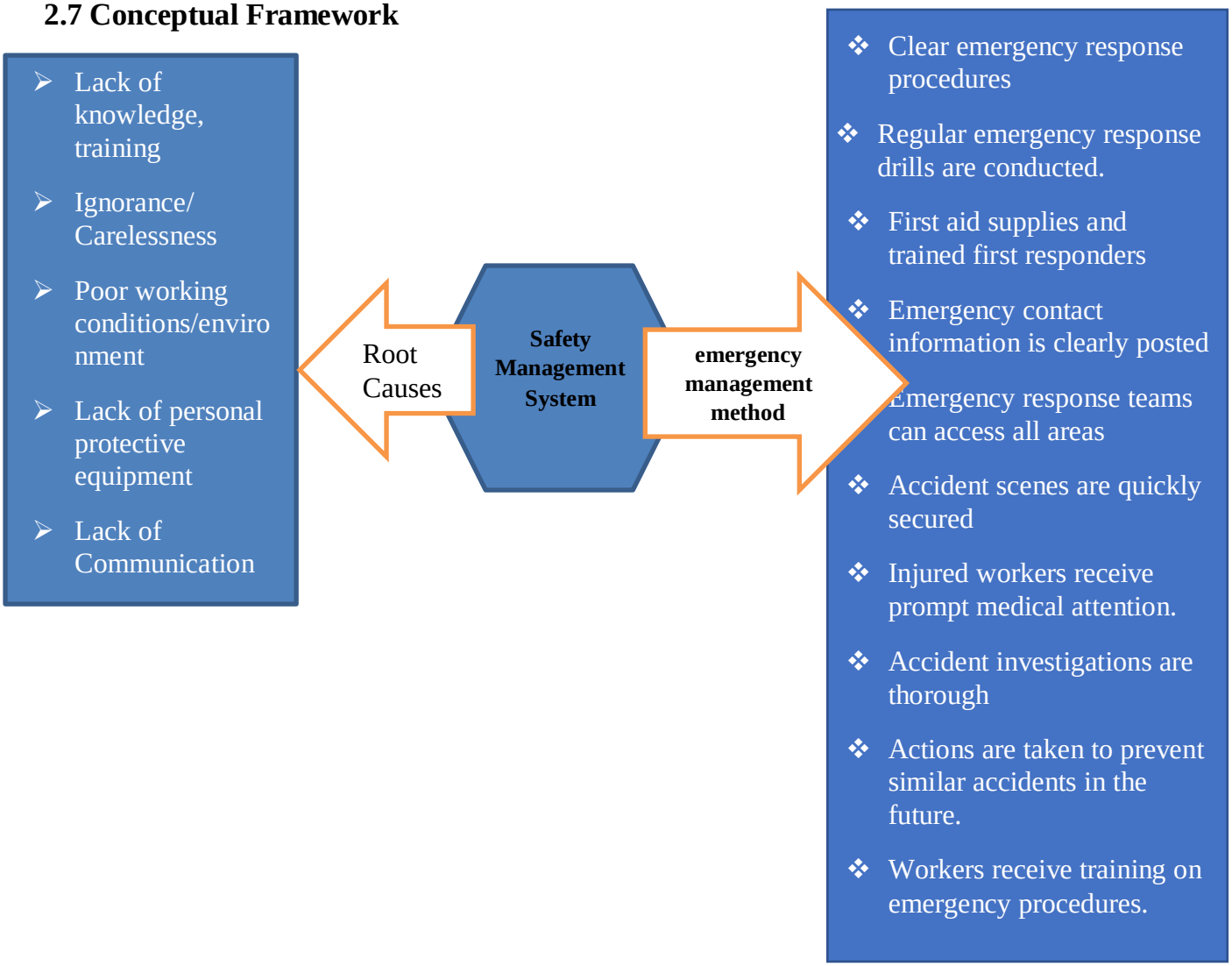
According to National Safety Council (NSC) 2006 cited in Hallowell (2012) in the past 40 years, the fatality rate in construction has declined by more than 40% due to the seriousness of OSHA acts. Nevertheless, as per the Bureau of Labor Statistics (BLS) in the report, the fatality and injury rate in construction remains five times higher than the all-industry average. This unbalanced injury-and illness rate has been attributed, in part, to the complex, dynamic, and transient nature of construction projects (Hallowell, 2012).

Singapore: According to Ofori & Debrah (2001), the Singaporeans Housing Development Bureau (HDB), has set up a Safety Unit in its Structural Engineering Department since 1976 to reduce accident frequency rates on its sites. It has hired full-time site safety supervisors to oversee safety arrangements on-site, prepare a safety program, issue inspection schedules, conduct safety meetings, and document the safety records for several years.

In Singapore, the Housing Development Bureau (HDB) promoting safety awareness among workers, contractors, supervisory staff, regular safety meetings, safety orientation courses on-site as compulsory, providing safety measures to ensure a safe working environment are

essential tools in promoting SH in the construction industry. Also, employing safety supervisors to ensure that safety is everyone's duty and practicing proactive management, and the last one is Safety Unit conduct checks to prevent accidents.

2.7 Conceptual Framework



2.8 Research Gap

There are a variety of existing studies that look into occupational safety in many industries and countries, including Ethiopia. However, several gaps were identified that indicate a need for further research. There is a lack of research that specifically investigates occupational safety

management in real estate projects. Most existing studies focus on construction projects in general, without differentiating between different types of projects (Alemayehu et al., 2015). The dynamics, risks, and management practices may vary between general construction and real estate projects, necessitating a focused research.

CHAPTER THREE

3. Research Methodology

3.1 Introduction

This chapter discusses the methodology and the research design which is applied to achieve the objectives of this study. The chapter begins with a description of the research design, followed by justifications to the chosen methodology. The research design includes details of the chosen study population and sample, the design for data collection instruments and methods for data collection.

3.2 Research design

A research design provides a framework for the collection and analysis of data. This research design follows a pragmatic research paradigm. Pragmatic research is a research philosophy that emphasizes the practical applications and usefulness of research methods. It is grounded in the belief that research should be driven by practical concerns and that the value of research is based on its ability to solve real-world problems. By prioritizing practical applications, pragmatic research can produce knowledge that is relevant and useful to those who will apply it.

3.3 Research approach

Depending on the approach, research can be categorized into qualitative and quantitative. According to Creswell (2009), quantitative data is a method of research, where the researcher uses positivist claims so as to: develop the knowledge that is based on the prior investigation which can be particularly seen in (i.e. use of observation and measurement, cause and effect thinking, test of theories, reduction to specific variables and hypothesis with questions), employs investigation strategies and inquiry (i.e. surveys and experiment), also gathers data on pre estimate instruments which produce statistical data. This type of research focuses on understanding a certain phenomenon by gathering and analyzing numerical information and running numerical tests (Creswell, 2009). This approach is deductive, which could be more applicable on research areas or mature subjects and it could also be applied in a different questioning area like what and how many. The results are normally accurate and easy to both understand and interpret. However, the results generally would cover the area that we focused on during the study as results that do not match the hypothesis would normally be hard to find due to the fact that the model has not been designed to measure them (Yin, 2009).

Qualitative research is explained as follows: "a research where the inquirer regularly makes knowledge claims, mainly founded on constructivist perspectives (i.e. meanings socially and historically constructed, the multiple meaning of individual experiences, with the intention of developing a pattern or theory) or supportive perspectives such as; collaborative or change oriented or both, issue oriented or political," (Creswell, 2009). This research could be more subjective as regards to examining and reflecting on perception in order to acquire more understanding of human and social activates. This approach could be more suitable for the

more undeveloped subjects and areas of research that are uncertain or still unclear and that require answers like why and what (Yin, 1994).

Creswell (2009) contributed a mixed approach in addition to the previously mentioned approaches. This method of approach is "where the researcher is inclined to base claims of knowledge claims on practical grounds (e.g. pluralistic, problem-centred, consequences oriented,)". In order to have a better understanding of the research problem, the mixed approach accommodates strategies for investigation that require gathering data either sequentially or simultaneously and, using numbers combined with text-based information.

This research follows a mixed quantitative and qualitative approach to analyze the data that are collected from the respondents as a form of questionnaire and interview. The information found from the interview with some respondent is used as a guideline for the recommendation and fill the gap of the questionnaire.

3.4 Research Type

Descriptive research attempts to recognize and identify characteristic information of a certain issue or problem. This research attempts to identify phenomena as it exists naturally. Where, how much, how many, what or who are suitable questions to ask. Explanatory or analytical research is a protraction of descriptive research that aims to clarify phenomena by measuring and understanding the relations between them. This type of analysis, explains and describes how and why different things are happening. For this kind, why and how the most are appropriate question words to use. Exploratory research is concerned with finding hypotheses, ideas or patterns. This research is used when there are a limited number of researches to refer to. What,

why, how, how much, how often, how many and where are the appropriate questions to ask for this type of research.

In this research, a descriptive research designs was used. The study is descriptive in that it seeks to describe the practice of occupational safety management in real estate projects. Thus, giving an in-depth understanding of the reality of safety management practice.

3.5 Sample and sampling design

3.5.1 Population

The study area was real estate projects which are owned by Ayat real estate in Addis Ababa. From real states in our country Ayat SC is expirinanced and older. The company. is a locally owned and operated corporation that was founded in Ethiopia. The company was founded in 1988 and has been a trailblazer in the real estate sector, particularly in the building of residential properties. Ayat has gained a strong reputation in the treacherous and largely unexplored real estate development, construction, and financing sectors over the past few years because to its innovative and extremely successful combination of these three services. The study population included various workers in the Ayat real estate construction projects. These workers were Project managers, site engineers, office engineers, Forman's & other relevant workers who can witness the practice of safety management in the projects. Currently, there are 104 construction operational department workers

3.5.2 Sample

3.5.2.1 Sample unit

The sample for this research are those who are involved in real estate construction work at Ayat real estate. These workers includes Project managers, site engineers, office engineers & Forman's.

3.5.2.2 Sample frame

The sample frame of this research includes, Project manager, site engineer, office engineer, Forman's and Sub contractors & daily labours at Ayat real estate. Currently, there are 3 active construction site projects under the company.

3.5.2.3 Sample size

In this paper the researcher used a simple formula from Yamane (1967) to determine the sample size. This formula can be used to determine the minimal sample size for a given population size:

n= N/(1+N(e2))

Where

n = sample size

N = total population size = 104 construction operational department workers

e = margin of error the total population of the study is 5%

n = 104/ (1+104(0.05)2) n=82.5= 83

Since, this research is a mixed approach, five different professionals (Project manager, site engineer, office engineer, Forman's & daily labours) was selected for interview.

3.5.2.4 Sample design

In this research both both probability and Non Probability sampling design were used. From Probability stratified sampling were used for the questionnaire and from non-probability purposive sampling were used for the interview. This is because the researcher used mixed approach and selected respondents who know the subject matter more. In addition, Purposive

sampling allowed the researcher to sample a specific population that are interested in (meets certain criteria for their study). Taking a sample of experience professionals from each category of Project manager, site engineer, office engineer, Forman's & daily labours helped to get appropriate and reliable result.

3.6 Data source

Throughout the data collection, the researcher collected both primary and secondary Sources of data to answer research questions. Primary sources of data were collected directly from the research sample by using questionnaire survey and interview.

Secondary Sources of data were collected through records, literature review and other relevant sources regarding construction site safety management practice.

3.7 Data collection technique

The researcher collected data for the study in a variety of ways, including visiting sites and handing out forms that were filled out and returned by respondents (Questionnaires). The other is to observe and inquire directly in various construction firms, as well as to observe how occupational safety management is implemented in real estate projects. The researcher also planned to conduct on-site semi structured interviews to get information on current safety measures practices, which would aid in evaluating the effectiveness of the safety measures.

3.8 Data analysis and presentation

The researcher decode the gathered data into SPSS and analyzed the data using different data analyzing methods such as statistical and verbal description after conducting on-site observation and collecting questionnaires from various construction firms. The findings of the questionnaire were analyzed in descriptive analysis. To summarize and describe basic features of the data

collected through surveys & interviews frequency, measures of central tendency (mean), variability (standard deviation, minimum, maximum) will be computed. This statistical method helped to see & describe the practice of occupational safety management, because the research methodology is descriptive. To decode the data & undertake these analysis, the researcher utilized SPSS software. Finally the analyzed data were presented in verbal, tabular and pictorial form.

3.9 Validity, Reliability and Ethical Consideration

To guarantee the research's validity and reliability, proper due attention was given in sampling and data collection, also careful consideration to the arrangement of the study questionnaire and research design. A detailed literature analysis was conducted both from international journals and from safety guides created by international institutes in order to assess the safety management practices used. The outcomes of the research were also be compared to earlier results after the analysis of the data.

Table 1: Cronbach's Alpha Reliability test using SPSS

	Cronbach's Alpha	N of Items
Root causes of accident	0.782	12
Emergency management method	0.882	10
Main safety measures used	0.717	10
Challenges	0.850	10

According to the tables above the variables are good Reliable because the result obtained from Cronbach's Alpha is 0.782, 0.882, 0.717, 0.850 so it is within acceptable range.

The researcher tried to reduce bias in this study by employing a standard data collection tool and scale based on previous research and literature. The research participants were also asked to complete the questionnaire thoroughly before giving it over to the researcher. The confidentiality of the research participants was preserved by using a code for all questionnaires, and all of the sources for this study will be recognized, and the researcher was also paraphrase other earlier literatures rather than directly quoting them. As a result, the researcher evaluates all ethical perspectives.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1 Introduction

In this chapter, the result obtained from Ayat SC real estate projects employees using a questionnaire survey & interview are presented and analyzed. This section present the results of descriptive analyses results. The presentation of the results is followed by discussions of the

information gathered from the respondents and making use of evidence from literature to support them. Generally, this section is organized in the following manner: First, profile of respondents was presented and analyzed. Second, data collected through questionnaires & interview were analyzed.

4.2 Response Rate

For the purpose of the study 83 copies of the questionnaire were distributed to the different workers in Ayat real estate. Accordingly, out of the 83 questionnaires, 6(7.2%) remain unreturned & 2(2.4%) were incomplete but the remaining 75(90.4%) were completed and returned. Hence, the response rate was 90.4%. The result of which the analysis was made on those 75 questionnaires which were fully completed and returned. After making proper screening on those questionnaires which were fully completed and returned data were fed into SPSS (version 20) for computation.

Table 2: Questionnaire survey response rate

No	Respondents	population	Number of sample size	Response	Response Rate (percentage)
1		104	83	75	90.4%

Source: Own Survey, 2023

4.3 Demographic Characteristics of the respondents & the Company

4.3.1 Respondent information

Table 3: Respondent position

Respondent position (Work status)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily labor	2	2.7	2.7	2.7
	Forman	21	28.0	28.0	30.7
	Office Engineer	22	29.3	29.3	60.0

	Site Engineer	30	40.0	40.0	100.0
	Total	75	100.0	100.0	

Own survey, 2023

According to table, 40.0 percent of responders are Site Engineer, 29.3percent are Office Engineer, 28.0 percent are Forman, and the remaining 2.7 percent are Daily labor, who are the first witnesses to most construction site incidents. Because it is evident that the responder has a significant impact on the study questionnaire, the researcher attempted to maintain the number of office engineers, engineers (from junior to site & project manager), and Forman with Daily labor.

Table 4: educational qualification

educational qualification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Elementary school	2	2.7	2.7	2.7
	High school	6	8.0	8.0	10.7
	Diploma	9	12.0	12.0	22.7
	First Degree	50	66.7	66.7	89.3
	Master's Degree or above	8	10.7	10.7	100.0
	Total	75	100.0	100.0	

Own survey, 2023

It can be seen from above Table that those respondents hold a range of educational qualifications from Elementary school, diplomas to Degree, and above degrees. The majority of the population holds a first degree which shows 50(66.7%), 9 (12.0%) have Diploma, 8(10.7%) own Master's Degree or above, 6(8.0%) finished high school. Consequently, the compositions of the respondents revealed that majority of them were first degree holders. This can be considered as an opportunity to obtain accurate response for the study questions.

Table 5: work experience

work experience (years)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0- 2 years	7	9.3	9.3	9.3
	2-5 years	15	20.0	20.0	29.3
	5 – 10 years	32	42.7	42.7	72.0
	>10	21	28.0	28.0	100.0
	Total	75	100.0	100.0	

Own survey, 2023

As indicated in the above table, that the majority of respondents 32(42.7%) have a work experience between 5-10 years, 21 (28%) for more than 10 years, 15 (20%) between 2-5 years & the remaining 7 (9.3%) have less than two years of experience. Since majority 32(42.7%) of the respondents have stayed in the office for more than five year, their feedback was valuable.

4.3.2 Company information

Table 6: Number of employees in the site

Number of employees in the site					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 25	9	12.0	12.0	12.0
	25-50	21	28.0	28.0	40.0
	50 – 100	10	13.3	13.3	53.3
	>100	35	46.7	46.7	100.0
	Total	75	100.0	100.0	

Own survey, 2023

From the collected data it is found that most construction site have greater than 100 **employees** (46.7%) and only few construction sites that have less than 25 workers involved (12.0%). 28.0 % of the sites have between 25-50 workers in the site

Table 7: Experience of the company

Experience of the company					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 2 years	19	25.3	25.3	25.3
	2-5 years	24	32.0	32.0	57.3

	>5 years	32	42.7	42.7	100.0
	Total	75	100.0	100.0	

Own survey, 2023

The above table shows 42.7% of respondents witnessed the companies have an experience of five and above years in this construction project and 32.0% have two up to five years of experience and the rest 25.3% of the company have less than two years of work experience in this real estate projects. Most of the companies have experiences greater than five. This implies that companies involved in the study have a vast of experience in the real estate construction area, which implies that the information forwarded could be important as required in the study.

4.4 Descriptive Analysis (Quantitative)

In this part descriptive statistics in the form of mean and standard deviation were presented to illustrate the level of agreement of the respondents with their implications of the company. The responses of the respondents for the variables indicated below were measured on five point Likert scale with: 1= strongly disagree, 2= disagree, 3 = neutral, 4= agree and 5= strongly agree. However, while making interpretation of the results of mean the scales were reassigned as follows to make the interpretation easy and clear.

This formula is adapted from (Vichea, 2005), with 5 point scales, the interval for breaking the range in measuring each variable id calculated by 5−1/5= 0.8. It means items with scores fall between the ranges of: 4.20 – 5.00 are considered as strongly agreed; 3.40 – 4.19 as agreed: 2.60– 3.39 as Neutral; 1.8 – 2.59 as disagree and 1.00 – 1.79 strongly disagree. Data from questionnaires were processed by SPSS program in terms of frequency, mean, and standard deviation (Descriptive statistics).

4.4.1 Root causes of accident

What are the main root causes of occupational accidents in real estate projects?

Table 8: Root causes of accident

	Descriptive Statistics						
		Mean	SD	Rank		Freq.	%
1	Working conditions and environment are in poor shape	3.32	1.153	6	S. Disagree	4	5.3
					Disagree	17	22.7
					Neutral	17	22.7
					Agree	25	33.3
					S. Agree	12	16.0
2	Lack of training and knowledge	3.56	1.211	1	S. Disagree	7	9.3
					Disagree	7	9.3
					Neutral	15	20.0
					Agree	29	38.7
					S. Agree	17	22.7
3	Lack of Communication	3.32	1.275	7	S. Disagree	9	12.0
					Disagree	10	13.3
					Neutral	19	25.3
					Agree	22	29.3
					S. Agree	15	20.0
4	Carelessness	3.56	1.244	2	S. Disagree	7	9.3
					Disagree	9	12.0
					Neutral	12	16.0
					Agree	29	38.7
					S. Agree	18	24.0
5	Ignorance	3.39	1.150	4	S. Disagree	6	8.0
					Disagree	10	13.3
					Neutral	20	26.7
					Agree	27	36.0
					S. Agree	12	16.0
6	Being struck by falling object	3.43	1.117	3	S. Disagree	2	2.7
					Disagree	16	21.3
					Neutral	20	26.7
					Agree	22	29.3
					S. Agree	15	20.0
7	Exposure to hazardous substances	3.15	1.227	8	S. Disagree	8	10.7
					Disagree	16	21.3
					Neutral	19	25.3
					Agree	21	28.0
					S. Agree	11	14.7
8	Electric, Fire, and	2.87	1.143	9	S. Disagree	10	13.3

	Explosions accidents				Disagree	18	24.0
					Neutral	25	33.3
					Agree	16	21.3
					S. Agree	6	8.0
9	Accidents during excavations (Slides, collapse, not shored…)	2.67	1.143	10	S. Disagree	15	20.0
					Disagree	17	22.7
					Neutral	24	32.0
					Agree	16	21.3
					S. Agree	3	4.0
10	Falling from scaffolds and ladders	3.37	1.160	5	S. Disagree	5	6.7
					Disagree	13	17.3
					Neutral	19	25.3
					Agree	25	33.3
					S. Agree	13	17.3
11	Tools and Machinery (Drilling, Grinding, Bending…etc.)	2.56	1.154	11	S. Disagree	15	20.0
					Disagree	23	30.7
					Neutral	22	29.3
					Agree	10	13.3
					S. Agree	5	6.7
12	Structural Failure on Construction Site	2.36	1.204	12	S. Disagree	24	32.0
					Disagree	18	24.0
					Neutral	18	24.0
					Agree	12	16.0
					S. Agree	3	4.0
	Root causes of accident	3.1289	.64116				

Own survey, 2023

This table shows the main root causes of occupational accidents in real estate projects. All the root cause dimensions are found to be higher than 2.67 mean. This shows that the root causes of occupational accidents in real estate projects is neutral and in agreed range for all dimensions of measurement. The average of the twelve root causes measurement dimension showed that, generally the root causes are in agree range with the aggregate mean of 3.12 and SD 0.64. This shows that the root causes are common to the project. From the root causes dimension “Lack of training and knowledge”, “Carelessness” & “Being struck by falling object” are the highest whereas “Tools and Machinery (Drilling, Grinding, Bending…etc.)” & “Structural Failure on

Construction Site" are the lowest with mean value of 2.56 & 2.36 respectively. This shows that Structural Failure is less likely to occur.

Q1. What are the main root causes of occupational accidents in real estate projects in Addis Ababa?

Most of the the main root causes of occupational accidents that were mentioned by the respondents were: "Negligence, Carelessness, Ignorance, Lack of supervision on safety issue, Lack of restricted laws, Lack of penalties/ serious measurement, Absence of safety belt, helmet, Lack of proper training, lack of safety material, lack of safety posters and prerequisite, Poor safety control, Shortage of safety equipment and materials & Improper management on the working environment."

Some major root causes of accidents in real estate projects include lack of safety training and awareness, failure to follow protocols, unsafe working conditions and improper use of equipment. Psychological factors such as risk-taking attitudes and stress can also contribute directly or indirectly to negligent behaviors leading to incidents (Akarte et al., 2021).

4.4.2 Emergency management method

What are the emergency management method in real estate projects?

Table 9: Emergency management method

		Descriptive Statistics					
		Mean	SD	Rank		Freq.	%
1	Clear emergency response procedures are made available to all workers on site.	2.91	1.210	9	S. Disagree	12	16.0
					Disagree	15	20.0
					Neutral	23	30.7
					Agree	18	24.0
					S. Agree	7	9.3

2	Regular emergency response drills are conducted.	2.97	1.039	6	S. Disagree	6	8.0
					Disagree	20	26.7
					Neutral	22	29.3
					Agree	24	32.0
					S. Agree	3	4.0
3	First aid supplies and trained first responders are available on site.	3.19	1.159	3	S. Disagree	7	9.3
					Disagree	16	21.3
					Neutral	15	20.0
					Agree	30	40.0
					S. Agree	7	9.3
4	Emergency contact information is clearly posted around the site.	2.93	1.201	7	S. Disagree	9	12.0
					Disagree	20	26.7
					Neutral	22	29.3
					Agree	15	20.0
					S. Agree	9	12.0
5	Emergency response teams can access all areas of the site if needed.	2.92	1.124	8	S. Disagree	9	12.0
					Disagree	19	25.3
					Neutral	20	26.7
					Agree	23	30.7
					S. Agree	4	5.3
6	Accident scenes are quickly secured to prevent further harm.	2.99	1.097	5	S. Disagree	7	9.3
					Disagree	16	21.3
					Neutral	31	41.3
					Agree	13	17.3
					S. Agree	8	10.7
7	Injured workers receive prompt medical attention.	3.25	1.001	1	S. Disagree	4	5.3
					Disagree	13	17.3
					Neutral	23	30.7
					Agree	30	40.0
					S. Agree	5	6.7
8	Accident investigations are thorough and aim to identify root causes.	3.08	1.136	4	S. Disagree	9	12.0
					Disagree	13	17.3
					Neutral	21	28.0
					Agree	27	36.0
					S. Agree	5	6.7
9	Actions are taken to prevent similar accidents in the future.	3.20	1.090	2	S. Disagree	5	6.7
					Disagree	14	18.7
					Neutral	26	34.7
					Agree	21	28.0

					S. Agree	9	12.0
10	Workers receive training on emergency procedures.	2.85	1.382	10	S. Disagree	17	22.7
					Disagree	15	20.0
					Neutral	16	21.3
					Agree	16	21.3
					S. Agree	11	14.7
	Emergency management method	3.0293	.79962				

Own survey, 2023

The table above shows different emergency management method in real estate projects. The agreement level of the respondents on the above emergency management method are in neutral range which is between 2.85 to 3.25. However the degree of agreement on the items were different in terms of their degree of implementation. 'Injured workers receive prompt medical attention.' was rated mean 3.25 and standard deviation 1.001. This shows that the project give medical treatment for injured workers. The other highest rated solutions are 'Actions are taken to prevent similar accidents in the future.' with mean of 3.20 standard deviation 1.090. The third strategy is 'First aid supplies and trained first responders are available on site.' which has a mean of 3.19 and standard deviation of 1.159.

Whereas the least rated emergency management method were 'Workers receive training on emergency procedures.' and 'Clear emergency response procedures are made available to all workers on site.' Both item has a mean of 2.85 and 2.91. This illustrates that there is less training given for the worker.

Q2. What are some of the most important safety precautions & emergency management method you take in this construction project?

According to the interviewee, important safety precautions & emergency management method were " Using safety equipment, Wearing reflective clothes, helmet and safety shoes,

Wearing helmet, closing of open down tunnels, Putting net on the corners of the building and Giving helmet for daily labourers and site engineers, reflector gloves and handrail for the internal stair workers. Also, putting safety net on the external sides were most important safety precautions method.

Key safety precautions and emergency response protocols involve use of proper PPE, emergency equipment, emergency drills, first aid resources, hazard identification and risk assessments (Gulsah et al., 2020). Safe work procedures are documented and implemented during critical high-risk activities like excavations, steel erections, demolitions while safety committees monitor compliance (Li et al., 2021).

4.4.3 Main safety measures used

What is the current level of adherence of occupational safety management practices used in real estate projects?

Table 10: Main safety measures used

	Practice Measures	No	Yes	Rank of Usage
1	Does the site have a safety officer?	16 (21.3%)	59 (78.7%)	1
2	Does this firm provide Personal protective equipment (PPE)?	19 (25.3%)	56 (74.7%)	2
3	Is the layout of the site safe for workers?	41 (54.7%)	34(45.3%)	8
4	Is there a formal written safety guideline on the construction site?	36(48.0%)	39(52.0%)	5
5	Is a budget for a safety system allocated by top management?	31(41.3%)	44(58.7%)	4
6	Is your project's safety-related work being audited	39(52.0%)	36(48.0%)	6

	on a regular basis while it's being built?			
7	Is your building project site equipped with first aid kit and first responders?	40(53.3%)	35(46.7%)	7
8	Does Proper supervision by staff trained in safety get carried out on your project?	41(54.7%)	34(45.3%)	8
9	Are all injuries and fatalities been documented and reported to the construction company?	21(28.0%)	54(72.0%)	3
10	Is there any follow-up or contribution from a governmental or non-governmental entity to improve safety in building projects?	41(54.7%)	34(45.3%)	8

Own survey, 2023

The table above shows the many forms of occupational safety management practices used by the company. Based on the response of the respondents 1. Is your project's safety-related work being audited on a regular basis while it's being built? (52.0%) 2. Is your building project site equipped with first aid kit and first responders? (53.3%) 3. Is the layout of the site safe for workers? (54.7%) 4. Does Proper supervision by staff trained in safety get carried out on your project? (54.7%)5. Is there any follow-up or contribution from a governmental or non-governmental entity to improve safety in building projects? Is not in good practices /use (54.7%).

Personal protection equipment is commonly used in the construction sector to refer to worker safety. However, safety is all about how to establish the right atmosphere in the workplace, and PPE should only be used as an extra layer of protection in case the worst case scenario occurs. TPPE is divided into two groups. The first category includes, a safety helmet, safety shoes, and proper apparel must be worn. The second category includes eye protection, protective gloves, ear protectors, and a safety harness, depending on the type of job (Jannadi & Bu-Khamsin, 2002).

If construction workers are dissatisfied with the PPE they have been given because it is uncomfortable, hazardous, or hinders productivity, they are less likely to use it, which raises the risk of accidents and illnesses considerably (Kenrick, 2012).

4.4.4 Challenges

What are the primary challenges of implementing effective occupational safety management practices in real estate projects?

Table 11: Challenges

		Descriptive Statistics					
	Challenges	Mean	SD	Rank		Freq.	%
1	It is difficult to maintain up-to-date knowledge of occupational safety regulations.	2.88	1.185	10	S. Disagree	14	18.7
					Disagree	11	14.7
					Neutral	24	32.0
					Agree	22	29.3
					S. Agree	4	5.3
2	There is a lack of sufficient training on occupational safety management for employees.	3.45	1.119	3	S. Disagree	3	4.0
					Disagree	15	20.0
					Neutral	15	20.0
					Agree	29	38.7
					S. Agree	13	17.3
3	Budget constraints limit the implementation of optimal safety measures.	3.11	1.203	9	S. Disagree	8	10.7
					Disagree	16	21.3
					Neutral	21	28.0
					Agree	20	26.7
					S. Agree	10	13.3
4	It is challenging to ensure consistent safety practices across different project sites.	3.35	1.109	5	S. Disagree	3	4.0
					Disagree	16	21.3
					Neutral	20	26.7
					Agree	24	32.0
					S. Agree	12	16.0
5	The complexity of projects makes it difficult to plan and implement effective safety measures.	3.31	1.208	8	S. Disagree	4	5.3
					Disagree	19	25.3
					Neutral	17	22.7
					Agree	20	26.7
					S. Agree	15	20.0

6	There is a lack of management commitment to occupational safety.	3.39	1.126	6	S. Disagree	4	5.3
					Disagree	15	20.0
					Neutral	15	20.0
					Agree	30	40.0
					S. Agree	11	14.7
7	There is a lack of effective communication about safety procedures and regulations among employees.	3.56	.948	1	S. Disagree	1	1.3
					Disagree	11	14.7
					Neutral	18	24.0
					Agree	35	46.7
					S. Agree	10	13.3
8	The company does not have a solid system for identifying and controlling hazards.	3.33	1.095	7	S. Disagree	3	4.0
					Disagree	16	21.3
					Neutral	20	26.7
					Agree	25	33.3
					S. Agree	11	14.7
9	Employees show a lack of awareness or disregard for safety procedures.	3.40	1.040	4	S. Disagree	4	5.3
					Disagree	9	12.0
					Neutral	25	33.3
					Agree	27	36.0
					S. Agree	10	13.3
10	There is a lack of adequate safety equipment and resources.	3.49	1.155	2	S. Disagree	4	5.3
					Disagree	12	16.0
					Neutral	18	24.0
					Agree	25	33.3
					S. Agree	16	21.3
	Challenges	3.3267	.73159				

Own survey, 2023

From the above table, it is found that most of the challenges are presented in the construction projects. The primary critical challenge in implementing effective occupational safety management practices in real estate projects was 'There is a lack of effective communication about safety procedures and regulations among employees." with a mean of 3.56 and SD .948. This shows that there is less effective communication and the second factor is "There is a lack of adequate safety equipment and resources" that hinder the implementation of effective occupational safety management practices. This item are rated as 'Agree'. The other high critical challenge is 'There

is a lack of sufficient training on occupational safety management for employees.', 'Employees show a lack of awareness or disregard for safety procedures. The least challenges are 'It is difficult to maintain up-to-date knowledge of occupational safety regulations.' with a mean of 2.88 and SD 1.185 and the other is 'Budget constraints limit the implementation of optimal safety measures.' with a mean of 3.11 and SD 1.203. This challenges contribute less to the implementation of effective occupational safety management practices in real estate projects. The aggregate mean for Challenges is 3.3267and SD is .73159 which is in agree range. Therefore, all the indicated measures are in 3.40 – 4.19 as agreed & 2.60– 3.39 as Neutral.

Q3. What challenges do you face in implementing proper safety measures in your project?

> The challenges in Real estate projects were "not continuously applicable of safety materials like wearing helmet and vest, Ignorance, There is no responsible and accountable person for safety consequences, Low payment and ignoring budget for safety materials, frequent design changes, logistics problem, delay in giving proper safety material & Due to the mature of the work, there are a lot of worker in this project that make the safety."

Challenges implementing safety include lack of expertise, financial constraints inhibiting investment in advanced safety gear, non-compliance from transient labor, difficulties supervising dispersed sites and overcoming cultural mindsets resistant to new protocols (Amarakoon et al., 2020). Buy-in from top leadership and changing attitudes also requires persistent effort (Al-Ahmarie, 2020).

Q4. What are the strengths of your construction firm in implementing proper safety measures?

> Most respondents stated that "the company has a potential to provide safety equipment but strategically there is less concern on the issues, Accident investigation & guiding the

contractors and subcontractors to follow and apply the instruction related to safety, in forcing them to fulfill the required infrastructures." were their construction firm major strength.

Strengths in implementing safety include strategic safety planning integrated into overall project planning, qualified safety professionals implementing comprehensive risk assessment-based programs, regular audits, incident reporting and corrective action tracking (Shah et al., 2021). Developing safety culture through continuous education and accountability enhances protocol effectiveness (Loosemore & Andonovski, 2020).

Q5**.** What are the weaknesses of your construction firm in implementing proper safety measures?

The weaknesses of the Real estate projects were "As a company there is a gap on Rules and regulations on safety, Lack of communication, lack of proper knowledge, No training on safety, no ordination for new workers about safety issues, There is no proper control of safety management, The office do not create its own methodology to keep the work place safe."

Weaknesses could include incident under-reporting due to fears of liability, inadequate resources for expanding programs to evolving risks, lack of systematic safety orientation for new hires, and minimal collaboration limiting joint accountability between organizational layers (Yinka et al., 2021).

The site observation also showed that,

- Most daily laborers do not wear Helmet while working, and because most of the work takes physical energy, they will be exhausted if they do not have good air in and out.

The pictures below were taken during the questionnaire survey in construction sites located under Ayat real estate projects in Addis Ababa.

Figure 1: photos taken from construction site

Q6. What kind of safety problems does the project encounter frequently?

> According to the interviewee, safety problems that their project encounter frequently were "falling from building / high rise building, Kicked by falling materials like HCB and plywood, Falling and sliding due to lake of site clearing, Falling from high rising structures which results death to our workers, electric explosion accidents, falling of plywood from height, falling into stagnant water on the excavated blocks."

The site observation also showed that, The Forman and other office workers do not push daily labours use proper use PPE (e.g. Helmet, Gloves, etc...) and in most of the construction projects, it was difficult to see a worker with the proper PPE.

Common safety issues are slips/trips/falls from heights, falling/flying objects, struck by/against incidents during material handling, musculoskeletal injuries from repetitive tasks and ergonomic deficiencies (Wachter & Yazdanifard, 2020). Unsafe site conditions and non-compliant behaviors recurrently require corrective actions and re-training despite protocols (Zou et al., 2020).

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This is the last chapter of the study which includes a summary of the findings, conclusions, and recommendations of the study. The main aim of this part is to summarize the finding and results that have been developed from the data analysis presented in Chapter four.

5.2 Summary

Construction has a reputation for being a hazardous industry. According to empirical studies revealed that the industry has a poor safety record when compared to other industries worldwide. Descriptive statistics like frequency, mean & SD were employed to analyze background information of respondents, respondent' perception on occupational safety management practices. The following is a summary of the study's main findings.

The root cause dimensions are found to be higher than 2.67 mean. From the root causes dimension "Lack of training and knowledge", "Carelessness" & "Being struck by falling object" are the highest whereas "Tools and Machinery (Drilling, Grinding, Bending…etc.)" & "Structural Failure on Construction Site" are the lowest with mean value of 2.56 & 2.36 respectively. Based on emergency management method in real estate projects. 'Injured workers receive prompt medical attention.' was rated high. The other highest rated solutions are 'Actions are taken to prevent similar accidents in the future.' with mean of 3.20. The third strategy is 'First aid supplies and trained first responders are available on site.' which has a mean of 3.19.

Based on occupational safety management practices used by the company the following are not well practiced by the company. project's safety-related work being audited on a regular basis while it's being built (52.0%); building project site equipped with first aid kit and first responders (53.3%); Is the layout of the site safe for workers (54.7%); Proper supervision by staff trained in safety get carried out on the project (54.7%); follow-up or contribution from a governmental or non-governmental entity to improve safety in building projects (54.7%). From the critical challenge in implementing effective occupational safety management practices in real estate projects 'There is a lack of effective communication about safety procedures and regulations among employees." with a mean of 3.56 the second factor is "There is a lack of adequate safety equipment and resources" that hinder the implementation of effective occupational safety management practices. The other high critical challenge is 'there is a lack of sufficient training on occupational safety management for employees.'& 'Employees show a lack of awareness or disregard for safety procedures.

5.3 Conclusions

From the results of this research, discussion of findings, and review of related literature, occupational safety management practice in Ayat SC real estate projects was investigated. The questionnaire and interview helped to answer each research questions and meet the general and specific objectives which are stated under section 1.3 of the introduction part of this research. Based on the preceding findings of the study, the following conclusions were made in relation to the four research objectives;

Based on occupational safety management practices used by the company the following (project's safety-related work being audited on a regular basis while it's being built; building project site equipped with first aid kit and first responders; Is the layout of the site safe for workers; Proper supervision by staff trained in safety get carried out on the project; follow-up or contribution from a governmental or non-

governmental entity to improve safety in building projects; are not well practiced by the company. This shows that the current level of adherence of occupational safety management practices is not adequate.

The main root causes of occupational accidents are "Lack of training and knowledge", "Carelessness" & "Being struck by falling object" are the highest. Based on emergency management method in real estate projects. 'Injured workers receive prompt medical attention.' was rated high. The other highest rated solutions are 'Actions are taken to prevent similar accidents in the future.'& the third strategy is 'First aid supplies and trained first responders are available on site.'

The critical challenge in implementing effective occupational safety management practices in real estate projects are 'There is a lack of effective communication about safety procedures and regulations among employees.", "There is a lack of adequate safety equipment and resources", and 'there is a lack of sufficient training on occupational safety management for employees.'& 'Employees show a lack of awareness or disregard for safety procedures.

5.4 Recommendations

Based on the findings and conclusions of the study, the researcher forwards the following recommendations.

- Government should take the initiative in enacting and enforcing suitable legislation by resourcing the right Ministries, Agencies, and Departments to accomplish their tasks well. Clients, contractors, and construction consultants should ensure that every construction contract takes into consideration all project, environmental, and worker safety standards. Workers and civic society should assure and demand that construction work is governed by proper safety policies, procedures, and provisions.

- Because the majority of construction site accidents are caused by workers' carelessness and ignorance, there should be a provision for worker safety training and orientation, and top management should take action against workers who break the rules. Construction companies and government agencies must make greater efforts to raise awareness and provide training for the workforces.
- Regular safety inspections by the authority's competent person are needed to monitor workplace safety performance, as well as to alert construction companies of any infractions.
- Since senior management and project managers are focused with schedules, costs, design revisions, and progress reports and are unconcerned about safety, every company should have at least one safety engineer or nurse on staff with a small on-site clinic. However, a first-aid kit with a properly trained Forman or site engineer should be present on the job site as a minimum.

5.5 Future work

- Further study could be conducted to investigate the effect health and safety on the performance construction projects. In addition, to encourage construction companies to take safety issues seriously, research can be conducted to estimate the cost of safety and compare it to the cost of accidents.
- Since safety management systems are such a large topic, study into other construction areas such as motorways, dams, rail lines, demolitions, and maintenance can be done.

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Appendix I

ADDIS COLLEGE

DEPARTMENT OF CONSTRUCTION TECHNOLOGY MANAGEMENT

M.SC IN CONSTRUCTION TECHNOLOGY MANAGEMENT

QUESTIONNAIRE FOR CONTRACTOR & CONSULTANTS

Assessment of occupational safety management practice: The case of real estate projects in Addis Ababa

My name is Serkalem Tamirat. I am currently a graduate student at Addis College Department of Construction Technology Management. This M.SC thesis research questionnaire is designed to assess the practice of occupational safety management in the construction of real estate projects. The objective of the study is to **assess** occupational safety management practice **IN** real estate projects.

To achieve this objective, the study requires the gathering of data related to occupational safety management practice currently used in the construction of real estate projects. The collected data will be used for academic purpose only and all information and feedbacks will be kept strictly confidential.

I, therefore, kindly requesting your valuable feedback, thanking you in advance for giving me time from your busy schedule. Please complete the questionnaire by giving details or ticking boxes as appropriate.

Thank you,

Serkalem Tamirat

Phone:

Email:

SECTION I. General Information

Information about respondents

1. Respondent position (Work status)

1. Forman ☐ 2. Site Engineer ☐ 3. Project Manager ☐ 4. Sub-contractor ☐

2. What is your educational qualification?

1. Elementary school ☐ 2. High school ☐ 3. Diploma ☐

4. First Degree ☐ 5. Master's Degree or above ☐

3. Respondents work experience (years)

1. 0- 2 years ☐ 2. 2-5 years ☐ 3. 5 – 10 years ☐ 4. >10 ☐

Company profile

1. Contractor Category

1. BC ☐ 2. GC ☐

2. **Construction grade**: _____

2. Average Number of employees in the site

1. Below 25 ☐ 2. 25-50 ☐ 3. 50 – 100 ☐ 4. >100 ☐

3. Experience of the company on this project construction (in years)?

1. Below 2 years ☐ 2. 2-5 years ☐ 3. >5 years ☐

Information about the project site occupational safety management

Part two: Root causes of occupational accidents

The major causes of occupational accidents in construction projects are listed below. Please indicate the degree to which these factors are causing occupational accidents.

Where, (1= Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly Agree)

No	**Root causes of accident**	1	2	3	4	5
1	Working conditions and environment are in poor shape					
2	Lack of training and knowledge					
3	Lack of Communication					
4	Carelessness					
5	Ignorance					

6	Being struck by falling object					
7	Exposure to hazardous substances					
8	Electric, Fire, and Explosions accidents					
9	Accidents during excavations (Slides, collapse, not shored…)					
10	Falling from scaffolds and ladders					
11	Tools and Machinery (Drilling, Grinding, Bending…etc.)					
12	Structural Failure on Construction Site					

Part three: occupational accident emergency management method

Please rate your level of agreement with the following statements:

Where, (1= Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly Agree)

No	Emergency management method	1	2	3	4	5
1	Clear emergency response procedures are made available to all workers on site.					
2	Regular emergency response drills are conducted.					
3	First aid supplies and trained first responders are available on site.					
4	Emergency contact information is clearly posted around the site.					
5	Emergency response teams can access all areas of the site if needed.					
6	Accident scenes are quickly secured to prevent further harm.					
7	Injured workers receive prompt medical attention.					
8	Accident investigations are thorough and aim to identify root causes.					
9	Actions are taken to prevent similar accidents in the future.					
10	Workers receive training on emergency procedures.					

Part Four: Level of adherence to occupational safety management practices

Please indicate your level of agreement on the below statements.

No	**Main safety measures used**	**Yes**	**No**
1	Does the site have a safety officer?		
2	Does this firm provide Personal protective equipment (PPE)?		
3	Is the layout of the site safe for workers?		
4	Is there a formal written safety guideline on the construction site?		

5	Is a budget for a safety system allocated by top management?		
6	Is your project's safety-related work being audited on a regular basis while it's being built?		
7	Is your building project site equipped with first aid kit and first responders?		
8	Does Proper supervision by staff trained in safety get carried out on your project?		
9	Are all injuries and fatalities been documented and reported to the construction company?		
10	Is there any follow-up or contribution from a governmental or non-governmental entity to improve safety in building projects?		

Part Five: Challenges faced by real estate projects

Please rate your level of agreement with the following statements:

Where, (1= Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly Agree)

No	**Challenges**	1	2	3	4	5
1	It is difficult to maintain up-to-date knowledge of occupational safety regulations.					
2	There is a lack of sufficient training on occupational safety management for employees.					
3	Budget constraints limit the implementation of optimal safety measures.					
4	It is challenging to ensure consistent safety practices across different project sites.					
5	The complexity of projects makes it difficult to plan and implement effective safety measures.					
6	There is a lack of management commitment to occupational safety.					
7	There is a lack of effective communication about safety procedures and regulations among employees.					
8	The company does not have a solid system for identifying and controlling hazards.					
9	Employees show a lack of awareness or disregard for safety procedures.					
10	There is a lack of adequate safety equipment and resources.					

Appendix II

Key Informant Interview Questions

1) What are the main root causes of occupational accidents in real estate projects in Addis Ababa?
2) What are some of the most important safety precautions & emergency management method you take in this construction project?
3) What challenges do you face in implementing proper safety measures in your project?
4) What are the strengths of your construction firm in implementing proper safety measures?
5) What are the weaknesses of your construction firm in implementing proper safety measures?
6) What kind of safety problems does the project encounter frequently?

የቃለመጠይቅ ዝርዝር ጥያቄዎች

1. በዚህ ሪል እስቴት ውስጥ ለሚከሰቱ የስራ ላይ አደጋዎች ዋናው ምክኒያት ምንድነው?

2. በዚህ ፕሮጀክት ውስጥ የምትተገብሯቸው የሴፍቲና የድንገተኛ አደጋ ጥንቃቄ ተግባራት እነማን ናቸው?

3. ተገቢውን የሴፍቲ ጥንቃቄ ከመተግበር አንፃር የሚገጥሟችሁ ተግዳሮቶች እነማን ናቸው?

4. ተገቢውን የሴፍቲ ጥንቃቄ ከመተግበር አንፃር የእናንተ ጠንካራ ጎኖች እነማን ናቸው?

5. ተገቢውን የሴፍቲ ጥንቃቄ ከመተግበር አንፃር የእናንተ ደካማ ጎኖች እነማን ናቸው?

6. በዚህ ፕሮጀክት አብዝተው የሚያጋጥሙ የሴፍቲ ችግሮች እነማን ናቸው?

Appendix II

Ayat SC Profile

AYAT SC

COMPANY PROFILE

AYAT SC | 2022

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1. About us

Ayat SC. is an Ethiopian Incorporated and locally owned and managed company. The company was established in 1988 and it is a pioneer in the real estate industry especially, in the construction of residential houses. With a pioneering and highly effective mix of Real Estate Development, Real Estate Construction, and Real Estate Finance, Ayat has developed a solid experience during the risky & virtually unknown market for the past several years.

This solid experience allowed the company to undertake more projects in the construction sector and confirmed a cogent knowledge and know-how of the latest technologies and techniques. The excellence of Ayat in the construction & quality delivery was further recognized in the whole country, so it moved to handle and realized major projects, from residential villas to high-rise apartments & business outlets.

Ayat has made tens of hundreds of Ethiopians and Ethiopian diasporas, at home and abroad, proud homeowners in their native country. In the previous years, Ayat has handed over more than 7,000 residential homes, 1,000 commercial outlets and created job opportunities for more than 15,000 Ethiopians.

With a proven experience in Organizing, Developing, and Managing Projects, Ayat SC decided to diversify into other promising sectors. We started with the fastest growing hospitality industry and currently own and manage the historically renowned Ras hotel & Lalibela Roha hotel. And this is followed by the construction of the high-end Kazanchis Ras Hotel, which is now in the finishing phase. The company has the ambition of becoming one of the major players in this industry in the coming few years.

The experience that we have gained through the years and the economic development of the country is an opportunity to develop new businesses; So, Ayat SC endeavors to be one of the well-known multi-disciplinary company in the country & the continent.

2. Vision, Mission & Values

2.1.Vision

To become a well-known, Africa wide Real Estate developer and a leading multi-disciplinary national company.

2.2.Mission Statement

To create memorable real estate and lasting relationships with the goal of creating new, urbanist, walkable city with high quality of life, high design, beautiful architecture, and sense of place in culture-driven backdrop.

2.3. Values

- Customer satisfaction
- Meeting goal and commitments
- Responsibility and accountability
- Teamwork and cooperation
- Environmental friendliness
- Standard and cost effective

3. Our Capacity

3.1.Work force

Ayat SC is composed of skillful and passionate employees. We have about 96 Engineers and 141 Staff. Besides, more than 40 sub-contractors are undertaking formwork, concrete, plastering, finishing & other sub-tasks of projects under our construction taskforce.

Our company is also working with 10 prime contractors which 8 among them are locals and the rest 2 are from abroad (Chinese). All these professional Prime contractors possess a large experience and can provide a final work of perfect quality in the domain they are experts on civil, electrical, water & sanitation and finishing works. Furthermore, our vast experience in the building industry enables us to control the quality delivery of contractors.

3.2.Equipment & machineries

This consists of top-of-the-range equipment and machinery, including earth movers, transport equipment, and other lightweight Machineries. Besides, we have our own concrete batching plant and stone crusher plant. Ayat also has well-organized woodwork, marble, and aluminum workshops which provide accessories for its construction projects.

4. Our services

4.1.Building Construction

Ayat has been undertaking the construction and delivery of residential villas, high-rise & low-rise apartments, malls, and business outlets with high quality, various designs, and styles in some of the most coveted locations in Addis Ababa.

4.2.Hotel & tourism

Ayat is also offering a hotel and tourism services through its historical & renowned Addis Ababa Ras & Lalibela Roha hotels. The company, in order to expand its market share & service, is now on the furnishing of a high-end hotel building around the central part of Addis Ababa, Kazanchis.

5. Projects

5.1. Ongoing Projects

5.1.1. AYAT HILL BOTTOM (Apartments and Business Outlets)

Located at Ayat settlement at Ayat county, has six apartments and business outlets complexes provide its residents a potent mix of tranquility and livability. The fifteen floored Ayat apartment/business/outlets complex offers luxury apartments for sale starting from floor level four and above. The magnificent location of Hill bottom complex coupled with the above features enable residents and businessmen to enjoy incomparable access and opportunity to many of the localities natural environ. In another tack, the outlets could be configured to different business ends: supermarkets, restaurants, emporiums, store, boutiques, shops etc., and entertainment facilities.

5.1.2. CCE BUSINESS OUTLETS

In this apartment-cum-business building, offices' and other businesses' conducting space is available at four floors, from ground-street level-up. These spaces are designed with cutting-edge, inspirational and supportive format in order to maximize buyer's convenience. As the building situated in an affluent area of the city and in a multi tenanted floors, business and other endeavors are easily facilitated among and between residents and businessmen who decides to purchase their desired lot before sales runs out.

5.1.3. CMC APARTMENTS

These apartments located in CCE-CMC are spacious residential units that reflects the magical merging of inspiration and architecture. The project, a masterpiece of design and craftsmanship, consists of 68 residential complexes parked in a 15th floor high rises. Erected in a variety with a view to bring a high-end community right to the midst of Addis. The charming and quiet environment, far from the hassle of the down town part of the city, belies the convenient access it has to the main roads leading to Megenagna and other key locations.

5.1.4. AYAT APARTMENTS

This project is the development within the Ayat hamlet that offers active and dynamic living experience in a suburbia setting in Addis Ababa. These fifty-one complex apartments, each G+4 are considered a whole community on their own. With all the required lifestyle amenities and immediate access to the metro station and the newly renovated Hill Bottom Recreation and spa center, residents can enjoy a range of recreational facilities in the sprawling green undulating space.

5.1.5. KAZANCHIS RAS HOTEL

As the company extends its business portfolio to other sectors, the Kazanchis Ras hotel project is one of the investments owned by Ayat SC – which is currently at the finishing phase. It is located at Kazanchis; A great business location surrounded by diplomatic residence. The project includes 444 hotel units, as well as a range of recreational facilities such as restaurants, swimming pool, shopping center and so on. The hotel is going to be a subsidiary to Ayat SC.

5.2. New Projects

Ayat SC is also on the way to develop new building projects which are dedicated to resident apartments, business outlets and school campus. These projects are located in Addis Ababa's central & suburb parts (Lideta, Meri & Ayat areas). The projects are consisting 30 buildings ranging from low to high-rise blocks.