Addis Ababa University

College of Business and Economics

School of Commerce

Department of Project Management

Assessment of Safety Measures on Construction Projects:

The Case of Arba Minch University Projects

By: Solomon Abebe

A Project Work Submitted to Addis Ababa University School of Commerce in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Project Management

June, 2022

Addis Ababa

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SCHOOL OF COMMERCE

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Declaration

I, the undersigned, confirm that the study "**Assessment of Safety Measures on Construction Projects: The Case of Arba Minch University Projects**" is the result of my own work and study, and that all sources of materials used in the study have been recognized. I conducted the research on my own, with the help and advice of the research advisor.

This study has not been submitted for any degree in any university. It is conducted for the partial fulfillment of the Master of Arts Degree in Project Management.

_____ _____

Solomon Abebe Date

Letter of Certificate

This is to certify that Solomon Abebe has conducted this project work entitled "**Assessment of Safety Measures on Construction Projects: The Case of Arba Minch University Projects**" in under my supervision.

This project work is original and suitable for the submission in partial fulfillment of the requirements for the award of Master of Arts Degree in Project Management.

Approval Board Committee:

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Acknowledgements

First and foremost, I give thanks to the Almighty God.

Next, I'd like to convey my heartfelt gratitude to the Addis Ababa University School of Commerce, and I'd want to use this occasion to thank my advisor, Birhanu D. (PhD), for his modest supervision and prompt response throughout this project.

I'd like to thank all of my friends for their help with the data collection. Also, I'd want to extend my gratitude to everyone who has contributed directly or indirectly to the success of this research, particularly all construction site workers who took the time out of their hectic schedules to respond to the research questionnaire.

Abstract

Many accidents and hazards are visible in construction activity. Meanwhile, as the construction sector continues to grow, the number of catastrophic injuries and fatalities on the field has increased. As a result, the goal of this study is to evaluate the safety measures used in construction projects at Arba Minch University by looking into the methods implemented. The study aims to identify the most important safety measures, as well as underlying weaknesses and strengths, as well as the principles that underpin effective management. The research was conducted using a combined quantitative and qualitative survey approach, with primary data collected through a questionnaire and interview. A total of 34 questionnaires were sent out to all contractors and consultants in this study, with 33 replies being gathered for analysis. The respondents are found in the Arba Minch region, which is where the entire project is located. The data was evaluated statistically and qualitatively in Microsoft Excel-13 spreadsheet and SPSS-20 using descriptive statics approach. Overall, the study's findings demonstrated that the majority of contractors have a poor track record of implementing safety measures. According to contractor responses, the root causes of construction site accidents include carelessness/ignorance and poor working conditions.

Keywords: *Safety measures, hazards and injuries, construction sites*

Acronyms and Abbreviations

BC	Building Contractor
GC	General Contractor
GDP	Gross Domestic product
ILO	International Labor Organization
OHS	Occupational health and safety
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
SMS	Safety management system
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Both developed and developing countries certainly benefit from the construction industry in terms of scale and share in the development process. The industry is important not only because of its finished product, but also because it employs a huge number of people (directly and indirectly) and so has an impact on a country's or region's economy during the construction phase (Wibowo, 2009).

According to Chitkara (2004), the construction industry accounts for 6-9 percent of the Gross Domestic Product (GDP) in many nations, and Bhimaraya (2001) estimates that it accounts for up to 10% of the GDP in most countries. According to the African Economic Outlook, Ethiopia's construction sector accounts for 9.4% of GDP (2015). The construction industry is an important part of the economy that has a big impact on other industries' efficiency and production. Infrastructure facilities must be completed before significant investment in the manufacturing, agriculture, or service sectors may be considered. Construction activity grows at a faster rate than population and GDP in some emerging nations [Chitkara, 2004].

Ethiopia has a longstanding tradition history of outstanding construction projects. These skills can be seen in the ruins of Queen Sheba's palace at Yeha, the Obelisks of Axum, the rock-hewn cathedrals of Lalibela, and the castles of Gondar, to name a few. There have been some notable developments in this regard with the birth of modern civilization, particularly during the late 19 and early 20 centuries. Even though Ethiopia's building industry is still in its infancy, it plays an important part in the country's economic development. The Ethiopian government and private sector are

currently working on a number of mega construction projects, including the Great Renaissance Dam, other electric-producing dams, irrigation dams, mega sugar factories, complex university and housing projects, high-rise apartment, offices, and other structures. The current situation of Ethiopia's construction industry falls short of the sector's domestic and international quality standards, performance, safety, and health criteria [MoWUD, 2006]. Construction projects face challenges in terms of construction techniques and management, as well as funding, timeliness, and the ability to implement safety and health precautions.

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 (Hendrickson and Horvath 2000). 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.

The purpose of this study is to assess safety measures on university projects, specifically at Arba Minch University, and to suggest the best suitable project safety and health management methods.

1.2 Statement of the Problem

Safety is a duty of all. Everyone has a responsibility to keep themselves safe. It is critical for all construction workers to contribute their part in providing and maintaining a safe and healthy working environment. However, 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 (Mbuya and Lema, 2004). In addition, a lack of

knowledge and experience limits the intervention process aimed at improving the health and safety of construction workers (Adan, 2004).

University building construction projects are conducted across the country. Furthermore, the Ethiopian government is projected to establish university buildings. Most construction enterprises in Ethiopia, based on their practices and experience, do not have well-articulated and created risk policies and response plans. As a result, in most construction projects, necessary health and safety precautions on the job sites have not been implemented, and numerous issues in health and safety management have arisen. Numerous accidents/injuries, health problems resulting in hospitalization, and absenteeism are all too typical on construction sites.

Despite the fact that many accidents and health issues go unreported, there is concern that the current situation is alarming. Construction sites have varying levels of health and safety awareness, necessitating a variety of training and communication methods. Some previous studies, such as Evaluation of Health and Safety Practice in Building Construction: A Case Study in Addis Ababa (Fekele, Quezon & Macarubbo, 2016), Occupational safety and health profile for Ethiopia (Dawit, ILO Consultant, 2016), and others, have been conducted in Ethiopia. However, earlier literatures in Ethiopia have left little documentation on university project safety and health management, based on practice and experience in the construction business.

The researcher aspired to conduct research on safety measures in university construction projects specifically in Arba Minch University and put forward alternatives in the construction industry. Safety measures contributed to the overall sum of problems indicated related to safety measures in building construction and the expected expansions of different construction projects in the future Ethiopia. The need

for effective safety measures in construction aspired the researcher to conduct research on safety and health measures in university construction projects specifically in Arba Minch University and put forward solutions in the construction industry safety

1.2.1 Research Motivations

The motivation for this research stems largely from personal observation of building projects' poor performance in terms of safety standards. Construction projects owned by the government and the business sector are among them. However, due to the limitation with regard to accessibility of data on private construction projects this thesis will focus on construction projects in Arba Minch University.

Table 1: Research Motivation

N0.	Question	Answer
1	Why has the research been established	During the execution phase of most construction projects in this country, there is a lack of safety and health safeguards.
2	What does the research try to achieve	To Contribute to the understanding of safety problems and mitigation methods while examining their sources and overall impact.
3	What are the important issues for the research?	Methodology and literature review together with distribution of questionnaire on Arba Minch university construction projects.
4	Who will benefit from or affected by this research?	Stake holders in construction industry and the researcher.

5	How can the research be done?	Literature review, distribution of questionnaires, and desk study on Arba Minch university construction projects.

Source: Own survey, 2022

1.3 Research Questions

In this research paper the research questions have been addressed as general and specific.

1.3.1 General research question

What is the current level of safety management in Arba Minch University construction projects?

1.3.2 Specific research question

The specific research questions this study addresses are:

- What are the main safety measures used currently in the construction of Arba Minch University projects?
- What are the factors that impact the safety measures in the construction of Arba Minch University Projects?
- At what level does OSHAcademy's eight elements of an effective safety Management System are implemented in construction site?

1.4 Objective of the study

1.4.1 General Objective

- The study's overall objective is to review the safety measures in building construction projects at Arba Minch University by looking into the methods used to implement safety measures.

1.4.2 Specific Objectives

This study will be undertaken with the following specific objectives:

- Identifying the main safety measures used currently in the construction of Arba Minch University projects?
- Identifying the factors that impact the safety measures in the construction of Arba Minch University Projects.
- Identifying the implementation of OSHAcademy's eight elements of an effective safety Management System.

1.5 Significance of proposed research

This study has a substantial impact on both the commercial and public sectors in terms of protecting the safety of the most vulnerable workers on construction sites and gaining a better understanding of the different sorts of accidents that might occur and their causes. In addition, the research will demonstrate the limitations and strengths of safety measures in the development of Arba Minch University Projects for Ethiopian government and non-government entities.

The study can also be used as a guide to highlight how Ethiopian construction projects utilize safety management strategies in building structures and to suggest some steps

that should be performed to close the gap and improve the safety management system. If properly applied, this research will improve the working environment and productivity of construction site personnel.

This study can indicate how the safety measures in government-owned projects outside the capital city look because the majority of research on construction site safety has been done in Addis Ababa. It also extends the findings of construction site safety researches on by examining the OSHAcademy's eight elements of an effective safety Management System to regional context.

1.6 Scope of the study

Geographical scope: This research focused on assessing safety measures in building construction projects located in Arba Minch University Projects. The selection of this project is based on the availability of suitable data and convenience to the researcher.

Conceptual scope: The study focuses on the evaluation and implementation of safety measures. Despite the fact that workplace safety is a broad topic, this study focuses primarily on construction site safety in terms of standard requirements.

Methodological scope: The study's target audience includes various grade building and general contractors working in Arba Minch University construction projects. The respondents are professionals who are professional site engineers and consultants who are working on the projects, and the questionnaire and site visit are utilized to obtain primary data. The study only reflects the current state of construction during the research time 2022 G.C.

1.7 Limitations of the study

The study only tries to address the construction projects that are under way by Arba Minch University using local construction companies of different grade due to the limitations of resource and time.

1.8 Organization of the Study

This research will have the following broad categories.

Chapter I: Introduction

Chapter II: Review of Related Literatures

Chapter III: Research Methodology

Chapter IV: Result and Discussions

Chapter V: Summery, Conclusions and Recommendations

Each of the above chapters will contain the following contents.

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 will include 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 effects of safety measures; the rate of accidents/ injuries in Arba Minch university 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
REVIEW OF RELATED LITERATURE

2.1 Introduction

In this section the researcher will present review of related literature which focuses on safety measures. To begin, the researcher reviews the history and basic definition of construction safety, 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 information about construction safety and accidents in the construction industry. Other literature relevant to the topic and demonstrating empirical results is also evaluated and regarded as a source of evidence and for ensuring the accuracy of the research findings.

2.2 History of Safety

"We must seek to understand the hazard we encounter." This was possibly the first documented safety statement made by E. I. du Pont when he established the gunpowder factory in the United States of America in 1802. It had the first safety precautions that were taken into account during the building's design and construction (Klein, 2009). However, it was a one-time act by the employer, not a law or regulation.

From the beginning until 1916, every employment was governed by "common laws," which required individuals to be responsible for themselves and the hazards associated with their jobs. Workers' compensation laws were enacted by the government after 1916, requiring companies to be accountable for the safety and health of their employees. Employers were then compelled to supply and pay for medical care and lost earnings as a result of on-the-job accidents. Prior to being a duty, this is a moral responsibility (Reese, 2003). However, because the law requires employers to pay for

injuries that occur on the job, it will be more cost-effective to prevent injuries from occurring in the first place. The first step in creating an organized industrial safety movement was to eliminate the hazards that present in the workplace. The death rate fell dramatically during the first twenty (20) years of the safety movement (Petersen, 1971). The Occupational Safety and Health Act (OSHAct) went into force in April 1971, affecting about five million enterprises and sixty million people in the United States (Hammer & Price, 2000).

Occupational health and safety (OHS) management safeguards employees' safety, health, and well-being at work. A common definition of occupational health has been agreed upon by the International Labour Organization (ILO) and the World Health Organization (WHO). The definition reads:

> "Occupational health should aim to promote and maintain the highest level of physical, mental, and social well-being for workers in all occupations; to prevent workers from becoming ill as a result of their working conditions; to protect workers in their employment from risks resulting from factors that are harmful to their health; and to place and keep workers in an occupational environment that is suited to their physical abilities.", (Guidotti, 2011).

2.2.1 Safety, Safety management and Accident

Safety is defined as the situation of being safeguarded against any form of incident (accident) that could be considered undesirable By controlling hazards to attain an acceptable level of risk. Accident is described as an unanticipated and unexpected event that results in injury, property damage, or death (Mwombeki, 2005).

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.

It is commonly understood in construction project management that each construction project is unique. As a result, the frequency of incidents varies from project to project, implying that one site may be more dangerous than another (Zekri, 2013). Similarly, the working environment is always changing, and the associated hazards vary on a regular basis (Jannadi & Bu-Khamsin, 2002).

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 Review

2.3.1 General Principles of Safety

A wide range of arrangements, such as skills, knowledge, and analytical capacities, are necessary to manage and implement all of the major parts that make up national OHS systems so that both employees and the environment are protected. To keep up with technological and economic changes, measures and procedures for preventing, regulating, lowering, or eliminating occupational hazards and risks have been created and applied regularly over the years (Alli, 2008).

Occupational safety is a broad, multidisciplinary topic that typically includes medical and other scientific subjects, as well as engineering, legislation, technology, economics, and industry-specific concerns. Despite the multiplicity of occurrences, certain fundamental principles have been found (ILO, 2001).

Table 2: General Principles of Safety from ILO

	General Principles of Safety
1)	Certain privileges are granted to all employees. Workers, corporations, and governments all have a role to play in ensuring that these rights are protected and that decent working conditions are encouraged.
2)	Occupational health and safety policies must be implemented. These rules must be implemented at the federal and state levels, as well as in the private sector. They must be notified to all or any relevant persons in a clear and concise manner.

3)	It is necessary to consult with social partners such as employers, workers, and other stakeholders. This could be done at all stages of policy development, implementation, and evaluation.
4)	Initiatives in occupational health and safety must emphasize prevention and protection. Workplace primary preventive actions must be prioritized. Workplaces and settings that are safe and healthy should be planned and developed.
5)	Information is critical for the development and implementation of effective programs and policies. Gathering and disseminating accurate information on hazardous substances, conducting workplace surveillance, and monitoring compliance with legislation and best practices are all crucial.
6)	Health promotion is the most important part of workplace health and safety practice. Employees' physical, mental, and social well-being should all be prioritized.
7)	Compensation, rehabilitation, and curative therapy must be offered to employees who suffer from job accidents, injuries, or diseases. Occupational hazards should be avoided to the greatest extent practicable.
8)	A safe and productive workplace relies heavily on education and training. Employees and employers must understand the importance of implementing safe working methods as well as how to do it.
9)	Employees, employers, and competent authorities all have responsibilities and obligations.

	Workers must follow prescribed procedures, corporations must provide a safe working environment, and authorities must provide health and safety policy advice, communication, and auditing.
10)	Policies must be enforced and an inspection mechanism must be in place to verify compliance with occupational health and safety policies.

Source: (ILO, 2001)

2.3.2 General Safety Rules for Construction

Table 3: 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)

2.3.3 Safety measures in Ethiopia Construction

Construction in underdeveloped countries like Ethiopia 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 etal., 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).

2.3.4 Accidents in the Construction Industry

An accident is defined as any avoidable action by workers or failure of machinery, tools, or other devices that disrupts production and has the potential to injure people or damage property. In many countries, construction projects are a major source of workplace accidents. The construction sector has a bad reputation for being a high-risk workplace (Zekri, 2013).

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

Scaffolding and ladder falls, falls from working height, and other construction-related falls are among the most common. As a result of being struck by falling objects, falling from equipment, stumbling or smashing into things, falling into a manhole and excavation. Excavation collapse (crush injuries), hand tool injuries, and electric contact are also possibilities. Explosions and Fires, Dangerous drug exposure (chemical and biological), Transporting large loads, Poor working conditions, typically in small

places, being struck or crushed by a worksite vehicle, and Structural Failure on the Construction Site (Fasil, 2017).

Construction Site Falls: Construction site falls include scaffolding falls, roof-related falls, falls resulting from flooring gaps, crane falls, shaft falls, and falling objects.

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 while large structures, such as buildings, are being built or maintained. It is estimated that 65 percent of construction workers work on scaffolds on a regular basis. Scaffolding is a must-have in the building industry. Scaffolds have been used to build some of the most amazing structures ever built by humanity. Many scaffolding accident victims blamed the occurrence on planking or support flaws that caused them to slide or be injured by a falling object.

Run Over by Operating Equipment: Construction sites are incredibly busy places to work, with a steady flow of vehicles and people. In the past, construction workers have been ran over or injured by working machinery. These kinds of mishaps can happen everywhere, but the risks are exacerbated when using heavy equipment on highways or near busy roads.

Electrical Accidents on Construction Sites: Each year, about 350 construction workers are killed in electrical accidents, according to the Occupational Safety and Health Administration (OSHA). These fatalities have been caused by electric shock, power line contact, and steam accidents, to name a few. People who operate on scaffolding or in cranes near electrical lines are particularly vulnerable to these threats.

Trench or Excavation Collapses: During underground construction, trenching is a critical process. A trench is a long, narrow trench with a depth that exceeds its width. When trenches are dug, safety precautions must be taken to prevent workers 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: When a building or other structure collapses, it can no longer support the same amount of weight as it could before it failed. Structure breakdowns can be disastrous, causing significant damage and even death. When the public's safety is risked for financial gain, or when poor design leads to building failure, these types of accidents occur. The contractor and the designer should be held responsible for their work.

According to the research, the construction industry has a greater prevalence of workplace accidents than other businesses. The most common accidents in the building and construction industry are falls from heights, such as from roofs, scaffolding, or ladders.

Heavy lifting and tools are involved in many fall injuries and accidents. Construction work requires a high level of safety, which is a major contractual requirement for those in charge of and doing it. Effective contractor safety programs help contractors achieve this aim by assisting them in systematically identifying and evaluating possible hazards so that controls may be put in place ahead of time and incidents can be averted. Interactions established by these initiatives also have a number of other benefits, such

as increased safety awareness, improved communication, and improved record-keeping, and cost savings.

Attrition is common in the building and housing industries, and there are several severe workplace accidents. It is vital that both employers and employees work together to ensure the safety of their workplace in order to prevent job-related accidents and other health concerns among employees. The employer is in charge of the entire working environment, but employees have a responsibility to play as well, such as obeying employer instructions and wearing non-public protection equipment provided by the employer.

2.3.5 Factors Affecting Safety and Health Performance

An extensive literature review has been conducted to identify the factors which affect the safety measures 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).

2.4 Empirical Review

Over the last few decades, the construction industry's operations have created severe health and safety concerns among governments, stakeholders, health and safety experts, and researchers (Enshassi and Mayer 2002; Rowlinson 2005). As a result, health and safety legislation has been enacted to ensure that construction business owners, as well as many other project participants, are responsible for managing the hazards connected with building projects. In the construction sector, health and safety management has progressed from accident-prevention methods to more systematic and proactive approaches to reducing the risk of hazards. According to previous research, certain

actions can improve health and safety performance and thus qualify as good health and safety practices.

According to Helander (1991), construction labor is much more risky than most other occupations. People falling from rooftops, scaffolds, or ladders are the most common causes of accidents. Several people have died as a result of buildings collapsing and objects falling from the sky. Many of these mishaps can be avoided by implementing safety procedures and guidelines. The dangers that construction employees encounter on the job site are routinely overlooked. Employee motivation to follow safe work procedures is affected as a result of this. According to Helander (1991), the cost of construction accidents accounts for around 6% of total building expenditures. As a result, the construction industry should apply substantial monetary incentives. As a result, monitoring safety and health is advantageous not only in terms of safety but also in terms of cost. Ignoring safety can lead to accidents and sicknesses, which can lead to a drop in sales and, in the worst-case scenario, bring the company to its knees.

Although the majority of accessible research were conducted in wealthy countries, their findings will apply to the majority of cases in poor countries as well. In the United Kingdom, Helander (1991) looked into the causes of 739 fatal construction accidents. He determined that 52 percent of them were caused by falls from rooftops, scaffolds, and ladders. Transportation equipment (such as excavators and dumpers) was responsible for 18.5 percent of the deaths, while falling objects and materials were responsible for 19.4 percent. Excavation labor accounts for 5% of all construction accidents, according to Hollander (1991).

In a construction safety research, management commitment, staff involvement, communication, audits/observations, goal-setting, and a healthy safety culture were all shown to reduce injuries (Hinze and Wilson, 2000).

Falling material and objects, electrical risks, transportation, and mobile plants, and other were the categories utilized to classify fatal accidents. The majority of falls occur while working on roofs, scaffolds, or ladders. Structural collapses and falling materials are responsible for a significant number of fatalities. Many of the dangers are specific to trades, and construction workers usually underestimate the risks in their own work, reducing motivation to follow safe work practices. A large percentage of these mishaps can be avoided by establishing and implementing safety standards and regulations (Helander, 1991).

Finally, Helander (1991) proposed that senior managers can help reduce the number of accidents if they:

- Take note of all of their field managers' safety records and place equal importance on them as productivity and total cost.
- Ensure that safety departments are used effectively by conveying safety issues, as well as cost and scheduling constraints, to personnel.
- Develop methods for allocating safety costs and assuring safety through better planning and the use of appropriate equipment and materials.
- Make safety prizes and provide safety training to new hires.

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:

- More than two-thirds (70 percent) of the accidents were found to be caused by issues emerging from worker actions or conduct, as well as worker skills. This is a sign of a lack of education, training, and oversight.
- In more than half of the cases, equipment faults, including personal protective equipment (PPE), were discovered (56 percent).

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, according to a local study in Addis Ababa City construction projects (Fasil, 2017). 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 are among the accidents that respondents identified as frequently occurring in Addis Ababa Road construction projects (Betelehem, 2019).

The above-mentioned literatures describe the knowledge field of safety management to aid the researcher in addressing the research topic. The researcher's analysis of many safety management literatures yielded the following conclusions: construction building safety regulations, construction dangers and injuries, empirical findings on frequent accidents, and accident root causes. As a result, the majority of the stories appear to be about various building accidents.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology to be used in the study. The adopted methodology to accomplish this study consists of: review of literature related to safety, the information about the study design, study location, study population, questionnaire design, and statistical data analysis.

3.2 Research Design

In this research a descriptive design is used to present the findings of the collected data. The data from the research sample is described using descriptive statistics. In addition to questionnaire survey, interview is used as a source of primary data which help the researcher to know beyond the reviewed literature.

3.2.1 Research Approach

The 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.

3.3 Population and Sampling

3.3.1 Target Population

Arba Minch University is currently working on a number of new and expansion building projects. There are currently 11 ongoing construction projects involving 8 (eight) contractors and 5 (five) consultants. They are all found in the Arba Minch region.

3.3.2 Sample Design

Because the number of contractors and consultants working on the project is limited, the researcher intends to conduct a census of respondents from all Arba Minch University building projects. Taking the entire population into account aids in determining and obtaining high-quality relevant information on the topic.

3.3.3 Sampling size

Since the sample design is a census all the relevant respondents will be used as a sample. Therefore, there are 3(three) relevant respondents from each contractor and 2(two) relevant respondents from each consultants which gives a total number of 34 respondents as a sample size.

3.3.4 Study Area

The study area is different construction projects that are owned by Arba Minch University.

3.4 Questionnaire Design and Data Collection

3.4.1 Questionnaire Design

Questionnaire is used to collect the data for the study. The Questionnaire is based on the design by (Fasil, 2017) and (Zekri, 2013). Modifications and new questions are then added to suit the safety measures in the construction of Arba Minch University projects. The Questionnaire used mainly yes/No question and a five-point Likert scale i.e. (Very low), (Low), (average), (High), and (Very High) (Peterson, 1999).

3.4.2 Procedure of Data Collection

The researcher plans to collect data for the study in a variety of ways, including visiting sites and handing out forms that will be 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 safety measures are implemented on Arba Minch University development projects. The researcher also planned to conduct on-site interviews to get information on current safety measures practices, which would aid in evaluating the effectiveness of the safety measures.

3.5 Method of Data Analysis

The researcher decoded 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 will be analyzed in descriptive analysis, such as frequency and mean of each factor, because the research methodology is descriptive. The researcher utilized IBM SPSS STATISTICS 20 to analyze the data.

3.6 Scale Reliability and Validity

To guarantee the research's validity and reliability, it was put to the test. Sampling and data collecting were given considerable consideration, as was the layout of the study questionnaire and research methodology. In order to analyze the safety management strategies adopted, a complete literature review was undertaken using both international journals and safety manuals developed by international institutes. After the data was examined, the findings of the study were compared to previous findings, and they were found to be consistent. In addition, the researcher underlined the importance of developing questionnaire design guidelines. The Likert scale is used in the majority of the study questions in the research questionnaire. To test the internal reliability of the questionnaire, Cronbach's alpha test was used and found to be 0.875 which is higher than 0.7, thus the construct has been believed to have adequate reliability.

3.7 Ethical Considerations

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

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRTATON

4.1 Introduction

In order to meet the research's objectives, this chapter compiles, analyzes, and examines the data collected from respondents. The questionnaire and interview findings will be interpreted as well. The response rate, general information on the contractor and the respondents who took part in the study, and a summary of the acquired data using data presentation tools like frequency, mean, and percentages are all included in this chapter. Tables and charts are also utilized to show ordered data since they make it easier to understand and see the information being distributed.

4.2 Response Rate of Respondents

This study has focused on Arba Minch University building projects. And this questionnaire was distributed to all selected contractors and consultants in all projects. Since the sample design is a census all the relevant respondents was used as a sample. The sample size identified for this research was 34 and the researcher distributes 34 questionnaire and collected 33 responses. This is more than 97% response rate.

Table 4: Questionnaire survey response rate

No	Respondents	population	Number of sample size	Response	Response Rate (percentage)
1	Contractors & Consultants	34	34	33	97.06 %

Source: Own Survey, 2022

Before starting the data encoding, the questionnaires were checked for their reliability and completeness. All of them are found complete; hence all the 33 questionnaires from the different contactors and consultants will be used for data analysis.

4.3 General Information of the Projects and the Respondent

The first section of the study questionnaire covers general information about the construction company, such as the firm's category, licensing grade, and average number of personnel on site, as well as the respondent's job title and years of experience.

4.3.1 Company profile

The table below shows that 60.6% of the respondents are working in Building Contractors Company and the rest 39.4 % are in General contractors.

Table 5: Construction Category of the Contractor

Contractor Category	Frequency	Percent
BC	20	60.6
GC	13	39.4
Total	33	100.0

Source: Own Survey, 2022

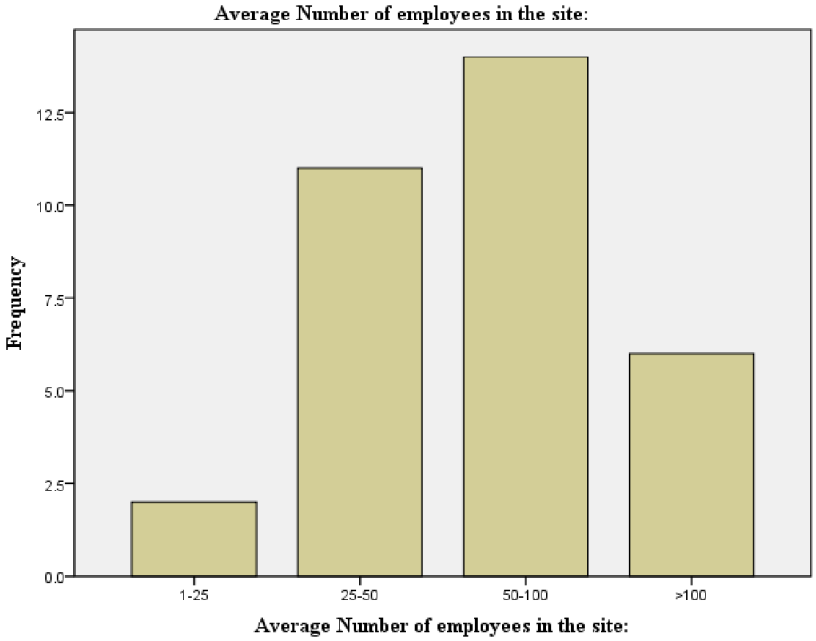
Based on the Construction Grade of the Contractors, the majority (81.8%) of the respondents are workers of grade one construction firm in Arba Minch university projects. This shows that most of the projects are taken by grade one contractors. Table 6 shows the grade of the constructions.

Table 6: Construction Grade of the Contractor

Construction grade	Frequency	Percent
1	27	81.8
2	3	9.1
3	3	9.1
Total	33	100.0

Source: Own Survey, 2022

Figure 1: Number of employees in the site



Source: Own Survey, 2022

From the collected data it is found that most construction site have between 50-100 workers in the site and only few construction sites that have less than 25 workers involved.

Table 7: Experience of the company on this project construction (in years)

Experience		Frequency	Percent
Valid	0-2	2	6.1
	2-5	14	42.4
	>5	17	51.5
	Total	33	100.0

Source: Own Survey, 2022

The above table shows 51.5% of respondents witnessed the companies have an experience of five and above years in Arba Minch University construction industry and 42.4 % have two up to five years of experience and the rest 6.1% of the company have less than two years of work experience in the University 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 area, which implies that the information forwarded could be important as required in the study.

4.3.2 Information about the respondents

Table 8: Respondent position (Work status)

Respondent position (Work status)	Frequency	Percent
Engineer	30	90.9
Forman	3	9.1
Total	33	100.0

Source: Own Survey, 2022

From the table 8 above, 90.9% of the respondents are Engineer who are working in both contracture and consultant firm and the rest 9.1% were Forman who are the first witness to most accidents in construction site. It is obvious that research questionnaire is highly influenced by the respondent, so the researcher tried to maintain the number of Engineers (Starting to junior to Site project manager) with Forman.

Table 9: Educational status of respondents

Educational status	Frequency	Percent
MSc/MA	5	15.2
Degree	26	78.8
Diploma	1	3.0
Others	1	3.0
Total	33	100.0

Source: Own Survey, 2022

Table 10: Respondents work experience (years)

work experience (years)	Frequency	Percent
0 -3	12	36.4
4-6	9	27.3
7-9	5	15.2
10-15	5	15.2
>15	2	6.1
Total	33	100.0

Source: Own Survey, 2022

From the above tables, 36.4% of the respondents have an experience below 3 years in the construction industry, 27.3 % have 4 up to 6 years of experience, 15.2 % have 7 up to 9

Years of experience and 6.1 % have greater than 5 years of experience in the construction industry and most of the respondents (78.8%) are degree holders.

4.4 Current Project Site Safety Measures

This section provides details on the Arba Minch University project site's current safety practices. The data was gathered via the questionnaire and thoroughly examined. The results were presented visually in tables and figures, and a follow-up interview was conducted with a subset of respondents to address any topics that need extra clarity or that were not thought to be addressed by the questionnaire.

4.4.1 Information about the project site safety measures

Table 11: Highest frequency of fatalities in the project

		Frequency	Percent
Death	Yes	1	3.0
	No	32	97.0
Disability	No	33	100.0
Temporary injury	Yes	33	100.0

Source: Own Survey, 2022

It is shown in the table that most of the accident that occur in the project causes Temporary injury and there were one death recorded due to construction accident in the sites.

It is found that Management/ Employee Carelessness is the major root cause of accident (51.5%) followed by Lack of Personal Protective Equipment (PPE) (24.2%), Lack of safety guidelines (21.2%), and finally Lack of knowledge, training (18.2%). Low quality material & safety budget cost also suggested by one engineer as cause of accident.

Table 12: causes of accidents

Causes of Accidents	YES (Frequency)	(%)
Lack of safety guidelines	7	21.2
Lack of Personal Protective Equipment (PPE)	8	24.2
Management/ Employee Carelessness	17	51.5
Lack of knowledge, training	6	18.2

Source: Own Survey, 2022

4.4.2 Major safety measures that are currently in use

Major safety measures used currently in the construction of Arba Minch University projects are rated in the table below.

Table13: Safety Measures

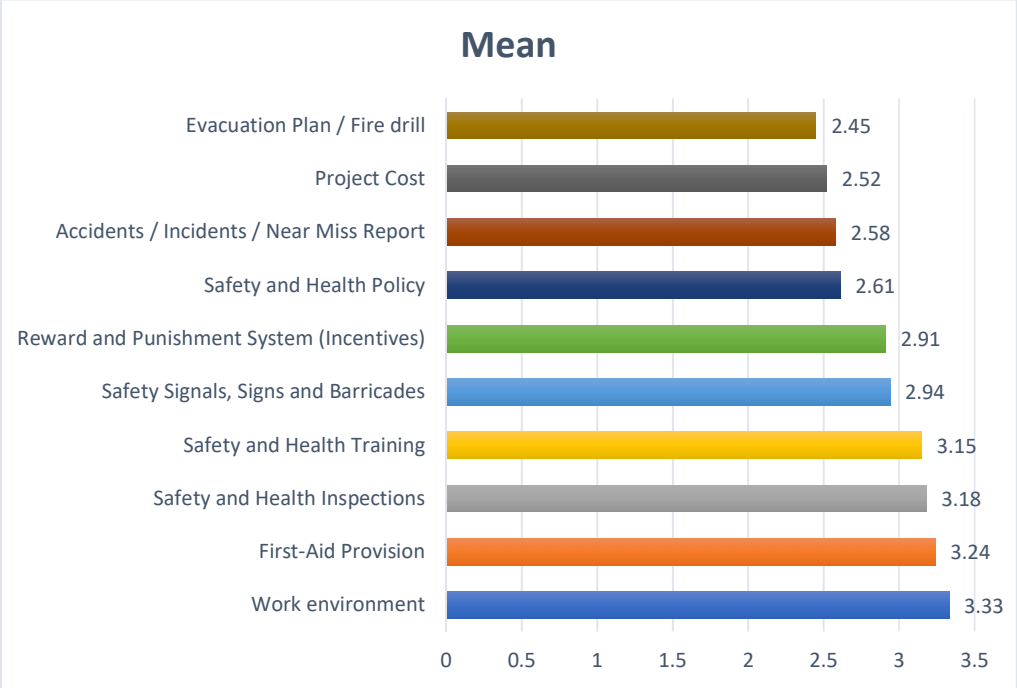
NO	Safety Measures	YES (%)	NO (%)
1	Do you have safety engineer in the site?	4 (12.1%)	29 (87.9%)
2	Do you have clinic in the site for medical aid?	2(6.1%)	31(93.9%)
3	Do you have first aid kit for accident?	33(100%)	
4	Do your project have a site-specific Safety measures plan?	11(33.3%)	22(66.7%)
5	Does your firm provide Personal Protective Equipment (PPE)?	19(57.6%)	14(42.4%)
6	Is there any manual of instruction on how to use Personal Protective	9(27.3%)	24(72.7%)

Source: Own Survey, 2022

Even if they are in different amount all of the listed safety related measures are currently in use throughout Arba Minch University projects. The projects are doing good regarding to have proper first aid kit for accident and more than half of them (57.6%) provide Personal Protective Equipment (PPE) for their employee. Whereas, in case of accident almost all of them do not have clinic in the site for medical aid. This may bring a lot of damage and worsen situations in case of accident. Also, majority of them (87.9%) do not have safety engineer which guide and mobilize the whole crew regarding safety measures. Nahusenai (2021) also found that over three quarters of the construction companies (71.7 percent) do not have a safety engineer on the site. This shows that proper safety measurement is not implemented in most of the projects in Arba Minch University. It is also found that there is no Safety measures plan and manual of instruction on how to use Personal Protective equipment in most projects.

4.4.3 Factors that impact the safety measures of construction projects

Figure 2: Factors that impact the safety measures



The above figure 2 shows that the impact of different factors on safety measures of construction projects. From the ten selected factors for this study, it is found that the work environment has the highest impact (mean of 3.33) followed by first aid provision and safety and health inspection. Safety training also has high impact on safety measures of Arba Minch university projects. On the contrary evacuation plan/Fire drill, project cost and Miss Report have less impact on safety measures in these project areas.

Setting a tide site might help to create a better working atmosphere. Access and traffic routes, material and storage management, site offices and services, the construction plant, manufacturing workshops, services and amenities, and the site attachment are all aspects of a tide site that must be identified. According to Zekri (2013), there is a clear link between the quality of the work environment and the level of safety on construction sites. Additionally, a high-quality work environment will enhance housekeeping and lower accident rates. In addition, it was recognized that poor housekeeping and messy construction sites were the leading causes of accidents.

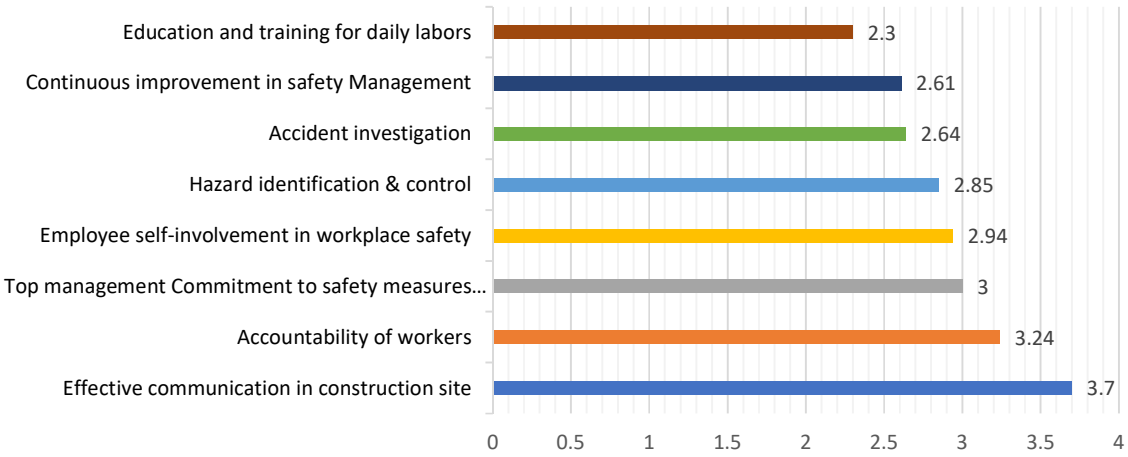
The term "safety and health policy" refers to an administrative ideology that is used to chart a course for an organization. It can be a series of acts or a well-thought-out decision. Zekri (2013) addressed a number of factors that influence construction site safety. The findings suggest that variables related to organizational policy are the most important group 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).

4.4.5 List of Occupational Safety and Health Administration (OSHA) safety Management System

From the figure shown below the response on the eight basic OSHAcademy's safety Management System it has been found that Education and training for daily labors are almost none existed and the rest seven systems are not existed and implemented in proper way. Out of 8 factors 6 of them are below the mean. This shows that the underpinning Safety Management techniques are not existed and implemented in Arba Minch University construction projects. The interview also shows most of the construction workers even do not have knowledge in this body of knowledge but perform some of them in informal way.

Nahusenai (2021) also founds that from the OSHAcademy's safety Management System, there is no education and training for daily labors about safety and other issues. The rest seven systems are not existed and implemented in planed way. Accident investigation, Hazard identification & control are also in lowest level of existence. In most site they only take reactive measurement for existed accidents.

Figure 3: Underpinning Safety Management techniques



	Effective communication in construction site	Accountability of workers	Top management Commitment to safety measures and good leadership	Employee self-involvement in workplace safety	Hazard identification & control	Accident investigation	Continuous improvement in safety Management	Education and training for daily labors
Mean	3.7	3.24	3	2.94	2.85	2.64	2.61	2.3

4.5 Interview Results and Discussion

Here under a summarized analysis of the interview question is presented. The interview was carried out with project managers and site supervisors to get more supportive information for the above questioner.

The construction company, according to all of the interviewees, does not have a safety policy. However, when there is a risk of head injury from collision, falling, or flying objects, site workers are required to wear helmets (hard hats) at all times. Also Workers on the job must always wear a luminous vest. Depending on the nature of their work, some employees are required to wear hand gloves, eye and face protection, and ear protection. In addition, first aid kits are available on site in the event of an emergency or accident.

From the interview summarized factors that impact safety measures are listed under: -

- ✓ Company owners' attitude towards
- ✓ Absence of health officer
- ✓ working environment

- ✓ Complexity of design
- ✓ Safety inspection
- ✓ Enforcing contractual specifications
- ✓ Project cost

The challenges for implementing proper safety measures are due to some contractors who do not provide personal protective equipment. Owners of the construction company are not willing to finance the required amount of budget for the implementation of safety measures.

In addition, a number of sites workers are not willing to use the personal protective equipment given to them the reason here is they said it lacks comfort and assume decrease productivity, and simply they handled on their hand for the sake of formality may inspectorate or supervisors can ask why they did not used at all.

As previously said, most construction firms lack an organized safety policy and structure that can be considered as a potential strength. The only thing that can be described as a good practice is supplying some personal protection equipment to selected personnel. Most construction organizations, on the other hand, continue to have a problem with poor safety management practices. As a result, three projects resulted in death, and the majority of the time, accidents and injuries occurred.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This last chapter of the study presents the summery of the findings which are obtained from the response of the research questionnaire. The conclusion drawn from the findings and the interview with respect to the research question and the recommendation for the existing safety measures are listed with future study suggestion.

5.2 Summary of findings

The construction sector has long been regarded as one of the most dangerous. According to empirical studies, the industry has a dismal safety record when compared to other industries around the world. The following is a summary of the study's main findings.

Most of the accidents on Arba Minch University construction projects are due Management/ Employee Carelessness (51.5%) followed by Lack of Personal Protective Equipment (PPE) (24.2%), Lack of safety guidelines (21.2%), and finally Lack of knowledge, training (18.2%). As the result of the accident that occur in the projects causes, there were one death record and many temporary injuries.

As per the data gathered on the construction projects, all of them do not have clinic in the site for medical aid. Also majority of them (87.9%) do not have safety engineer which guide and mobilize the whole crew regarding safety measures. Whereas all projects are doing good regarding to have proper first aid kit for accident and more than half of them (57.6%) provide Personal Protective Equipment (PPE) for their employee.

It was discovered that nearly no education and training for daily labors exists, and the remaining seven systems do not exist or are not executed well. Out of 8 factors 6 of them are below the mean. This shows that the underpinning Safety Management techniques are not existed and implemented in Arba Minch University construction projects.

5.3. Conclusions

From discussion of findings, results of this research and review of related literature the safety measures in Arba Minch university construction projects was investigated. The interview and questionnaire assisted in answering each research question and achieving the general and specific objectives specified in section 1.4 of the research.

According to records gathered on the construction site, 87.9% of contractors do not have a safety engineer on site, and 93.9 percent do not have a clinic. This demonstrates that the majority of the company does not place a high enough priority on worker safety. Carelessness/ignorance, poor working conditions/environment, and a lack of information and training are the primary causes of construction site accidents. These are the three most common causes of construction site accidents. This demonstrates that most accident causes can be mitigated by utilizing effective safety measures implemented by both the building business and individual workers. Workplace conditions and the availability of first-aid supplies for safety and health inspections have a significant impact on the safety measures implemented in university projects.

Employee safety training and orientation were virtually non-existent. Accident investigation, hazard identification, and control are at a minimum. Furthermore, senior management and project managers are unconcerned about safety precautions because they are preoccupied with schedules, costs, design revisions, and progress reports.

Some businesses are lacking in building site necessities such as safety signage and rules. Most site engineers on construction sites have a basic understanding of OSHAcademy's safety management system. This, however, does not represent the entire construction sector; some organizations go above and above the rules, adopting all safety management systems and supplying safety shoes, protective glasses, belts, and other personal protection equipment (PPE).

5.4. Recommendation

Based on the conclusions, and the results found from this study, the subsequent points can be recommended:

- ✓ Because the majority of construction site accidents are caused by workers' negligence or ignorance, there should be a provision for worker safety training and orientation, and top management should take action against workers who do not follow the laws. Construction companies and government agencies must make greater efforts to raise awareness and provide training for their workforces.
- ✓ Safety and health policies, as well as risk assessment, are critical issues that must be addressed effectively. In addition, the effectiveness of site safety and health inspections should be improved by employing a more qualified individual.
- ✓ Regular safety and health inspections, conducted by the authority's competent person, are required to monitor workplace safety and health performance and to alert construction companies of any violations.
- ✓ Since top managements and project managers are busy with schedule, cost, design changes and progress report and are not committed to safety measures

every contractor should have at list 1 safety engineer or nurse with small site clinic. But as a baseline first aid kit with proper trained Forman or site engineer should be present on the site.

- ✓ Government should take the initiative in enacting and enforcing relevant legislation by resourcing the right Ministries, Agencies, and Departments to accomplish their responsibilities effectively. 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 health and safety policies, procedures, and provisions.

5.5 Future work

- ✓ To encourage construction companies to take safety and health issues seriously, research can be conducted to estimate the cost of safety and compare it to the cost of accidents.
- ✓ Research can be carried out on how the safety related problems are affecting the cost, schedule, and quality performance of construction project.
- ✓ Because 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.
- ✓ Research can be extended to include safety measure that are taken by contractors in all Government university projects

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Appendix I

ADDIS ABABA UNIVERSITY

School of Commerce

Department of Project Management

QUESTIONNAIRE FOR CONTRACTOR & CONSULTANTS

In partial fulfilment of the requirement for degree of Master of Arts in Project Management

Assessment of Safety Measures in Construction Projects: The Case of Arba Minch University Projects

My name is Solomon Abebe. I am currently a graduate student at AAU College of Business and Economics School of Commerce in the Department of Management. This M.A thesis research questionnaire is designed to assess the practice of safety measures used currently in the construction of Arba Minch University projects. The objective of the study is to **assess the *safety* measures in the construction of Arba Minch University** projects by specifically investigating the methods implemented for safety management.

To achieve this objective the study requires the gathering of data related to safety measures used currently in the construction of Arba Minch University projects. The data collected will be used for academic purpose only; 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,

Solomon Abebe

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Email: solag1627@gmail.com

SECTION I. General Information

Company profile

1. Contractor Category: BC ☐ GC ☐

2. Construction grade: 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

3. Average Number of employees in the site:

1-25 ☐ 25-50 ☐ 50-100 ☐ >100 ☐

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

0-2 ☐ 2-5 ☐ >5 ☐

Information about respondents

1. Respondent position (Work status): Engineer ☐ Forman ☐

2. Educational status of respondents

PhD ☐ MSc/MA ☐ Degree ☐ Diploma ☐ Others……

3. Respondents work experience (years)

0 -3 ☐ 4-6 ☐ 7-9 ☐ 10-15 ☐ >15 ☐

Information about the project site safety measures

1. Which following fatalities at the project happen with the highest frequency?

☐ Death ☐ Disability ☐ Temporary injury

If other, please
specify……

2. Most of the accidents on your construction site are due to:

☐ Lack of safety guidelines ☐ Lack of Personal Protective Equipment (PPE)

☐ Management/ Employee Carelessness ☐ Lack of knowledge, training

If other, please specify……

SECTION II.

1. What are the major safety measures used currently in the construction of Arba Minch University projects? Tick on the space provided based on the condition that are implemented on your construction project site.

No	Main safety measures used	YES	NO
1	Do you have safety engineer in the site?		
2	Do you have clinic in the site for medical aid?		
3	Do you have first aid kit for accident?		
4	Do your project have a site-specific Safety measures plan?		
5	Does your firm provide Personal Protective Equipment (PPE)?		
6	Is there any manual of instruction on how to use Personal Protective Equipment (PPE)?		

2. Factors that impact the safety measures in your construction project. Please Mark "X" on the space provided Rank the list on next table from 1 to 5 based on their Impact

(Where 1=Very Low, 2=Low, 3=Average, 4= High and 5= Very High)

No	**Description**	1 Very Low	2 Low	3 Avg	4 High	5 Very High
1	Project Cost					
2	Safety and Health Policy					
3	Accidents / Incidents / Near Miss Report					
4	Evacuation Plan / Fire drill					
5	Safety and Health Training					
6	First-Aid Provision					
7	Safety Signals, Signs and Barricades					
8	Reward and Punishment System (Incentives)					
9	Work environment					
10	Safety and Health Inspections					

3. Which of the following underpinning **Safety Management** techniques are **existed and implemented** in your construction site? Sign'×' mark on the option that you agree on the space provided

1=Never, 2=Rarely, 3=Sometimes, 4= Often and 5= Always

SN	List of Occupational Safety and Health Administration (OSHA) safety Management System	1	2	3	4	5
1	Top management Commitment to safety measures and good leadership					
2	Accountability of workers					
3	Employee self-involvement in workplace safety					
4	Effective communication in construction site					
5	Hazard identification & control					
6	Accident investigation					
7	Education and training for daily labors					
8	Continuous improvement in safety Management					

Appendix II

Interview Questions

1) Does your construction firm have Safety policy?
2) What are some of the most important safety precautions you take in this construction project?
3) What are the most important factors that impact safety measures in this construction project?
4) What challenges do you face in implementing proper safety measures in your project?
5) What are the strengths of your construction firm in implementing proper safety measures?
6) What are the weaknesses of your construction firm in implementing proper safety measures?
7) What kind of safety problems does the project encounter?