JIMMA UNIVERSITY
JIMMA INSTITUTE OF TECHNOLOGY
SCHOOL OF GRADUATE STUDIES
FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING
CONSTRUCTION ENGINEERING AND MANAGEMENT CHAIR

A COMPARATIVE STUDY ON OCCUPATIONAL HEALTH AND SAFETY PRACTICES BETWEEEN DOMESTIC AND FOREIGN CONTRACTORS. (A CASE OF ADDIS ABABA CITY PUBLIC CONSTRUCTION PROJECTS)

A Thesis submitted to School of Graduate Studies, Jimma University, Jimma Institute of Technology, Faculty of Civil and Environmental Engineering in Partial Fulfillment of the Requirements for the Degree Master of Science in Construction Engineering and Management

By

Gezahagn Belay Tafese

September, 2020

Jimma, Ethiopia

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Advisor: Dr Tamene Adugna
Co-advisor: Mr Moges Getahun

September, 2020
Jimma, Ethiopia

DECLARATION

I, declare that the study entitled "A **Comparative study on occupational health and safety practices between domestic and foreign contractors. (A case of Addis Ababa city public construction projects)"** is the result of my own effort and study that all sources of materials used for the study have been acknowledged. I have conducted the study independently with the guidance and comments 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 Science degree of construction engineering.

Gezahagn Belay Tafese _____ _____

Signature Date

As research Adviser, I hereby certify that I have read and evaluated this thesis paper prepared under my guidance, by Gezahagn Belay Tafese entitled "A COMPARATIVE STUDY ON OCCUPATIONAL HEALTH AND SAFETY PRACTICES BETWEEEN DOMESTIC AND FOREIGN CONTRACTORS. (A CASE OF ADDIS ABABA CITY PUBLIC CONSTRUCTION PROJECTS)"and recommend and would be accepted as a fulfilling requirement for the Degree Master of Science in Construction Engineering and Management.

Advisor: Dr Tamene Adugna _____ _____

Signature Date

Co - Advisor: Mr Moges Getahun _____ 08/09/2020

Signature Date

ABSTRACT

The 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. I*n Ethiopia, accounting for 18% of the country's GDP for the financial year 2017-2018. The government has pumped millions of dollars into social housing, which has been a windfall for both foreign and local building contractors, and the construction sector is currently the largest employer in the country, with more than two million people employed in full-time and temporary jobs.*

The nature of the construction work is dangerous, risky and needs attention in integrating health and safety management into the entire process. How to reduce the accidents and ill-health problems at construction sites in public construction projects has been a challenge for a long time, and the main objective of this study was to assess the current health and safety management practices of domestic and foreign contractors working in public construction projects which found in Addis Ababa city.

The study was qualitative and quantitative type and the data was collected from both primary and secondary sources. The data was analyzed by using Microsoft excel.

The result of the data shows that foreign contractors are relatively good in managing health and safety than the domestic contractor. Even though the country has a different code of practice to manage the health and safety performances of the contractor but the result indicates that there is a lack of enforcing those rules and regulations by the government and regulatory bodies. As the result shows 83% of respondents from foreign companies and 29% of respondents from domestic companies believe that health and safety is used as a criterion during the prequalification phase of public bidding.

The researcher recommends that every stakeholder of the industry should work together to reduce the safety risk of construction sites and to make the construction site healthy and safe for everyone.

Key Words: Occupational Health and Safety, Domestic, Foreign, Contractors.

ACKNOWLEDGEMENT

At the beginning, I would like to thank the Almighty God for giving me strength to endure the challenges in my quest to complete this study. Next, I would like to thank my Adviser Dr Tamen Adugna and Co- Adviser Mr Moges Getahun for their advice and patience throughout the process of completing the study. And also any others who participate directly and in directly.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

EBCS	Ethiopia Building Code Standard
GDP	Gross Domestic Product
HSE	Health and Safety Executive
ILO	International Labour Organization
OHS	Occupational Health and Safety
RII	Relative Importance Index
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

The 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, the construction industry contributes to 11% of gross domestic products (GDP) in most developing countries (Giang and Pheng, 2010). In Ethiopia, it accounts for 18% of the country's GDP for the financial year 2017-2018. The government has pumped millions of dollars into social housing, which has been a windfall for both foreign and local building contractors, and the construction sector is currently the largest employer in the country, with more than two million people employed in full-time and temporary jobs. Numerous projects have turned around Ethiopia's economic decline, particularly in the city of Addis Ababa. Currently, the country forms the heart of Africa's economic evolution due to high demands in the construction sub-sectors. The wave of construction in Addis Ababa has spilled into other Ethiopian cities, causing investors to take serious measures in expanding their business in the country. **(https://semonegna.com/challenges-facing-ethiopia-construction-industry-sector)**

According to the report by national fire association (2008, 20-80), construction activities has 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, dust, using plant and equipment, fire, exposure to live cables, poor housekeeping and ergonomics.

Historically, the construction industry has a poor health and safety (H&S) performance track record (Windapo, 2013). According to Chileshe and Dzisi (2012), governments and industry bodies globally acknowledge that construction has an undesirable accident record and that persistently poor H&S records continue to hinder performance improvement. Further, global estimates by the Foreign Labor Organization (ILO) confirm that H&S problems in the sector are more extensive than previously recorded (Murie, 2007). For many years construction has consistently been among those industries with the highest injury and fatality rates (Khalid, 1996; Hanna et al., 1996 cited in Haupt, 2001). Statistical data show that, worldwide, the highest rates of occupational deaths occur in agriculture, forestry, mining and construction (Alli, 2008).

The construction industry has, therefore, earned the reputation of being a dangerous or highly hazardous industry because of the disproportionately high incidence of accidents and fatalities that occur on construction sites around the world (Smallwood and Haupt, 2008). Foreign, construction workers are two to three times more likely to die on the job than workers in other industries while the risk of serious injury is almost three times higher. Health and safety, therefore, is an economic as well as humanitarian concern that requires proper management control.

According to [Seifedin.s, 2014], the Safety of construction is one of the essential components in the processes of construction when it can be preferred as a mitigation measurement before an incident occurring. However, in all over Ethiopia, millions of daily laborers work in big constructions through unsafe working environment. They work on high rise buildings standing on old and inclined wooden scaffolds and ladders; they even transport heavy construction materials on them. Moreover, the constructions do not have safety nets, restraint and fall arrest systems. As a result, a dozen daily laborers get different serious injuries. Many, in fact, lose their lives.

One of the most common myths that have plagued this industry is that health & safety comes at a cost. Construction managers tend to believe that introducing and executing measures that ensure health and safety in the construction sector will lead to higher costs and hence lower profitability. However, it has been proved that investment in construction health and safety actually increases the profitability by increasing productivity rates, boosting employee morale and decreasing attrition (Mohammed, 2003). Construction safety and health management, therefore, deals with actions that managers at all levels can take to create an organizational setting in which workers will be trained and motivated to perform safe and productive construction work. The system should delineate responsibilities and accountabilities. It should also outline procedures for eliminating hazards and identifying potential hazards before they become contributing factors to unfortunate accidents.

Studies have shown that the true costs of construction injuries can have a substantial impact on the financial success of a construction organization and may increase overall construction costs by as much as 15% (Everett and Frank, 1996). The calculated costs of construction accidents to a large extent represent the losses incurred by a construction organization (Tang, Ying, Chan, and

Chan, 2004). Construction accidents cost the construction organization, the sector and the national economy a great deal annually (Pillay, 2014).

1.2 Statement of the problem

Recently, Ethiopia's construction industry has experienced considerable growth in construction activities. In Addis Ababa city both the city administration and FDRE government is constructing too many projects. Therefore it provided employment opportunities for wide range of laborers, both skilled, and the urban poor who do not have many skills.

Despite its importance, construction sites have been regarded as very risky areas where construction workers are subject to fatalities and ill- health problems. Many building construction activities are inherently risky to health and safety such as working at height, working underground, working in confined spaces and proximity to falling materials, handling loads manually, handling hazardous substances, noises, dusts, using plant and equipment, fire and exposure to live cables. In Ethiopia Construction site accidents have not been well recorded. Nevertheless, it is reported that many people lost their lives on construction sites and many more seriously injured. Not only are construction workers who suffer injuries and death but also people and children who are not engaged in the industry.

Moreover, deaths, permanent disabilities and severe injuries have been on the increase for building workers through major accidents and poor working conditions. This unfortunate scenario has been a monumental threat to the productivity and the overall performance of construction projects as well as diminishing the labor force and the economy of the country. How to reduce the accidents and ill-health problems at construction sites in in public construction projects has been a challenge for a long time. To address the aforementioned health and safety issue, risk assessment, communication and control has been argued to be a focal point for reducing accidents and ill-health problems on construction sites (Kirchsteiger 2005; Smith et al. 2006; Jung et al, 2008).

1.3 Justification of the research problem

In the construction industry most of the companies use construction safety and health as formality only, because there is no self-dependent public institute to enforce the implementation and to control the performance of the contractor in practicing health and safety. Health and safety problems occur in many public projects..

1.4 Research Question

1. What is the nature of safety and health risks in public construction projects?
2. What are the current practices in health and safety management?
3. Is there any difference between domestic and foreign contractors in practicing health and safety?
4. Is that safety is a criteria for selecting contractor during prequalification phase?

1.5 Objectives

❖ **General objective**

The main objective of this study is to assess the current health and safety management practices of domestic and foreign contractors working in public building construction projects found in Addis Ababa city.

❖ **Specific objective**

- To examine the nature of health and safety problems in public construction projects.
- To identify the current practices in health and safety management.
- To identify the difference of domestic and foreign contractors in practicing health and safety.
- To identify whether the safety is used as criteria in selecting a contractor during the prequalification phase of public bidding.

1.6 Significance of the study

- To improve health and safety standards at construction sites by covering general health and safety provisions as well as duties and responsibilities of the employers, engineers, and contractors regarding safety measures and the minimum requirements.
- To show Measures to be followed during all the stages of the project to provide safe work-place to all employees and to protect them against accidents.

1.7 Scope of the study

The study was limited to public building projects in Ethiopia, Addis Ababa city. The scope of the study focuses on assessing the health and safety practices of both domestic and foreign contractors which are in under construction for last 3 years.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

According to Tranfield et al., (2003) Undertaking a review of the literature is an important part of any research project to specify a research question that will further develop the knowledge base. It underlines all underpinning knowledge that can be used and correlated to the project, to establish an understanding of the problem or gap being considered, and informs the reader of the topic under review. This review will look at and give a background to health and safety definitions and discuss generally events within such an environment, and then move on to develop current research and work undertaken to identify and give justification to the health and safety areas to be discussed.

2.2 Definition of terms

Before initiating a debate and discussion regarding occupational health and safety issues, a few definitions need to be clarified, and the associated legal framework discussed. It is important towards having a clear perspective on the specific nature of the sector and the associated working conditions normally encountered within the construction sector. This would contribute towards enhancing the existing health and safety standards prevailing therein.

Health

Lecture note by Mewael (2015) defines that Health is the general condition of a person in mind, body, and spirit, usually meaning to be free from illness, injury or pain. It deals with chronic hazards; a chronic effect is long term deterioration due to prolonged exposure to milder adverse conditions. The World Health Organization (WHO) defined health in its broader sense in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (WHO, 2006). In this study, health means being free from illness, injury or pain which can be caused by construction activities.

Safety

According to the lecture note by Mewael (2015) Safety deals with acute hazards; an acute effect is a sudden reaction to a severe condition. It is related to external threats, and the perception of being sheltered from threats. According to the Business Dictionary, safety is defined as relative freedom from danger, risk, or threat of harm, injury, or loss of personnel and/or property,

whether caused deliberately or by accident. Safety can also be defined as the control of recognized hazards to achieve an acceptable level of risk. In this study, safety means freedom from danger, harm, and injury to the person involved in construction activities.

Hazards

Health and Safety Executive (HSE) (2004) define a hazard as any source of potential damage, harm or adverse health effects on something or someone under certain conditions at work. A hazard is the potential for harm. In practical terms, a hazard is often associated with a condition or activity that, if left uncontrolled, can result in an injury or illness. A hazard can cause harm or adverse effects (to individuals as health effects or organizations as loss of property or equipment). According to EBCS 14 "Hazard" means the inherent potential of any machine, material, or ambient factors to cause illness or injury from contact with or exposure to construction works. In this study, hazard means anything which has the potential to cause harm to people on construction sites.

Accident and Injury

Andersson (1999) said that the terms accident and injury refer to separate phenomena, mutually interrelated as cause and effect (exposure and outcome). The terms „accident" and „injury" are hereby used by the definition adopted at the first World Conference on Accident and Injury Prevention (WHO, 1989); that is, an accident is an unintentional event which results or could result in an injury, whereas injury is a collective term for health outcomes from traumatic events (Andersson, 1999). Rejda (1992) defined an accident as a "sudden, unforeseen and unintentional" event, which may result in physical harm to a person and/or damage to property.

The use of the term „accident" in this thesis is based on an event that causes physical harm or damage to the body resulting from an exchange, usually acute, of mechanical, chemical, thermal, or other environmental energy that exceeds the body's tolerance.

2.3 Occupational safety and health

Occupational health and safety has been defined by the Foreign Labour Organization (ILO), 2001 as: *"The prevention and maintenance of the highest degree of physical, mental and social well-being, the prevention of ill-health among workers caused by their working conditions, The protection of workers from factors adverse to their health in their employment, and the placing and maintaining workers in occupational environments adapted to their individual and psychological conditions."*

According to WHO (1995), occupational safety and health can be defined as a multidisciplinary activity aiming at:-

- Protection and promotion of the health of workers by eliminating occupational factors and conditions hazardous to health and safety at work
- Enhancement of physical, mental and social well-being of workers and support for the development and maintenance of their working capacity, as well as professional and social development at work
- Development and promotion of sustainable work environments and work organizations The ILO/WHO definition of occupational health is "The promotion and maintenance of the highest degree of physical, mental social well- being of workers in all occupation" and the WHO considers occupational health service to be responsible for the total of worker and, if possible, his or her family.

2.4 Health and safety management practices

The definition from wikipedia.org states that Safety can be defined to be the control of recognized hazards to achieve an acceptable level of risk. This can take the form of being protected from the event or from exposure to something that causes health or economical losses. It can include the protection of people or possessions of construction companies. Assessment of occupational hazards, as well as the assurance of occupational safety at a construction site, is an extremely important question to be analyzed. It has been estimated that every third occupational fatality or injury occurs at a construction site. Also, in comparison to other areas of economic activities, many more violations of regulatory enactments on health and safety are registered in the construction sector (ILO 2006). On the other hand, Construction Site Safety Management is defined as the efficient and effective implementation of the policies and tasks necessary to satisfy the safety of a construction firm's employees and management. Construction safety management focuses on the careful management of the processes involved in the production and distribution of products and services within construction sites (Bernold et al. 1993). According to Bernold et al (1993) activities such as the management of purchases, the control of inventories, logistics, and evaluations are often related to construction site safety management. Therefore, construction site safety management includes the analysis and management of internal processes. Paulson (1992) argues that safety is a subject to which most people are quite willing to pay lip service, but which too few are willing really to do something about. Safety and health are of profound

importance, particularly in the construction industry. Because, as stated in Foreign Labour Office (ILO) (1995) in many countries known fatal accidents, and those involving loss of working time in this industry, frequently exceed those in any other manufacturing industry. Contributing to the high rate of accidents are those characteristics of the industry which distinguish it from the rest of the manufacturing sector. These are:

- The high proportion of small firms and self-employed workers;
- The variety and comparatively short life of construction sites;
- The high turnover of workers;
- The large numbers of seasonal and migrant workers, many of whom are unfamiliar with construction processes;
- Exposure to the weather; and
- The many different trades and occupations (ILO, 1995).

On the other hand, Helander (1991) states that construction workers are much more hazardous than most other occupations. Most accidents involve falls of persons and occur during work on roofs, scaffolds, and ladders. The collapse of structures and falling materials also account for many fatalities. Many of these accidents can be avoided by the establishment of procedures and regulations to enhance safety. And often construction workers underestimate the hazards in their work. This affects the motivation for adopting safe work procedures. Helander (1991) further states that the cost of construction accidents amounts to about 6% of total building costs.

There are hence forceful monetary incentives in construction safety. Consequently, these may encourage the industry as well as agencies to invest in this area. Accordingly, managing safety and health is not only good for safety; it also gives good financial benefits. Ignoring safety can result in accidents and ill-health which not only reduces the profits but can also go to the extent of crippling the whole company. Similarly, Rozario (1996) maintains that to increase efficiency and reduce accidents, which not only benefits the individual construction company but also the whole nation, there should be a consistent high standard of performance throughout the construction industry.

Pouliakas and Theodossiou (2010) also stressed the significance of safety and health by stating that the increasing competition related to the globalization era, the predominance of service-oriented industries, the rising job insecurity associated with labor market flexibility (e.g. part-time/ temporary contracts) and the shifting demographic composition of the workforce (towards

more female, racially diverse and elderly employees), poses important challenges for the health and safety of workers in modern economies. Given the rapidly changing economic environment of recent decades, health and safety have therefore gained new impetus, spurred primarily by the non-trivial costs it entails to both individual and national welfare.

As stated by the Construction Industry Training Board (CITB) (1990), the employees „health, safety and welfare at work are protected by law. The employer must protect the employees and to keep them informed about safety and health. However, employees also have a responsibility to look after themselves and others.

Scientific and legal literature largely focuses on solutions to different issues about health and safety at work. Easter, Hegney, and Taylor (2004) emphasize teamwork as the key strategy for accident prevention in construction crews. Holt (2001) analyzed the ergonomic aspects of workers executing daily construction tasks. Parker (2006) analyzed the occupational accident patterns and proposes strategies for improving safety. It is emphasized that more investigations should be undertaken to reveal options for improving education and training effectiveness of construction workers in the area of health and safety (Bentley *et al*, 2006).

In general, accidents at construction sites could be qualified as defects of the health and safety management system, which occur due to several aspects, including technical, technological, organizational and other types of factors (Dessler. 2008). Such multiple criteria aspects of risk and safety in construction or reconstruction works have been analyzed by Bechal *et al.* (2012) and Parker. (2006). besides, any unwanted construction event is usually related to health and safety solutions established in technological work cards of the construction technology project.

2.4.1 Health and Safety management practices around the world

Considering the importance of the health and safety of construction workers in the industry, different countries have designed their norms, which fit their specific objectives. The Foreign Labor Organization (ILO) provides specific guidelines on health and safety in construction activities. The general objectives of health and safety norms/codes in any country construction industry can be summarized as:

- To help prevent accidents and harmful effects on the health of those employed in the construction industry.
- To provide guidelines in the appropriate design, selection, installation and safe operation of equipment, and process related to civil engineering work.

- To guide in establishing administrative, legal and educational frameworks within which preventive and remedial measures can be implemented

Rizwan, (2015) discussed that here is much variation in occupational structures, working conditions, environment and the health status of workers in different parts of the world, in different countries and different areas of the economy. Therefore, the structure of the construction industry is not consistent throughout the world. Nowadays construction industry plays a key role in expanding the economy of any country, especially a developing country. It supplies the infrastructure required for other sectors of the economy to thrive. Many studies have indicated that the construction industry brings a level of economic development in the country. The construction industry everywhere faces difficulties and challenges. Nevertheless, in developing countries, these issues and challenges are present together with a general level of socio-economic stress and a reduced productivity rate when compared to developed countries.''

Another study by " Tente, (2016) discussed that construction plays a part in many economic sectors (ILO Construction OS & H), as the industry contributes more than a tenth of the global GDP and it is believed to employ over 7per cent of the world's entire workforce (Kayumba, 2013). However, construction is recognized as the most dangerous industry in which to work (Lingard and Rowlinson,2005). This is supported by the fact that there are around 340 million occupational accidents and 160 million victims of work-related illnesses annually worldwide (Neale, 2013). For instance, in Asia; China and Japan recorded significant levels of injuries and fatalities in the construction industry (Chan et al., 2004). In Thailand, the industry faced high accident and injury rate at the project level. Furthermore, in 2003 Thailand's construction industry accounted for 14 percent of the total number of 787 deaths at work and 24 percent of the total seventeen cases of permanent disability (Aksorn and Hadikusumo, 2007). Despite the industry not recording the highest in accident statistics in Malaysia, a worrying increase in the number of accidents was recorded (Abdullah and Wern, 2011).

2.4.2 Developing Countries health and Safety management Practice

The construction industry is an important part of the economy in many countries and is often seen as a driver of economic growth especially in developing countries. Owing to its relatively labor-intensive nature, construction works provide opportunities for employment for a wide range of people skilled, semi-skilled and unskilled. Despite its importance, construction

industries are considered risky with frequent and high accident rates and ill health problems to workers, practitioners, and end-users.

According to Al Hajeri (2011) "There is a wide variation in economic structures, occupational structures, working conditions, work environment, and the health status of workers in different regions of the world, in different countries and different sectors of the economy. Therefore the mechanization of the construction industry is not uniform throughout the world. However, the construction industry plays a vital role in boosting the economy of any country, especially a developing country. It provides the infrastructure required for other sectors of the economy to flourish. Many studies, such as Coble and Haupt (1999) have shown that the construction industry reflects the level of economic development within the country. The construction sector everywhere faces problems and challenges. However, in developing countries, these difficulties and challenges are present alongside a general level of socio-economic stress and a lower productivity rate when compared to developed countries (Ofori, 2000). Nevertheless, it is generally believed that the construction industry is a good source of employment at various levels of skills, from general labor to semiskilled, skilled and specialist workforce. Other major areas that impact on this sector are lack of research and development, lack of trade and safety training, client dissatisfaction, and the continuously increasing construction costs (all of which result in less profitability).

2.4.3 Health and Safety management Practice in Ethiopian Construction Industry

The construction industry, in general, is comparatively less organized and involves the participation of a major percentage of unskilled labor as compared to other industrial sectors. As a major employment generator in many parts of the world, construction is also a sector associated with a proportionately high number of job-related accidents and diseases. Despite mechanization, the industry is still largely labor-intensive, while working environments are frequently changing and involve many different parties. Rizwan, (2015) quoting from (Singh et al., 1999) in a developing countries health and safety rules hardly exist at all.

The construction industry in developing countries is generally underdeveloped, dysfunctional or non-existent. Many developing countries, especially in Africa and Asia, do not have consistent national building codes and regulations. Wherever they exist they are inappropriate, out of date, ineffective, outmoded and based on conditions that prevailed while they were still being colonized. It is of particular importance to the construction industry, where it is one of the major

employers of the workforce in Ethiopia. Statistics indicate that injuries and death due to construction-related accidents are increasing. Most construction industry accidents in Ethiopia have not been reported and well recorded. Nevertheless, it is reported that many people lost their lives on construction sites and many more seriously injured. Not only are construction workers who suffer injuries and death but also people and children who are not employed in the industry. Besides human tragedies, accidents could substantial economic cost to the industry due to the fact it could also cause damage to plant and equipment, damage to work already completed, loss of productive work time while debris is cleared and damaged work rebuilt, increased insurance premiums, and, loss of confidence and reputation.

According to the [AACEPRA], Addis Ababa City Fire, Emergency Prevention and Rescue Agency's 2017 nine-month report, there have been 410 accidents, most of which occurred in highly-populated slum areas. 291 of the accidents were fire-related and the rest happened at or near construction sites.

According to Ethiopian construction project management institute [ECPMI, 2017] study, it has been confirmed that over 900 people have lost their lives due to a lack of proper safety procedures during this fiscal year alone.

2.5 General duties of competent authorities in health and safety management

According to ILO, (1992) the competent authority should provide appropriate inspection services to enforce or administer the application of the provisions of the national laws and regulations and provide these services with the resources necessary for the accomplishment of their task, or satisfy itself that appropriate inspection is carried out. The measures to be taken to ensure that there is organized co-operation between employers and workers to promote safety and health at construction sites should be prescribed by national laws or regulations or by the competent authority. Such measures should include:

- The establishment of safety and health committees representative of employers and workers with such powers and duties as may be prescribed;
- The election or appointment of workers' safety delegates with such powers and duties as may be prescribed;
- The appointment by the employer of suitably qualified and experienced persons to promote safety and health;
- The training of safety delegates and safety and health committee members.

1. Contractors

In terms of effectiveness, safe working conditions at construction Jobsites are best achieved when the prime or general contractor assumes his rightful leadership role and takes the responsibility to (a) establish, (b) coordinate, (c) monitor and (d) generally manage the overall basic safety program content and structure for all parties and persons at his job site. Undefined authority among the parties involved related to job site safety is not a workable arrangement for such an important matter that affects the life and limb of every worker on the job site. (Mouleeswaran.K)

2. Safety officer/manager

Every construction company of any size should appoint a properly qualified person (or persons) whose special and main responsibility is the promotion of safety and health. (Safety, health and welfare on construction sites, a training manual)**.** Proactive companies may establish a safety committee composed of upper management, risk managers, safety directors, and operational staff to continually discuss and review safety performance. (George Cesarini G. H.) Whoever is appointed should have direct access to an executive director of the company. To carry out the functions the safety officer should have experience of the industry and should be properly trained and qualified and, where such exists, should be a member of a recognized professional safety and health body. (Safety, health and welfare on construction sites, a training manual)**.**

3. Consultants/ Supervisors

Good planning and organization at each worksite and the assignment of clear responsibility of supervisors are fundamental to safety in construction. Each supervisor requires the direct support of site management and should seek to assure within his or her field of competence that: Working conditions and equipment are safe; Workplace safety is regularly inspected; Workers have been adequately trained for the job they are expected to do; Workplace safety measures are implemented; The best solutions are adopted using available resources and skills, and Necessary personal protective equipment is available and used. Making the worksite safe will require regular inspection and provision of the means for taking remedial measures. The training of workers enables them to recognize the risks involved and how they can overcome them. Workers should be shown the safe way of getting a job done. (Safety, health and welfare on construction sites, a training manual)**.**

4. Client

A case study by (kerry.B, Rachel. R and Michael.C) Communication was a key feature in achieving client-led safety initiatives and for driving a top-down approach to safety. This more intensive approach to communication meant communicating safety messages for the overall project direction or directly communicating with personnel on-site. Further, the client's involvement (or that of a client's representative) with on-site activities including inductions, safety meetings, inspections and safety walks was perceived as contributing to safety best practice. In the case of Sydney Airport Gate 24, client representatives were involved with activities on-site maintaining frequent communication with the contractor and closely monitoring safety. In some cases, client-appointed external facilitators reported directly to the client. In the Wivenhoe Alliance, the facilitator worked through safety goals and objectives and communicated effectively and openly with other stakeholders. (Zekri, 2013)

5. Safety Committees

An active safety committee is a great spur to safety. Its primary purpose is to enable management and workers to work together to monitor the site safety plan to prevent accidents and improve working conditions on-site. Its size and membership will depend on the size and nature of the site and upon differing legal and social conditions in the countries concerned, but it should always be an action-oriented group of people in which both management and workers are represented. The safety committee carrying out a site inspection together raises the level of safety consciousness at the site. (Safety, health and welfare on construction sites, a training manual)**.**

6. Outside Agencies

a) Government Intervention

In many countries, laws and regulations are governing the conditions of work in the construction industry. These are usually enforced by factory or labor inspectors who are often also able and willing to provide advice on compliance. However, even in the best-regulated countries, the numbers of inspectors are too few to provide day-to-day surveillance on-site, even where it is their job to do so. (Safety, health and welfare on construction sites, a training manual)**.**

b) Foreign Agreements national laws and regulations are often based upon foreign conventions, agreements, declarations, and programs. These have been drawn up by different United Nation Organizations including the Foreign Labor Organization (ILO) and the World Health

Organization (WHO). In 1988 the ILO adopted the Safety and Health in Construction Convention (No.167), and its accompanying Recommendation (No.175), which provides a foundation of law on which safe and healthy working conditions can be built. (Safety, health and welfare on construction sites, a training manual)**.**

7. Workers

Every worker is under a moral, and often also a legal, duty to take the maximum care for his or her safety and that of fellow workers. There are various ways of involving workers directly in site conditions, such as:

- "Toolbox briefing", a five- to ten-minute session with the supervisor just before starting a task gives the workers and the supervisor a chance to talk about Safety problems likely to be encountered and potential solutions to those problems. This activity is simple to implement and it may prevent a serious accident;
- "Safety check"; a check by workers that the environment is safe before starting an operation may allow them to take remedial action to correct an unsafe situation that could later endanger them or another worker. (Safety, health and welfare on construction sites, a training manual)**.**

2.6 Accident and Cause of accident in construction site

According to literature by (Chi *et al*, 2005; Murie 2007) Accidents are viewed as originating from a technical or human error. The multiple accident causation theory postulates that many contributory causes are leading to an accident (Heinrich 1931). The causes are categorized into behavioral and environmental factors. Behavioral factors include attitudes, skills, and knowledge. Environmental factors include Worksite hazards and procedures that contribute to injuries (Taylor et al., 2004). Tam, Zen, and Deng (2004) concurs with this view and suggests that the main factors affecting safety in China were managers' poor safety awareness, lack of training, reluctance to commit resources to safety, and reckless operations. Furthermore, Dessler (2008) conducted a study in the Lithuanian Republic and identified that the major reasons for serious and mortal accidents are inexperienced employees, lack of qualifications and understanding risk on a construction site. Raymond, Revitt, and Samelson (1997) surveyed in Malaysia to identify the causes of accidents on construction sites; they found that unsafe methods, including incorrect procedures, knowledge level, and disobeying procedures are the most frequent reasons for accidents on construction sites. In addition to these causes, Holt (2001)

argued that secondary causes of accidents centered on management pressures, such as financial restrictions, lack of commitment, inadequate policy and standards, deficient knowledge and information, restricted training and task selection, and poor quality control systems. He further emphasized that incomplete structural connections, temporary facilities, tight work areas, varying work surface conditions, continuously changing work-sites, multiple operations and crews working nearby are common causes of construction-related deaths and injuries.

To conceptualize the literature (above) on sources of accidents and ill-health problems on construction sites, it is observed that the causes of construction accidents can generally be classified into the five most influential factors namely, site conditions, equipment and materials, human, management and job factors (building/task itself). The Figure below represents a summary of the sources of health and safety risk on construction sites. The sources include site conditions such as the nature and physical layout of the work, location and weather, equipment and materials specification such as paint and asbestos that have the potential to cause ill-health problems. The human factor includes human behavior, competence, attitude and management such as leadership and safety culture of the organization. The job factors include the nature of the task, design, detail, duration and the size of the structure itself.

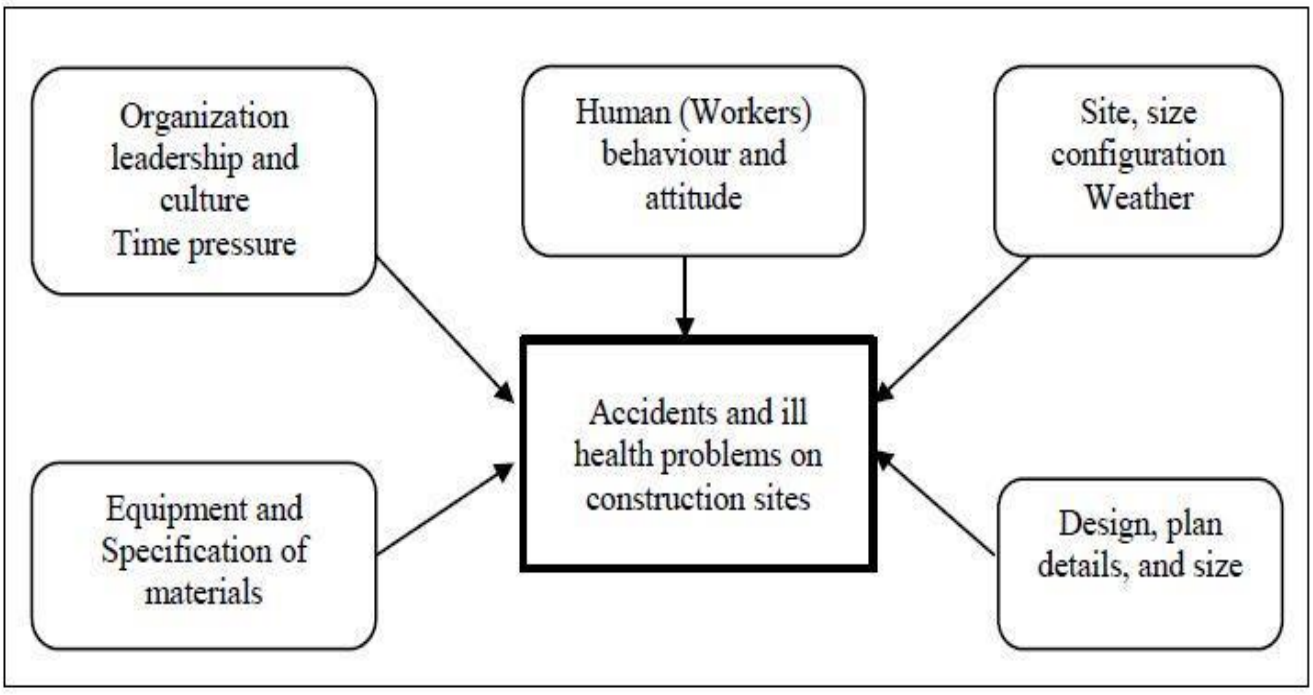

Figure 2.1: Accidents and ill health problems on the construction site

According to the notebook by Mr. Mewael (2015), the followings are major causes of accident on construction sites:

1. Process related causes of accidents

I. **Falling**

Falling from heights is the number one construction killer in most countries, and it is principally due to the lack of proper edge in a variety of construction sites. Work near unprotected open edges of floors or roofs, unguarded holes, penetrations, and voids; unguarded excavations, trenches, shafts, lift wells, unstable structures (E.g. incomplete scaffolding), etc. are some of the causes.

A. Person (Worker) Falling

i. From Scaffolds

Most falls from scaffolds occur through personnel overbalancing, tripping or slipping. The rest may be attributable to general defects in the scaffolding such as boards slipping or breaking, the absence of guard rails, insecure foundations, etc.

ii. From Ladder

Most falls are caused by the person slipping or overbalancing and falling from the ladder, a considerable number caused by the movement of the ladder (either the bottom slips outward or the top slip sideways). Several accidents also arise out of defects (e.g. missing or broken rungs) in the ladder or, in some cases, by the breaking of the ladder.

iii. From structure and other heights

Such falls occur in a variety of ways such as falls from shuttering often as a result of a collapse of the shuttering on which persons are standing, falls through unprotected openings and fragile roofs, and are almost always the result of the individual's concern.

iv. From plant (machines)

Falling from plants is also surprisingly frequent on construction sites. The majority of such falls occur when drivers are climbing on to, or descending from, their machines.

v. Into excavations and manholes

Falls into excavation usually occur when workers slip while trying to jump, to climb out of them. a surprising amount of personnel fall into uncovered manholes (particularly those which have become obscured by vegetation) while walking across the site.

B. Falling Of Materials (Objects)

i. From heights or in excavations

All sorts of things ranging from small tools (nails) to wheelbarrows, scaffold parts and girders - fall from heights. Mostly, the falls occur from working positions such as scaffolds or from structures where personnel are working, faces of excavations, or from Lorries and dumpers. Around 50% of all injuries suffered by such are the result of falling debris.

ii. On the level

Most accidents result from presumed dropping materials on their own (or other people's) feet, often during loading or unloading operations. A substantial number of accidents also arise from the collapse of unstable stacks of materials such as pipes.

2. Root Causes of Accidents

Accidents are primarily caused by people and not by process. Many safety experts have an opinion that the root causes of an accident lies in the reason for the mistake having been made. The following root causes of an accident may be cited as being the most common:

i. Ignorance and Lack of training

The majority of plant equipment-related accidents usually related to the operator's misuse. There are numerous reasons for the incorrect usage of plant and equipment, the most common is the operator's ignorance of the correct method of usage. The "it cannot happen to me!" attitude is regarded as the biggest single root cause of construction-related or any other types of accidents.

ii. Carelessness

Carelessness will always be the prime challenger for the role of "root causes" in an accident in construction especially involving young people.

iii. Lack of discipline

This is also another common cause of accidents involving young people at the construction site.

iv. Distraction

Accidents resulting from distraction are numerous and ranges from the comparatively minor variety to serious and possibly fatal instances.

v. Miscommunication

There are two rules regarding communication. Ensure that all instructions are clear and unambiguous. By way of ensuring that what was heard what was meant, check that the instructions have been fully understood.

3. Accidents related to plant, Machinery and Transport. **Striking personnel, Collisions and Overturning**

The majority of plant or transport-related accidents fall within this category.

ii. Lifting appliances

The majority of such accident consists either of personnel being struck by swinging loads or of variety sustained in sliding operations or while using pulley blocks.

iii. Pneumatic and Power tools

Most accidents in this category occur either through the misuse of tools or a lack of concentration on the part of the user. This section comprises plant and machinery related accident types that do not fit into any of the previous three sub-categories.

4. Miscellaneous Causes (Others)

i. Stepping on, or striking against objects

Around 50% of the injuries from accidents in this category result from people unintentionally stepping on a nail protruding from timber. The remainder results from a variety of causes such as striking against protruding scaffold members or reinforcing bars, or handling broken pipes, glass or similar sharp-edged materials without gloves.

ii. Hand tools

The majority of such accidents are caused by personnel striking themselves, or others with picks, shovels and suchlike. Many accidents also result from defective tools or misuse of tools. Meanwhile, many people are injured due to being chopped and cuts by equipment and handheld working tools such as chisels, screwdrivers, knives, saws, hammers, nails and drilling machines. The greatest hazards posed by hand tools results from misused and improper maintenance.

iii. Collapse of Excavation

Such accidents, which are almost exclusively due to inadequate support-work, are usually serious and often fatal. Other factors that contribute to such accidents are the movement of plant and stacking of materials too close edges of excavations. Side slope instability of excavated wall related to the soil or ground type.

iv. Electricity

Electricity shock is also one source of enormous potential danger. Electricity regularly accounts for between 5% a 10% of fatalities in the construction industry. The study by (Hughes & Ferrett, 2011) stated that In the UK, for example, 2% of all fatalities at work are caused by electric

shocks. Most injuries and deaths from electricity are due to, using poorly maintained electrical equipment, working near overhead high tension lines or domestic electricity supplies, contact with underground power cables during excavation work and working without appropriate safety gear.

v. Manual Handling

Manual handling is defined as the movement of a load by human effort alone (Hughes & Ferret, 2011). It can include any activity requiring the use of force exerted by a person to lift, push, pull, carry or otherwise move or restrain any moving or stationary object (HSE, 1998).

(Hughes & Ferret, 2011) argued that lifting bricks, cement blocks and cement bags weighing 50 kilos has been regarded as risky activities on construction sites. Back injuries and emasculatory disorders, sciatica, hernias, and slipped discs are often the most serious of construction site injuries (Ibid). In the study by Smallwood (2008) it was revealed that in construction, 25% of injuries are back injuries. Almost 30% of all construction workers complain of back pain that requires over thirty days off. The average number of days of work missed by a construction worker is higher than in other fields of employment.

vi. Fire

Health and safety executive (2000) said that Fire is one of the many hazards that construction workers could face on site. Although fire hazards are not seen as such as high risk compared with falling from a height and slipping, tripping and falling, fire hazards need to be considered at all stages of the building process. The report by **(**Hughes & Ferret, 2011) shows every year on many construction sites, workers are killed or injured as a result of a fire. There are about 400 construction fires annually in the United Kingdom (UK) and about 100 of them cause over £50,000 worth of damage and can result in the incomplete dislocation of the project schedule. Fires on site are caused by braising work carried out by plumbers, gas lines for underground work, power lines, power leads and tools, machinery requiring petrol and diesel, and hazardous chemicals.

vii. Hazardous Substances

Hazardous substances have a serious impact on construction site workers' health. These may come in the form of liquids, gases, vapors, fumes or dust. The study done by Murie (2007) states at the construction site, workers might be exposed to chemicals by breathing them in, ingestion and absorption through the eyes or skin. Also Hughes & Ferrett, (2011) argue that chemicals at

worksites can cause headaches, eye irritation, dizziness, faintness, sleepiness and affect judgment and coordination. They can damage the central nervous system and can harm the skin, liver, kidneys and cardiovascular system. Additionally, Murie (2007) said some solvents increase the likelihood of cancer. Solvents can also cause reproductive problems. They can reduce fertility and cause birth defects and miscarriages. Some paints and varnishes, bonding agents and resins, can cause asthma and dermatitis. Welding fumes – which may include a cocktail of metal fumes, can cause serious health problems in the long term. The respiratory system is affected and, as chemicals are absorbed, they can slowly affect the brain and internal organs (Hughes & Ferrett, 2011).

viii. Noise

According to the National Code of Practice (2004), Occupational noise-induced hearing loss is defined as hearing impairment arising from exposure to excessive noise at work, which is also commonly known as industrial deafness the NOHSC. As reported by HSE, (1998). Exposure to hazardous noise levels is so widespread as to be routine, and occupational deafness is very common among building workers. Some activities on construction sites are notoriously noisy, for example, rock breaking during demolition work or the operation of a jackhammer. The use of vibrating wacker plates, electric tools, explosive powered nail guns, and vibrators during concrete pours; all cause-specific noise problems for the operators and workers in the vicinity about maintaining their hearing ability. Noise comes from the operation of the plant, machinery and power tools, the movement of vehicles and deliveries of materials.

ix. Dust

According to Hughes & Ferrett, (2011) dust is a common hazard on roads and building works at many sites. The health risks associated with a dusty jobs depend on the type of dust (physical, chemical and mineralogical), which will determine its toxicological properties, and hence the resulting health effect; and the exposure, which determines the dose. If dust is released into the atmosphere, there is a good chance that someone will be exposed to it and inhale it. If the dust is harmful, there is a chance that someone will suffer an adverse health effect, which may range from some minor impairment to irreversible disease and even life-threatening conditions. There are higher death rates from respiratory disease and lung and stomach cancers in dusty trades. At construction sites cement, silica and wood dust and dust from medium-density fiberboard pose particular risks.

x. Aggression, Violence, and Bullying

The report by HSE, (1998) said that aggression and violence occurs when people are verbally abused, threatened or assaulted in circumstances relating to their work. At construction sites, aggression and violence are manifested through the use of foul language and physical attacks. Where there is aggression and violence, human dignity is debased. Violence and aggression may come from superiors or workmates. Bullying occurs when workers feel that they are being singled out for unfair treatment by a boss or colleague. For example, a worker is constantly criticized instead of being instructed, being demoted and being shouted at by workmates or superiors. Aggression, violence, and bullying can contribute to other risks such as stress (Hughes & Ferrett, 2011).

2.7 Hazard Prevention and Control measures

According to OSHA, (2002) their different Systems used to prevent and control hazards. Those are Engineering Controls, Safe Work Practices, Administrative Controls, and Personal Protective Equipment (PPE), Systems to Track Hazard Correction, Preventive Maintenance Systems, Emergency Preparation, and Medical Programs.

i. Engineering Controls

The first and best strategy is to control the hazard at its source. Engineering controls do this, unlike other controls that generally focus on the employee exposed to the hazard. The basic concept behind engineering controls is that, to the extent feasible, the work environment and the job itself should be designed to eliminate hazards or reduce exposure to hazards. Engineering controls can be simple in some cases. They are based on the following principles: If feasible, design the facility, equipment, or process to remove the hazard or substitute something that is not hazardous. If removal is not feasible, enclose the hazard to prevent exposure in normal operations. Where complete enclosure is not feasible, establish barriers or local ventilation to reduce exposure to the hazard in normal operations.

ii. Safe Work Practices

Safe work practices include the company's general workplace rules and other operation-specific rules. For example, even when a hazard is enclosed, exposure can occur when maintenance is necessary. Through established safe work practices, employee exposure to hazards can be further reduced.

iii. Administrative Controls

Administrative controls to mean other measures aimed at reducing employee exposure to hazards. These measures include additional relief workers, exercise breaks and rotation of workers. These types of controls are normally used in conjunction with other controls that more directly prevent or control exposure to the hazard.

iv. Personal Protective Equipment (PPE)

When exposure to hazards cannot be engineered completely out of normal operations or maintenance work, and when safe work practices and other forms of administrative controls cannot provide sufficient additional protection, a supplementary method of control is the use of protective clothing or equipment. This is collectively called personal protective equipment, or PPE. PPE may also be appropriate for controlling hazards while engineering and work practice controls are being installed.

There are so many personal protective equipment's such as;

- Head protection/Safety helmets
- Hearing protection (headband and cup, helmet muffs and earplugs, foam expanding earplugs, etc)
- Eye protection (goggles, safety glasses or shields)
- Respiratory protection (use masks, the simplest mask is a disposable paper type)
- Body protection (Full sleeved shirts and trousers provide good protection, and in case of ionizing radiation use of shielding layers inside the cloths is necessary)
- Hand and foot protection (Protective gloves, safety footwear, etc.)
- Safety belts and harness (full harness is preferable to a safety belt), etc.

v. Hazard Assessment and Training

The basic element of any management program for PPE should be an in-depth evaluation of the equipment needed to protect against the hazards at the workplace. The evaluation should be used to set a standard operating procedure for personnel, and then train employees on the protective limitations of the PPE, and its proper use and maintenance. Using PPE requires hazard awareness and training on the part of the user. Employees must be aware that the equipment does not eliminate the hazard. If the equipment fails, exposure will occur. To reduce the possibility of failure, equipment must be properly fitted and maintained in a clean and serviceable condition.

vi. Systems to Track Hazard Correction

An essential part of any safety and health system is the correction of hazards that occur despite the overall prevention and control program. For larger sites, documentation is important so that management and employees have a record of the correction. Hazard correction information can be noted on an inspection report next to the hazard description. Employee reports of hazards and reports of accident investigation should provide space for notations about hazard correction.

Vii. Preventive Maintenance Systems

Good preventive maintenance plays a major role in ensuring that hazard controls continue to function effectively. It also keeps new hazards from arising due to equipment malfunction. Reliable scheduling and documentation of maintenance activity is necessary. The scheduling depends on knowledge of what needs maintenance and how often. The point of preventive maintenance is to get the work done before repairs or replacement is needed. Documentation is not only a good idea but is a necessity.

Viii. Emergency Preparation

During emergencies, hazards appear that normally are not found in the workplace. These may be the result of natural causes (floods, tornadoes, etc.), events caused by humans but beyond control (train or plane accidents, terrorist activities, etc.), or within a firm's own systems due to unforeseen circumstances or events. We must become aware of possible emergencies and plan the best way to control or prevent the hazards they present. Some of the steps in emergency planning include Survey of possible emergencies, Planning actions to reduce the impact on the workplace, Employee information and training, and Emergency drills as needed.

ix. Medical Programs

A company's medical program is an important part of the safety and health system. It can deliver services that prevent hazards that can cause illness and injury, recognize and treat illness and injury, and limit the severity of work-related injury and illness. The size and complexity of a medical program will depend on many factors, including the: Type of processes and materials and the related hazards, Type of facilities, Number of workers, Characteristics of the workforce, and Location of each operation and its proximity to a health care facility.

2.8 How we create a healthy and safe working environment?

According to [C-167, 1988] preventive and protective measures, Article 13

Safeties of workplaces are considered the following points:

- All appropriate precautions shall be taken to ensure that all workplaces are safe and without risk of injury to the safety and health of workers.
- Safe means of access to and egress from all workplaces shall be provided and maintained and indicated where appropriate.
- All appropriate precautions shall be taken to protect persons present at or in the vicinity of a construction site from all risks which may arise from such site.

According to [Richard and John,2009] To maintain a safe environment on the job site, the following critical elements must be established:

- Review the drawings for potential safety concerns.
- Upper management must be committed to safety.
- Learn to communicate safety to all workers on the job site.
- Provide a safety manager and/or director on the job site
- Make sure that the site is clean with no debris scattered around.
- The safety manager and PM must constantly walk the job site.
- Enforce OSHA standards.
- Have weekly toolbox meetings with all trade foremen.
- Review any current problems.
- Request ways to improve safety on the job site.
- The meeting should be of short duration but cover critical issues.
- Make sure all trades are using safety equipment prescribed by OSHA.
- Listen to all the workers and make safety modifications as suggested.
- Have special safety meetings with all "new" workers. (Approximately 25% of the accidents occur with workers working less than one month on the job site.)
- Review all building codes to make sure all safety requirements are being met.
- Listen to weather reports to make sure all equipment and material will be secured in case of high winds.
- Make sure that certain trades do not work during inclement weather (i.e., ironworkers).
- A safety plan has to be prepared which would include the location of first aid stations,
- Evacuation plan in case of an emergency, communications set up, and safety horns.
- Install safety signs around the site.

- Prepare a safety manual that will be handed out to all subcontractors.
- Invite insurance safety groups to visit the site and make recommendations.
- Do not rush jobs and overwork the trades' people.
- Drugs and alcohol must be prohibited from the job site.
- Smoking must be prohibited from the job site to eliminate potential fire.

2.9 Safety precaution for construction sites

According to EBCS 14, before work begins, the site layout plan that contains the following items shall be prepared and approved. Safe means of access to and egress from all workplaces, The sequence or order in which work will be done, Access for workers on and around the site, The locations of danger zones, Storage for flammable materials, if there are any, Routes for vehicular traffic, Storage areas for materials, construction waste and equipment, and Materials need to be stored as close as possible to the appropriate workstation.

Also, it should have to contain the location of construction machinery, The location of office rooms and trade workshops, The location of medical and welfare facilities, Delineation and fencing external border of the site and marking it to keep away unauthorized persons and to protect the public from site hazards, Appropriate lighting posts, and Signs and signals that convey required cautionary messages.

2.10 Signs and Signals

Warning, Cautionary, and Informative signs and signals shall be placed where required.

Signs shall be visible at all times when work is being performed and shall be removed or covered when the hazards no longer exist.

- Danger Signs: Danger signs shall be used only where an immediate hazard exists. Danger signs shall have red as the predominating color for the upper panel; black outline on the borders; and a white lower panel for additional sign wording
- Caution signs: Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices.
- Caution signs shall have yellow as the predominant color; black upper panel and borders. Yellow lettering of "caution" on the black panel; and the lower yellow panel for additional sign wording. Black lettering shall be used for additional wording.
- The standard color of the background shall be yellow; and the panel, black with yellow letters. Any letters used against the yellow background shall be black.

- Exit signs: Exit signs, when required, shall be lettered in legible red letters, not less than 6 inches (15 cm) high, on a white field and the principal stroke of the letters shall be at least three-fourths inch (2 cm) in width.
- Safety Instruction signs: Safety instruction signs, when used, shall be white with a green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background.
- Directional signs: Directional signs shall be white with a black panel and a white directional symbol. Any additional wording on the sign shall be black letters on the white background.
- Accident prevention tags: Accident prevention tags shall be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. They shall not be used in place of, or as a substitute for, accident prevention signs.
- Flagmen: When operations are such that signs, do not provide the necessary protection adjacent to a highway or street, flagmen or other appropriate traffic controls shall be provided.
- Hand signaling by flagmen shall be by use of red flags at least 18 inches square (77 cm2) or sign paddles, and in periods of darkness, red lights.
- Flagmen shall be provided with and shall wear a red or orange warning garment while flagging. Warning garments worn at night shall be of reflective material.

CHAPTER THREE

METHODOLOGY

3.1 Study area

The study area was Addis Ababa. Addis Ababa is the capital city of Ethiopia that is located at 8°7'' northern latitude and 38°45'' eastern longitude with an average altitude of 2400 above mean sea level. In the year 2016, the total population of the city is an estimated 3.6 million with an annual growth rate of 3.8%. The city has divided into 10 sub-cities. The city economy is growing annually by 14%. The city alone currently contributes approximately 50% towards the national Gross Domestic Product GDP, highlighting its strategic role within the overall economic development of the country.

Figure 3.1: Locational Map of Addis Ababa city **(Google map, 2019)**

3.2 Study design

The study is qualitative and quantitative type of research. According to a lecture note by Dr.-Ing Esayas Alemayehu (PhD) Qualitative research is research undertaken to gain insights concerning attitudes, beliefs, motivations and behaviors of individuals to explore a social or human problem and include methods such as focus groups, in-depth interviews, observation research and case studies, and Quantitative research is research concerned with the measurement of attitudes, behaviors and perceptions and includes interviewing methods such as telephone, intercept and door-to-door interviews as well as self-completion methods such as mail outs and online surveys. The graphical presentation of the study design looks the following.

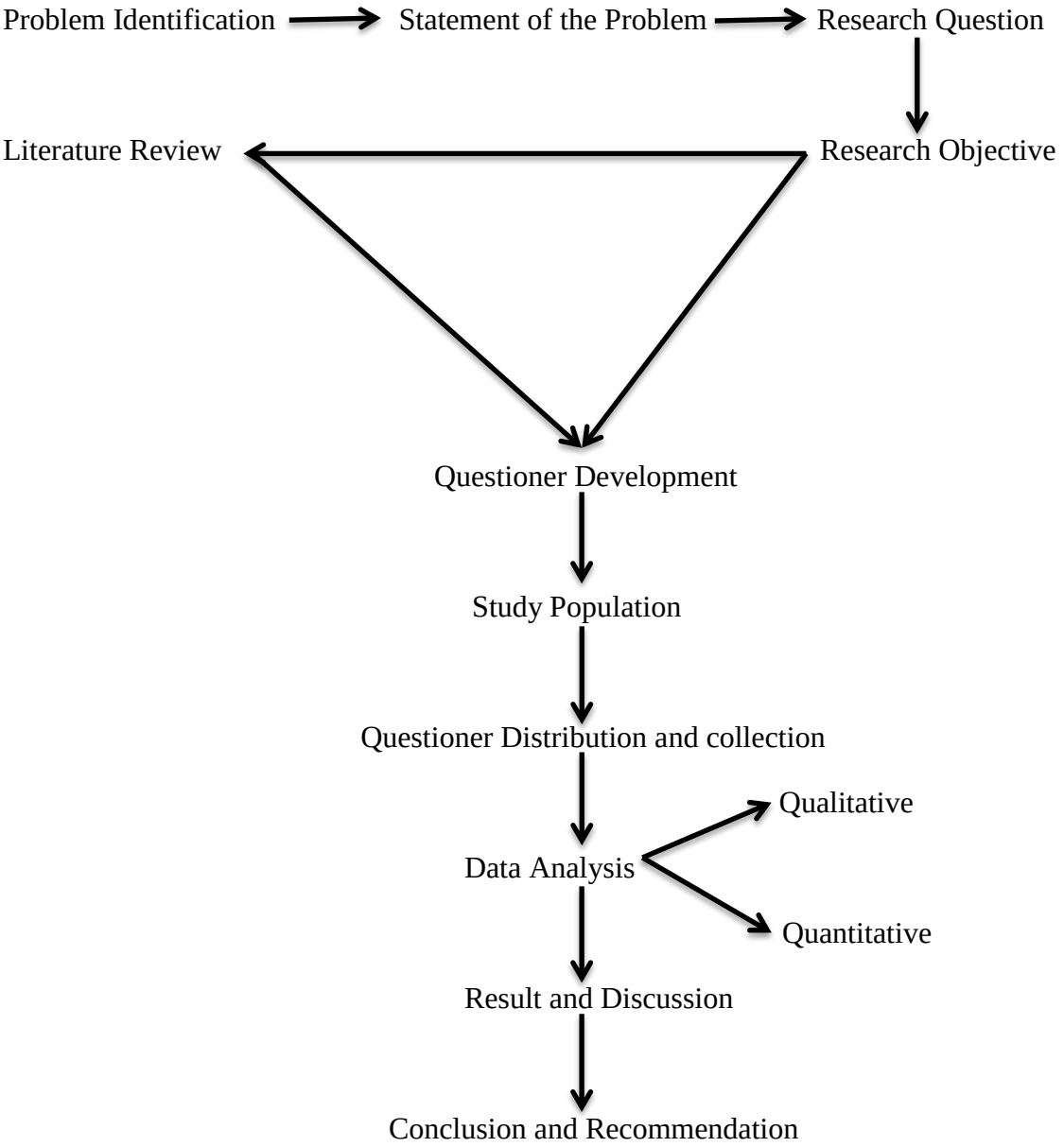

Figure 3. 2 Research design frame work

3.3 Study variables

- **Independent variable**
  - Current practices
  - Health and safety policy of the country
  - Stakeholders perspective
  - Allocation of budget
- **Dependent variable**
  - Occupational Health and safety practice

3.4 Population

The target population of the study was public building construction. Comprises only foreign-registered grade 1 and local registered grade 1contractor's which currently working on public building construction projects for the last three years which found only in Addis Ababa city.

3.5 Sample size and sampling producer

The total population of the study was 47 projects which are constructed both by foreign contractors and domestic contractors. Since the population size is small the researcher was using a non-probabilistic sampling method which is purposive sampling. From those projects, 7 projects are constructed by foreign contractors and 40 projects are performed by locally registered grade one contractors.

3.6 Source of data

To undertake this research, the researcher used both primary and secondary sources of data. To realize the target, the study used a well-designed questionnaire as the best instrument. This was completed by the employees of the contractors in addition to its site observation checklist used. Secondary data were collected from published and unpublished reports were referred to.

3.7 Data collection process

Among the available methods in collecting data three methods are adopted, those are literature review, questionnaires, and observation. Literature is reviewed to establish what others have documented on the subject matter. Useful information is collected from seminar and workshop papers, journal papers and internet sources. Questionnaires were used to gather information for the study. And also the observation is helping to analyze by observing the site visually.

3.8 Data processing and analysis

After the collection of the data the researcher has analyzed the data by using Microsoft excel, relative importance index and proper growing-up sentences with meanings, And the data were presented by using graphs, tables, and charts.

$$\text{Relative Importance Index (RII)} = \frac{\sum w}{AN} = \frac{(5n_5+4n_4+3n_3+2n_2+1n_1)}{5N}$$

Where: w is the weighting given to each factor by the respondent, ranging from 1 to 5,

n_1 = number of respondents for very high,

n_2 = number of respondents for high,

n_3 = number of respondents for average,

n_4 = number of respondents for low,

n_5 = number of respondents for very low,

A is the highest (i.e. 5 in the study) and

N is the total number of samples.

The relative importance index ranges from **0 to 1**

3.9 Ethical consideration

The research considered all legal procedures to find out the problems and give the solution as per the Ethiopian constitutional law with other General conditions of contract to avoid grievance among the contraction parties and the state.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1 Introduction

The chapter analysis the data collected from respondents through questioner, interview and from different literature written by other authors. During the analysis, the data collected from project constructed by a Foreign contractor and project constructed by a domestic contractor was analyzed separately by using Microsoft excel and the result is compared.

Table 4. 1: Distribution rate of the questioner

	Distributed Questioner							
	For Foreign Contractors				For Domestic Contractors			
	Distributed	Properly filled and returned	Properly not filled and returned	Not returned	Distributed	Properly filled and returned	Properly not filled and returned	Not returned
Frequency	7	6	-	1	40	28	4	8
Percentage	100%	83%	-	17%	100%	70%	10%	20%

Table 4.1 indicates that a total of 47 questioner was distributed for both Foreign and domestic contractors. From the total distributed 47 questioner 34(72%) of the questioner was properly filled and returned by both contractors. when we see separately from total of 47 questioner distributed 7 of them was distributed to the Foreign contractors and 6(86%) was properly filled and returned and 1(14%) of the questioner was not returned. Among the 40 questioner distributed to the domestic contractors 28(70%) was properly filled and returned and 4(10%) was properly not filled and returned and 8(20%) was not returned.

4.2 Demographic characteristics of respondents

1. Job title of respondents

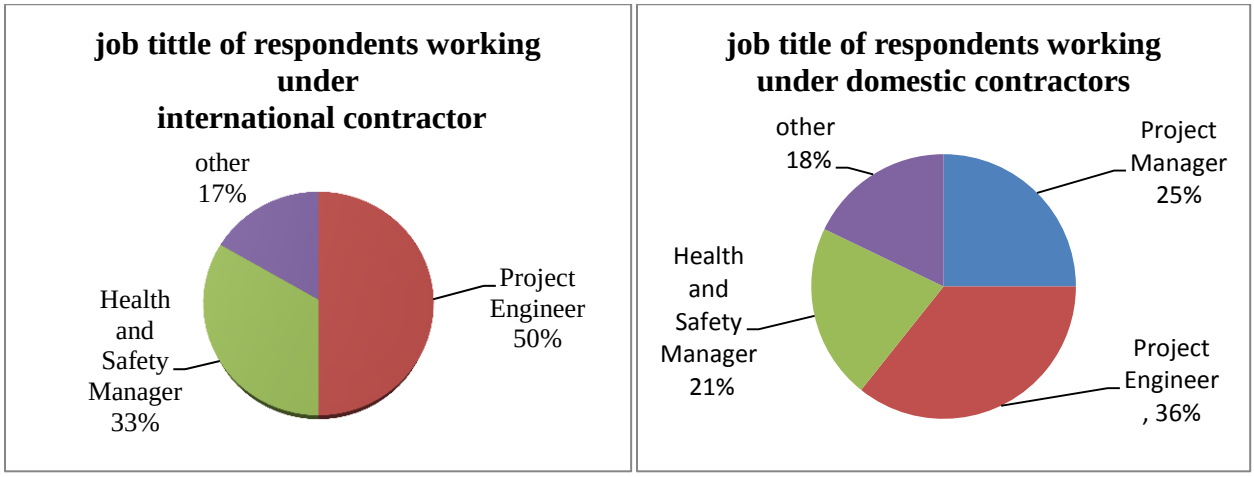

Figure 4. 1: Job titles of respondents

The above figure indicates that from the total 6 respondents working under foreign contractors 50% of respondents was project Engineer, 33% health and safety manager and the rest 17% was other professionals. And also from the total of 28 respondents working under domestic contractor 36% of the respondents was project Engineer, 21% health and safety managers, 25% project managers and 18% of respondents was other professionals.

4.3 Current Health and safety practice of domestic and foreign contractors

4.3.1 Health and safety policy

Table 4. 2: Health and safety policy

Does your construction firm have Health and safety policy and implementation plan?	Foreign contractors	Domestic contractors
Yes	100%	100%
No		
Reason for No answer:		
A. Lack of awareness by all parties in the industries		
B. Budget not considered in the firm		
C. Clients does not consider as a perquisites for awarding projects		
D. Others		

The above table shows that from 6 Foreign contractors 100% of the respondent witnessed that their company/project has health and safety policy, and also from 28 local grade one contractor 100% of the respondent witnessed that their company/project have health and safety policy, but the respondents said the big question is that most of our local construction companies do not use or properly implement the policy. As we know that here in our country the safety culture is not good enough so that is why our local construction firm does not properly implement the rules and regulations also the policy. After the bid is awarded the implementation of the policy is not regularly supervised. The Foreign Company's belief that safety is an investment that means if you are invested in health and safety finally you collected the good result that means it's better to invest in health and safety rather than investing after the accident has occurred.

A policy is an administrative belief used to set a path in an organization. It can be a sequence of actions and an effective decision. (Sawacha, et al., 1999) discussed numerous variables that affect safety on construction sites. The results propose that variables correlated to organization policy are the most main group of factors affecting the safety performance in the U.K. construction industry. Liska al., (1993) also identified zero accident techniques by practicing having safety policies and procedures on project sites.

4.3.2 Coordinating health and safety policy with other human resource policies

Table 4. 3 Coordinating health and safety policy with other human resource policies

Does your firm coordinate its Health &Safety policies with other human resource policies to ensure wellbeing of workers?	Foreign Contractors	Domestic Contractors
Yes	67%	57%%
No	33%	43%
Reason for No answer:		
A. Lack of awareness by all parties in the industries	100%	75%
B. Budget not considered in the firm		
C. Clients does not consider as a perquisites for awarding projects		25%
D. Others		

The above table shows that from a total of 6 foreign contractors around 67% of the respondents agreed that their firm coordinates its health and safety policy with other human resource policies

to ensure the wellbeing of workers and to be environmentally friendly, and the rest 33% of the respondents disagreed. When we see the domestic contractors from 28 local grade one contractor around 57% of the respondent agreed that their company coordinate its health and safety policy with other human resource policy and the rest 43% of the respondents says that their company does not coordinate its health and safety policy with other human resource policy. All of the respondents working under Foreign contractor who said No witnessed that lack of awareness is the reason for not coordinating the policy with other human resource policy, and also for 75% of the respondents who are working under domestic contractors lack of awareness is the major reason for not coordinating, around 25% of the respondents also believe that the client is not considering as a prerequisites for awarding the project

4.3.3 Hiring project site safety officer

Table 4. 4 Hiring project site safety officer

Do your construction projects/sites have a Safety Officer?	Foreign Contractors	Domestic Contractors
Yes	83%	39%
No	17%	61%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		29%
B. No contractual obligation in the contract		18%
C. There is no controlling and enforcement law in the contract agreement	100%	53%
D. Not required to hire safety officers		
E. Other		

The above table shows that from 6 Foreign contractors around 83% of the respondent witnessed that their company appointed health and safety officer for the specific site and the rest 17% of the respondent witnessed that their company do not hire health and safety officer for specific site or they said that the company appoint or hire the safety officer as company, not for specific project site. And those respondents believe that it's due to no controlling and enforcement law in the contract agreement. When we see the domestic contractors from the total of 28 domestic grade one contractor around 39% of the respondents witnessed that their company appoint health and safety officer for specific project site, and the rest 61% of the respondents witnessed that the company do not appoint health and safety officer for the specific project site. When the

respondents are explaining their reason 53% of the respondents believe that its due to there is no controlling and enforcement law in the contract agreement, around 29% of the respondents also said its due to lack of awareness by all the stakeholders of the industry. The other 18% of the respondents also believe that it is due to no contractual obligation in the contract to hire health and safety officers for specific projects.

4.3.4 Site specific health and safety plan

Table 4. 5 Site specific health and safety plan

Does your project have a site-specific Health &Safety plan?	Foreign Contractors	Domestic Contractors
Yes	17%	11%
No	83%	89%
Reason for No answer:		
A. Lack of awareness by all parties in the industries	80%	56%
B. No contractual obligation in the contract		12%
C. There is no controlling and enforcement law in the contract agreement	20%	32%
D. Others		

The above table shows that from a total of 6 foreign contractors around 17% of respondents witnessed that their company has a specific health and safety plan for a single or specific project. The rest of 83% of the respondents witnessed that their company do not have a health and safety plan for specific project. From those respondents who said no 80% of them believe that Lack of awareness is the reason for not having specific health and safety plan. Around 20% of the respondents also believe that there is no controlling and enforcement law in the contract agreement. In case of domestic contractors from the total of 28 domestic grade one contractors' 11% of the respondents believe that their company has specific health and safety plan and the rest 89% of the respondents witnessed that their company do not have health and safety plan for specific project site. From those who said no around 56% of them believe that lack awareness is the major reason for not having site-specific health and safety plan. Also, 32% of the respondents believe that there is no controlling and enforcement law in the contract agreement. And the rest 12%of the respondents also believing that there is no contractual obligation in the contract to have specific health and safety plan.

4.3.6 Consideration of health and safety in site layout planning

Table 4. 6 Consideration of health and safety in site layout planning

Does the Layout of the site consider Health & Safety aspects? (During constructing site offices, access roads, temporary structures while constructing the project)	Foreign contractors	Domestic Contractors
Yes	67%	43%
No	33%	57%
Reason for No answer:		
A. Lack of awareness by all parties in the industries	50%	56%
B. No contractual obligation in the contract		6%
C. There is no controlling and enforcement law in the contract agreement	50%	13%
D. Others		25%

The above table shows that from a total of 6 foreign contractors 67% of respondents witnessed that the layout of the site considers health and safety, and the left 33% of the respondents witnessed that the site layout does not consider health and safety aspects due to different reasons. Among those respondents who said no, for 50% of them lack awareness is the reason for not considering health and safety while they are planning the site layout, and the rest 50% of them also believe that there is no controlling and enforcement law in the contract agreement. When we see the domestic contractors from a total of 28 local grade one contractor 43% of the respondents witnessed that their firm/project considers health and safety in site layout planning. And the other 57% of the respondents witnessed that their firm/project do not consider health and safety during the site layout planning. Among those respondents who said no 56% of them believe that lack of awareness is the major reason for not planning health and safety during the planning of the site layout. 6% of the respondents believe that there is no contractual obligation, 13% of them also said that there is no controlling g and enforcement law in the contract agreement. The left 25% of them explains other reasons they believe as a cause for the problem.

4.3.7 Review of constructability of the project in health and safety aspect

Table 4.7 Review of constructability of the project in health and safety aspect

Do Constructability of project is reviewed periodically or frequently in Health &Safety aspect?	Foreign Contractors	Domestic Contractors
Yes	17%	4%
No	83%	96%

Reason for No answer:		
A. Lack of awareness by all parties in the industries	40%	41%
B. No contractual obligation in the contract	20%	15%
C. There is no controlling and enforcement law in the contract agreement	20%	22%
D. Not standard practice	20%	22%
E. Others		

The above table indicates that from the total of 6 foreign contractors 17% the respondent witnessed that their company/project periodically review and supervise the constructability of the project and the rest 83% of the respondents witnessed that their company/project does not supervise periodically the constructability of the project in respect to health and safety. Among those respondents who said no, for 40% of them lack of awareness is the major reason for not supervising the site periodically, 20% no contractual obligation, 20% there is no controlling and enforcement law in the contract, and 20% of the respondents also believe that no standard practice in the country, and also 20% of the respondents also listing their reason. When we see the domestic contractor from the total of 28 local grade one contractor 4% of the respondent believe that their firm periodically review and supervise the constructability of the project and the rest 96% of the respondents witnessed that their company do not supervise the constructability of the project in a regular base. When we see the reason 41% of the respondents who said no believe that its due to lack of awareness, 15% of the respondents believe that no contractual obligation, 22% of them also said there is no controlling and enforcement law in contract agreement, and also other 22% of the respondents believes that the country does not have standard practices.

4.3.8 Availability of safety sign boards

Table 4. 8 Availability of safety sign boards

Are there any site safety sign boards which can give safety precaution, warning and motivation to the workers to follow occupational safety?	Foreign Contractors	Domestic Contractors
Yes	100%	100%
No		
Reason for No answer:		

A. Lack of awareness by all parties in the industries		
B. Budget constraint		
C. No company Health & Safety policy in the firm		
D. Other		

The above table shows that that all the foreign and domestic contractors have site safety sign boards which can give safety precaution, warning, and motivation to the workers.

4.3.9 Manager's encouragement of workers commitment

Table 4. 9 Manager's encouragement of workers commitment

Do Managers encourage and support worker participation, commitment and Involvement in Health &Safety activities?	Foreign Contractors	Domestic Contractors
Yes	83%	25%
No	17%	75%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		29%
B. Budget constraint		19%
C. Upper level management commitment problem	100%	52%
D. Other		

The above table shows that from total of 6 Foreign contractors 83% the respondent witnessed that company's/project manager encourage and support workers participation commitment and involvement in health and safety and the rest 17% of the respondents witnessed that the company's/project manager is not encouraging and support workers health and safety participation, commitment and involvement. The major reason for this is due to the top manager's commitment problem. When we see the domestic contractors from the total of 28 local grade one contractor 25% of the respondents witnessed that companies higher-level managers/project managers encourage, and support health and safety participation, commitment and involvement activities of the workers and the rest 75% respondents witnessed that companies higher managers do not encourage and support health and safety activities of workers. For 52% of the respondents who said no upper-level management commitment problem is the major reason, for other 29% of the respondents lack of awareness is the reason for the problem and also around 19% of the respondents believe that it's the manager do not encourage and

support health and safety practice of the workers due to budget constraint or they believe that budget is not considered by the client for health and safety problem.

4.3.10 Manager's encouragement and support training of employers'

Table 4. 10 Manager's encouragement and support training of employers'

Do Managers encourage and support training of employees in Health &Safety?	Foreign Contractors	Domestic Contractors
Yes	83%	36%
No	17%	64%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		17%
B. Budget constraint		50%
C. Upper level management commitment problem	100%	33%
D. Other		

The above table shows that from the total of 6 foreign contractors 83% of the respondents witnessed that the company managers/project managers encourage and support training of workers, and the rest 17% of the respondents witnessed that the managers/project managers do not encourage and support training of the workers due to upper-level managers commitment problem. When we see the domestic contractors from the total 28 local grade one contractor 36% of the respondents witnessed that the managers encourage and support the training of the employees in health and safety, the rest 64% of the respondents said that the manager does not encourage and support the training of workers. For 50% of the respondents who said no budget, constraint is the major reason for not encouraging and supporting the training of workers by top managers, also for 33% of the respondent's upper-level management commitment problem is another reason, and 17% of those respondents believes that lack of the awareness also another reason.

4.3.11 Monitoring health and safety performance of workers

Table 4. 11 Monitoring health and safety performance of workers

Do Managers actively monitor the Health &Safety performance of their projects and workers through reports?	Foreign Contractors	Domestic Contractors
Yes	67%	25%
No	33%	75%

Reason for No answer:		
A. Lack of awareness by all parties in the industries		19%
B. Budget constraint		
C. Upper level management commitment problem	100%	81%
D. Other		

The above table show that from the total of 6 Foreign contractors 67% of the respondents witnessed that company's managers/project managers actively monitor the health and safety performance of the workers, and the rest 33% of the respondent witnessed that the company managers/project managers do not actively monitor the health and safety performance of their workers and also not collecting health and safety report. The entire respondent who said no believes that it due to upper management commitment problem. When we see the domestic contractor from a total of 28 local grade one contractor only 25% of the respondents believe that managers/project managers actively monitor the health and safety performance of their workers. And the rest 75% of the respondents witnessed that top-level managers do not monitor the health and safety performance of the workers. among those respondents who said no around 19% of the respondents believe that it's due to lack of awareness and the rest 81% of the respondents who said no believes that top-level managers are most of the time not committed.

4.3.12 Giving first Aid for their workers

Table 4. 12 Giving first Aid and Availability of first aider

Is there adequate first aid and first aider(s) on your construction projects/sites?	Foreign Contractors	Domestic Contractors
Yes	100%	39%
No		61%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		24%
B. Budget constraint		76%
C. There is no enforcement law		
D. Other		

The above table shows that from a total of 6 foreign contractors 100% of the respondents witnessed that their company provides adequate first aid and first aider for workers. When we see the domestic contractors from the total of 28 local grade one contractor 39% respondents

witnessed that their company/project provides first aid and first aider for all site workers, and the rest 61% 0f the respondents witnessed that the company/project does not provide first aid and first aider for the workers due to different reason. Among those respondents who said no 24% of them believe that it's due to lack of awareness and the other 76% of the respondents said that it's due to budget constraint. When we say the budget constraint during contract agreement most of the project does not consider health and safety expenses so this makes difficult for the contractor to provide adequate first aid and first aider for the project.

4.3.13 Provision PPE

Table 4. 13 Provision PPE

Do your firms Provide personal protective equipment (PPE) for workers?	Foreign contractors	Domestic Contractors
Yes	100%	29%
No		71%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		25%
B. Budget constraint		75%
C. There is no enforcement law		
D. Other		

The above table shows that from a total of 6 foreign contractors 100% of the respondents witnessed that all of them provide personal protective equipment for the workers. When we see the domestic contractors from a total of 28 domestic grade one contractor 29% of the respondents witnessed that their company provides PPE for the workers, and the rest 71% of the respondents say the company does not provide PPE for all of the workers. when the respondents who said no explain their reason 75% of the respondents believe that the budget assigned for health and safety by the client is not sufficient to provide those PPE for all workers of the company. The other 25% of the respondents also believe that it's due to the awareness gap between stakeholders of the company.

4.3.14 Provision of right tools equipment and plants

Table 4. 14 Provision of right tools equipment and plants

Do your firms Provide right tools, equipment and plant to execute construction?	Foreign contractors	Domestic Contractors

Yes	100%	89%
No		11%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		33%
B. Budget constraint		67%
C. There is no enforcement law		
D. Other		

The above table shows that all respondents from foreign contractors witnessed that their company provides the right tools, equipment, and plants used to execute the work for the workers. When we see the domestic contractors from a total of 28 local grade one contractors 89% of the respondents witnessed that the company provides right tools, equipment, and plants which used to execute different works, and the rest 11% of the respondents witnessed that the company does not provide those things. 67% of the respondents who said no believes that budget constraint is the major reason for not providing those things and the rest 33% believe that the problem is due to lack of awareness.

4.3.15 Provision of good welfare and facilities

Table 4. 15 Provision of good welfare and facilities

Do your firm provided good welfare facilities such as showers, canteens, toilets for construction site workers?	Foreign Contractors	Domestic Contractors
Yes	50%	32%
No	50%	68%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		16%
B. Budget constraint	67%	68%
C. There is no enforcement law		
D. Other	33%	16%

The above table shows that from the total of 6 foreign contractors 50% of the respondents witnessed that their company provide good welfare facilities for their workers and the rest 50% of the respondent witnessed that their company do not provide good welfare and facilities to all of their company workers. Around 67% of the respondents who said no believe that the major reason is budget constraint and the rest 33% of list other reasons for the problem and they said that the company provides those things but it's not enough for all the workers most of the time

higher-level workers are using only. When we see the domestic contractors from a total of 28 local grade one contractor 32% of the respondents witnessed that their company provides good welfare facilities for the workers and the rest 68% said that the company does not provide those things due to different reasons. Around 68% respondents said that no budget is assigned by the client to provide those things and also for 16% of the respondents lack of awareness by all stakeholders of the industry is another reason for the problem and the rest 16% of the respondents listed some other reasons which they believe as a cause for the problem.

4.3.16 Providing material schedule for hazardous material

Table 4. 16 Providing material schedule for hazardous material

Does Material schedule data sheets provided for all hazardous materials on site?	Foreign contractors	Domestic Contractors
Yes	67%	29%
No	33%	71%
Reason for No answer:		
A. Lack of awareness by all parties in the industries	100%	55%
B. Budget constraint		15%
C. There is no enforcement law		30%
D. Other		

The above table shows that from a total of 6 foreign contractors 67% of the respondents witnessed that their company provides material data sheet for all hazardous materials and the rest 33% of the respondents said that the company does not provide the material data sheet for hazardous material. 100% of the respondents who said no believe that the reason for not providing the material data sheet for hazardous material is lack of awareness. When we see the domestic contractors from total of 28 domestic grade one contractors 29% the respondents witnessed that the companies/project provide the material data sheet schedule for the hazardous material used in the site, and the rest 71% of the respondents witnessed that their firm does not provide those things for their workers due to different reasons. 55% of the respondents who said no believe that the first reason for not providing the material data sheet schedule for hazardous material is lack of awareness, also 30% of them believe that its due to there is no enforcement law in the contract agreement, and the other 15% also believe that it is due to budget problem.

4.3.17 Giving induction training for workers

Table 4. 17 Giving induction training for workers

Do Workers undergo induction training on Health &Safety before commencing work on a particular site?	Foreign Contractors	Domestic Contractors
Yes	67%	43%
No	33%	57%
Reason for No answer:		
A. Lack of awareness by all parties in the industries	50%	63%
B. Budget constraint	100%	31%
C. Lack of H&S policy implementation on projects	100%	38%
D. There is no enforcement law	50%	19%
E. Others		

The above table shows that from a total of 6 foreign contractors 67% of the respondent witnessed that their company gives induction training on health and safety before the commencement of the work for the workers and the rest 33% of the respondents witnessed that their company does not give the training due to different reasons. For all of the respondents who said no lack of health and safety policy implementation on the project and budget constraint is the major reason for not giving induction training for all workers. For 50% of them also the other reason is lack of awareness and also 50% of them believe that there is no enforcement law in the contract agreement. When we see the domestic contractors from a total of 28 domestic grade one contractor 43% of the respondents witnessed that their company gives induction training for the workers before the commencement of the work and the rest 57% of the respondents witnessed that their companies do not give the training due to different reasons. For 63% of the respondents who said no the major reason is budget problem in the project and also around 38% of them indicate that there is a lack of health and safety implementation in the project. There are also around 31% of respondents who said lack of awareness is the problem for not giving the training and according to 19% of the respondents, there is no enforcement law in the contract agreement to the give the training.

4.3.18 Training workers regularly in health and safety

Table 4. 18 Training workers regularly in health and safety

Do Workers are regularly trained in Health & Safety?	Foreign Contractors	Domestic Contractors
Yes	83%	18%
No	17%	82%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		26%
B. Budget not considered for Health & Safety	50%	78%
C. Upper level management and involvement problem	50%	30%
D. There is no enforcement law		17%
E. others		

The above table shows that from a total of 6 foreign contractors 83% of the respondents witnessed that their company regularly gives training for the workers and the rest 17% of the respondent witnessed that their company does not give the training on regular base due to different reason. For all of them a major reason for not giving the training regularly is budget problems and due to upper management commitment problems. When we see the domestic contractors from a total of 28 local grade one contractor 18% of respondents witnessed that their company gives health and safety training regularly and the rest 82% of the respondents witnessed that their companies do not give the training regularly due to different reasons. According to the questioner survey data, 78% of the respondents said that the major reason for not giving the training regularly is budget not considered for health and safety. Also, around 30% of respondents said that there is an upper-level management commitment problem in giving the training. For 26% of respondent's lack of awareness is another reason for not giving the training and also 17% of respondents said there is no enforcement law to give the training.

4.3.19 Training in proper use of PPE

Table 4. 19 Training in proper use of PPE

Do Workers trained in proper care & use of personal protective equipment?	Foreign Contractors	Domestic Contractors
Yes	50%	39%
No	50%	61%

Reason for No answer:		
A. Lack of awareness by all parties in the industries		35%
B. Budget not considered for H&S	67%	59%
C. Upper level management and involvement problem	67%	29%
D. There is no enforcement law	33%	24%
E. others		

The above table shows that from the total of 6 foreign contractors the 50% of the respondents witnessed that their company gives proper training in proper care and use of PPE for the workers and the rest 50% of the respondents said that their firm does not give the training due to different reasons. 67% of the respondents who said no believe that the major reason is the budget considered for health and safety and upper-level management commitment problem and also around 33% of them believe there is no enforcement law in the contract agreement. When we see the domestic contractors from a total of 28 local grade one contractors the respondents witnessed that only 39% of them give training for their workers to develop their knowledge on proper care and use of PPE. The rest 61% of them do not give the training for their workers due to different reasons. the major reason is that 59% due to budget is not considered for health and safety, 35%, lack of awareness of, 29% upper management commitment problem and 24% of the respondents believe that there is no enforcement law in the contract agreement.

4.3.20 Instruction manual

Table 4. 20 Instruction manual

Instruction manuals or safe work procedures are used to aid in preventive action?	Foreign Contractors	Domestic Contractors
Yes	100%	82%
No		18%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		60%
B. Budget not considered for H&S		
C. Upper level management and involvement problem		40%
D. There is no enforcement law		
E. others		

The above table shows that from a total of 6 foreign contractors 100% of respondents agreed that their company uses instruction manuals and safe work procedures to aid in preventive action for accidents. When we see the domestic contractors from a total of 28 local grade one contractors the respondent witnessed that 82% of them use instruction manuals and safe work procedures to create a good and safe working environment and only 18% the company is not using and follow instruction manuals and safe work procedure. Among those respondents who said no for 60% of them the major reason is lack of awareness by all the parties of the industry and the other 40% of the respondents believe that it's due to upper-level management commitment problems.

4.3.21 Proper supervision by health and safety staff

Table 4. 21 Proper supervision by health and safety staff

Do Proper supervision by staff trained in Health & Safety carried out on your project?	Foreign Contractors	Domestic Contractors
Yes	100%	29%
No		71%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		25%
B. upper level management commitment problem		45%
C. There is no enforcement law		30%
D. Others		

The above table shows that from the total of 6 Foreign contractors the respondents witnessed that all of them performs site supervision by health and safety trained staffs, and when we see the domestic contractors from the total of 28 domestic grade one contractor only 29% of them undergo site supervision by health and safety trained staff and the respondents witnessed that the rest 71% of them do not carry out the task due to different reason. The major reason is that upper-level management commitment problem (55%), 30% of the respondents also believes that there is no enforcement law in the contract agreement. The other 25% of the respondents said that there is an awareness gap in all stakeholders of the industry, and around 15% of them also list some other reasons

4.3.22 Inspection by local authorities

Table 4. 22 Inspection by local authorities

Do Local authorities and Health &Safety enforcement agencies visit sites for inspection regularly?	Foreign Contractors	Domestic Contractors
Yes		
No	100%	100%
Reason for No answer:		
A. There is no regulatory body established for Health &Safety	50%	57%
B. Lack of awareness by all parties in the industries	33%	36%
C. There is no enforcement law in the contract agreement with the client		
D. There are no standards in the code of practice		
E. Others	17%	7%

The above table shows that all the respondents from the foreign and domestic contractors witnessed that the local authorities and health and safety agencies do not visit the site and health and safety performance of the company regularly due to different reasons. When they are explaining the reason around 50% of the respondents from Foreign contractors and 57% respondents from domestic contractor believe that there is no regulatory body established for supervision of health and safety, also around 33% of respondents from the Foreign contractor and 36% of respondents from the domestic contractor believes that there is a lack of awareness by all the parties of the industry and the rest 17% of respondents from Foreign contractor and 7% from domestic contractor lists some other reasons which they are believing as a cause for the problem.

4.3.23 Filing all accident and fatalities

Table 4. 23 Filing all accident and fatalities

Are all injuries, fatalities filed & reported to the concerned body?	Foreign contractors	Domestic Contractors
Yes	67%	29%
No	33%	71%
Reason for No answer:		
A. Rarely done by the consultant		24%
B. Lack of awareness by all parties in the industries		18%

C. Upper level management and involvement problem		22%
D. There is no regulatory body enforce to report		36%
E. Others		

The above table shows that from a total of 6 foreign contractors 67% of the respondents witnessed that their company filed and report all injuries and fatalities to the concerned body the rest 33% of the respondents witnessed that their company do not do the same thing due to different reason. All the respondents who said believe that lack of awareness by all parties of the industry, upper-level management problem and absence of regulatory body to enforce the report are the major reason for not filing and reporting the accidents to the concerning body and also 50% of the respondents said most of the time the job is done rarely by the consultant. When we see the domestic contractor from the total of 28 domestic grade contractors 32% of the respondents agreed that their company filed and report injuries and fatalities for the concerned body, and the rest 68% of the respondents witnessed that their firm does not do the same thing due to different reasons. 36% of the respondents who said no believe that there is no regulatory body to enforce the report. Around 22% of them also said upper-level management commitment problem is another reason. 24% of the respondents also said it's rarely done by the consultant. For 18% of the respondent's lack of awareness by all parties of the industry is another reason.

4.4 Using health and safety as bid qualification criteria

Table 4. 24 Using health and safety as qualification criteria

Do you think that that health and safety used as a criteria for selecting contractors during bid qualification?	Foreign Contractors	Domestic Contractors
Yes	83%	29%
No	17%	71%
Reason for No answer:		
A. Lack of awareness by all parties in the industries		12%
B. Rarely done by client or consultant	100%	64%
C. There is no regulatory body enforce		24%
D. Others		

The above table shows that from the total of 6 respondents working under Foreign contractors 83% of witnessed that when their company is winning the bid health and safety is the major criteria during the prequalification of the bid and the rest 17% of the respondent said that safety

is not used as a criteria during bid qualification the reason is that the client or the consultant is not considering health and safety as a criteria because they believe that it incurs additional cost. When we see the domestic contractors from a total of 28 respondents working under domestic contractors 29% of witnessed that health and safety is used as bid qualification criteria and the rest 71% of them witnessed that health and safety are not used as bid qualification criteria. The major reason is around 64% the respondents who said no believe that it is rarely done by the client or the consultant because the client believes that it incurs additional cost, 12% there is lack of awareness by all parties of the industry and also 24% the respondents believe that that there is no regulatory body to follow and enforce the process.

4.5 Nature of construction site health and safety accidents

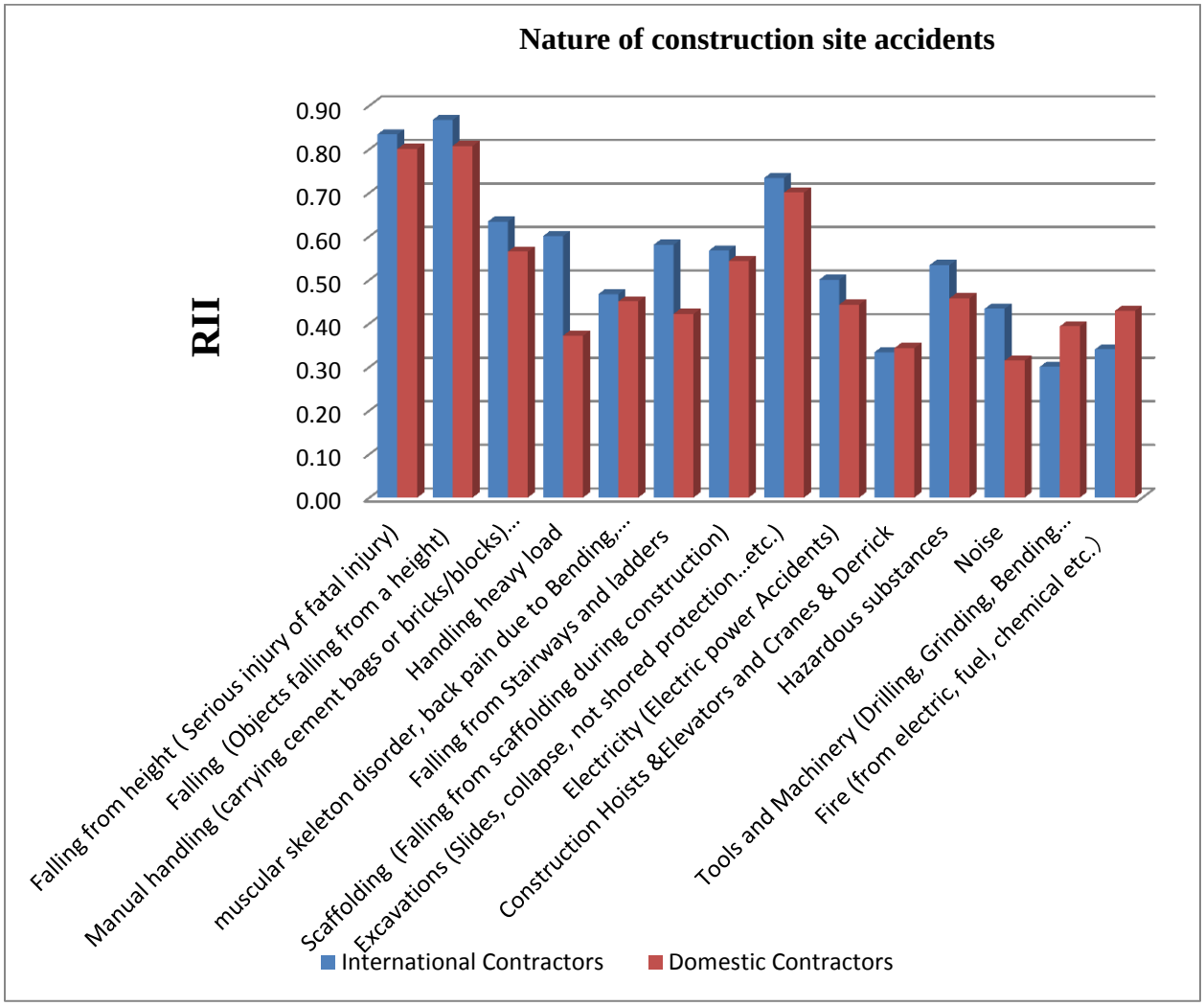

Figure 4. 2: Nature of accidents

The above figure shows the ranks of causes of accidents according to the response of respondents from both Foreign and domestic construction companies'. For the respondents from the foreign companies falling of objects from a height is frequently happening and highly ranked cause of accident, falling of person from a height is the second cause, sliding or collapse of excavation is the third cause of construction site accident. Manual handling, handling heavy load, falling from scaffolding, falling from stairways or ladder, hazardous substance, electricity, muscular skeleton disorder and back pain due to Bending or twisting, noise, fire, Construction Hoists &Elevators and Cranes & Derrick, Tools and Machinery are the other reasons for construction site accidents which takes the rank from four up to fourteen respectively. For the respondents from domestic contractors also falling of objects from height takes the first place and falling of person from a height is the second cause of construction site accidents. Sliding or collapsing of the excavation, manual handling, falling from scaffolding, hazardous substance, muscular skeleton disorder and back pain due to Bending or twisting, electricity, fire, falling from stairways and ladder, tools and machinery, handling heavy load, Construction Hoists &Elevators and Cranes & Derrick and noise are the other reasons for construction site accidents which takes the place of from three up to fourteen respectively.

4.6 Summary of the result

Out of 47 questioners distributed both for domestic and foreign contractors only 34 of the questioner is properly filled and returned. Therefore the discussion and analysis are done based on those questioners which are properly filled and returned. From 6 respondents from foreign contractors, only 33% of them are from the health and safety department. In the case of domestic contractors out of 28 respondents, only 21% of the respondents are from the health and safety department. When we see health and safety practices of both the domestic and foreign contractors 100% of the companies have health and safety policy but the problem is that they are not properly implementing the policy and 100% the foreign companies have written health and safety plan but in the case of the domestic ones, only 68% of them are having. 67% of the foreign companies and 57% of the domestic companies coordinate their health and safety plan with other human resource policies. When we see the hiring of health and safety officers 39% of locally available construction firms do not hire safety officers for specific project sites regarding the foreign companies have good health and safety culture. According to the respondents from foreign companies, only 17% of the companies have a safety plan for the specific project site and

also only 11% of the domestic companies have a site-specific safety plan. Only 67% of foreign contractors and 43% of domestic contractors are considering health and safety during site layout planning. The result shows that 17% of the foreign contractors and 4% of domestic contractors periodically review the constructability of the project with respect to health and safety. All the domestic and foreign companies are having a site safety signboard that gives safety precautions, warnings, and motivation to the workers. 83% the managers from the foreign contractors and only 25% of domestic contractor's manager encourage and support worker's participation, commitment and involvement in health and safety activities. According to the result from the questioner data, the Foreign companies have a good culture of providing first aid and first aider, personal protective equipment's, right tools, equipment and plant to execute the work, good welfare facilities and also material schedule data sheets for hazardous material used in the site for their workers when we are comparing them with the locally available companies. In giving training for their workers again the foreign companies are good relatively; also almost all of the foreign companies properly supervise the project with respect to health and safety. In both cases person falling from a height, objects falling and excavation slides and collapse are the major cause of construction site accidents. As the result of the survey shows 83% of respondents from foreign companies and 29% of respondents from domestic companies believe that health and safety is used as criteria during the prequalification phase of public bidding.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The objective of this study is to assess and compare the current health and safety management practices of foreign and domestic contractors which are managing public construction found in Addis Ababa city. In meeting those objectives different instruments are used to collect and analyze the data. And the results from the data are used to show the landscape of both domestic and foreign contractors in managing and practicing health and safety, and also the nature of health and safety problems.

When we see the nature of health and safety problems the construction industry is the leading industry by killing people and the result from the study indicates that persons falling from a height, objects falling and excavation collapse are the major causes of construction site accidents.

It's concluded that there are big differences between domestic and foreign contractors in practicing and managing health and safety. The foreign contractors are good at managing and practicing health and safety than the domestic ones. Maybe the difference is due to capacity, experience, safety perception of the contractor, enforcing and inspection mechanism, also in domestic contractors, the major problem is there is an information gap between employees of the company is properly managing and practicing health and safety. As the result shows most of the locally available companies do not plan health and safety from the start of the project to the end because they believe that planning health and safety incurs additional cost but the foreign companies say that planning health and safety increases profitability. The country has a different code of practice to manage the health and safety performances of the contractor but the result indicates that there is a lack of enforcing those rules and regulations by the government and regulatory bodies.

The result of the study shows that 83% of respondents from foreign companies and 29% of respondents from domestic companies believe that health and safety is used as criteria during the prequalification phase of public bidding.

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5.2 Recommendation

Finally from the result of the study the following points are recommended for all stake holders of the industry.

The contractor

- The Contractor should have establish, coordinate, monitor and manage the overall basic safety program and structure for all parties and persons at his job site.
- The Construction companies should have to be responsible for educating and training their labor force and increasing their awareness of the causes and effects of site incidents on themselves, families, the project and the community at large.
- The contractor should have to plan health and safety by considering the socio-economic benefits of implementing health and safety plan before the start of the project and appoint safety officer which manage the implementation of safety plan of the company.
- Construction companies should have to prioritize (give an attention) to factors having a high influence on health and safety performance of the projects.
- The contractor should have to prepare regular safety meeting to discuss with their employees.
- The contractor should have to provide PPE, good welfare facilities, right tools and equipment's, and material data sheet for the usage of hazardous material and follow whether the workers are using those things properly.
- The contractor should have to record and report all construction site incidents to the concerned body because it helps to teach others.
- The contractor should have to consider health and safety during bid preparation process.

The Government

- The government should have to establish the department of occupational health and safety administration which follow up the health and safety performance of the construction companies and punish those companies which are not good in managing health and safety.
- The government should have to be committed to implement and enforce health and safety rules and regulation.

- The government should have to properly supervise and inspect the health and safety performance of the construction companies by staff trained in health and safety regularly.

The consultant

- The Consultant should have to regularly inspect work place safety whether workers have been adequately trained for the job they are expected to do.
- In preparing the contract document the consultant should have to include health and safety guide lines, rules and regulations which enables to enforce for minimizing health and safety problems while the project is started.
- The consultant should have to directly support the site management and assures within his or her field of competency that working conditions and equipment are safe to use.
- Safety must be prequalification criteria during tendering.

The owners

- The client should have to check the time frame and the budget is sufficient and wil1 allow the provision of health and safety.
- The client should have to check that whether the contractor is competent and have made proper provision of health and safety to do any of the work before awarding the project.
- The client should have to enforce the contractor to implement the health and safety plan and also the consultant to do the supervision regularly and properly.

The workers

- The workers should have to give first for their safety before they are starting any king and should have not to negotiate on their safety with any one.
- The workers should have to use PPE, welfare facilities and the right tools for being safe.
- The worker should have to ask for their rights and be responsible in performing their job.

Finally every stake holders of the industry should have to work together to reduce the safety risk of construction sites and to make the construction site healthy and safe for everyone, and both the domestic and the foreign contractor should have to learn their best practices from each other.

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APPENDIX

Dear Participant:

This MSC thesis research questionnaire is designed to assess A COMPARATIVE STUDY ON OCCUPATIONAL HEALTH AND SAFETY PRACTICES BETWEEEN DOMESTIC AND INTERNATIONAL CONTRACTORS. (A CASE OF ADDIS ABABA CITY PUBLIC CONSTRUCTION PROJECTS).The objective of the study is to assess the current health and safety management practices in public construction projects which found in Addis Ababa city. The information obtained will be used for academic purpose only; all information and feed-backs will be kept strictly confidential. Your experience and educational background in the construction industry will greatly contribute to the success of my study and I believe this kind of study will be an input for the development of Ethiopian construction industry. So, I am kindly requesting you to respond each and every question.

What you say in this question is completely confidential thank you for giving me your time and effort to respond for the questions.

Questioner for analyzing health and safety management practices of foreign and domestic contractors

1. Demographic data of respondents

1.1 Job title

Project manager □ Project Engineer □ Health and safety manager □ others □

2. Health and safety practices of the contractors

2.1 Does your construction firm have Health & Safety policy?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries
B. Budget not considered in the firm
C. Clients does not consider as a perquisites for awarding projects
D. Others……

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2.2 Does your construction firm have a written in house Health & Safety rules &regulations and implementation for all workers reflecting management concerns for safety and health?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries
B. Budget not considered in the firm
C. Clients does not consider as a perquisites for awarding projects
D. Others……

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2.3 Does your firm coordinate its Health &Safety policies with other human resource policies to ensure wellbeing of workers?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries
B. Not a standard practice

C. The construction agreement with clients does not enforce the company to have Health& Safety policy

D. Others……

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2.4 Do your construction projects/sites have a Safety Officer?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries

B. No contractual obligation in the contract

C. There is no controlling and enforcement law in the contract agreement

D. Not required to hire safety officers

E. Others……

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2.5 Does your project have a site-specific Health &Safety plan?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industry

B. No contractual obligation in the contract

C. There is no controlling and enforcement law in the contract agreement

D. Others……

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2.6 Does the Layout of the site consider Health & Safety aspects? (During constructing site offices, access roads, temporary structures while constructing the project)

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industry

B. No contractual obligation in the contract

C. There is no controlling and enforcement law in the contract agreement

D. Others……

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2.7 Do Constructability of project is reviewed periodically or frequently in Health &Safety aspect?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries

B. No contractual obligation in the contract

C. There is no controlling and enforcement law in the contract agreement

D. Not standard practice

E. Others……

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2.8 Are there any site safety sign boards which can give safety precaution, warning and motivation to the workers in your site?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries

B. Budget constraint

C. No company Health & Safety policy in the firm

D. others ……

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2.9 Do Managers encourage and support worker participation, commitment and Involvement in Health &Safety activities?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries

B. Budget not considered in the contract

C. Upper level management and commitment problem

D. others ……

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2.10 Do Managers encourage and support training of employees in Health &Safety?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries

B. Budget not considered in the contract

C. Upper level management and commitment problem

D. others ……

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2.11 Do Managers actively monitor the Health &Safety performance of their projects and workers through reports?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. Upper level management and commitment problem

D. others ……

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2.12 Do Managers ensure that the Health & Safety budget is adequate?

Yes □ No □

If your answer is no, why?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. Upper level management and commitment problem

D. others ……

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2.13 Is there adequate first aid and first aider(s) on your construction projects/sites?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. There is no enforcement law

D. others ……

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2.14 Do your firm Provided personal protective equipment (PPE)?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. There is no enforcement law

D. others ……

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2.15 Do your firm Provided right tools, equipment and plant to execute construction?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. There is no enforcement law

D. others ……

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2.16 Do your firm Provided good welfare facilities such as showers, canteens, toilets?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget constraints

C. There is no enforcement law

D. others ……

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2.17 Does Material schedule data sheets provided for all hazardous materials on site?

Yes □ No □

If your answer is no why?

A. Lack of skilled personnel

B. Lack of awareness by all parties in the industries

C. Budget constraints

D. There is no enforcement law

E. others ……

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2.18 Do Workers undergo induction on Health &Safety before commencing work on a particular site?

Yes □ No □

If your answer is no why?

A. Budget constraints in projects

B. Lack of awareness by all parties in the industries

C. Lack of H&S policy implementation on projects

D. There is no enforcement law

E. others ……

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2.19 Do Workers are regularly trained in Health & Safety?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget not considered for Health & Safety

C. Upper level management and involvement problem

D. There is no enforcement law

E. others ……

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2.20 Do Workers trained in proper care & use of personal protective equipment?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget not considered for H&S

C. Upper level management and involvement problem

D. There is no enforcement law

E. others ……

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2.21 Instruction manuals or safe work procedures are used to aid in preventive action?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget not considered for Health & Safety

C. Upper level management and involvement problem

D. There is no enforcement law

E. others ……

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2.22 Do Proper supervision by staff trained in Health & Safety carried out on your project?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Budget constraint

C. There is no enforcement law

D. Others……

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2.23 Do Local authorities and Health &Safety enforcement agencies visit sites for inspection?

Yes □ No □

If your answer is no why?

A. There is no regulatory body established for Health &Safety

B. Lack of awareness by all parties in the industries

C. There is no enforcement law in the contract agreement with the client

D. There are no standards in the code of practice

E. Others……

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2.24 Are all injuries, fatalities filed & reported to the concerned body?

Yes □ No □

If your answer is no why?

A. Rarely done by the consultant

B. Lack of awareness by all parties in the industries

C. Upper level management and involvement problem

D. There is no regulatory body enforce to report

E. Others……

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3. using of health and safety as bid qualification criteria

3.1 Do you think that that health and safety used as a criteria for selecting contractors during bid qualification?

Yes □ No □

If your answer is no why?

A. Lack of awareness by all parties in the industries

B. Rarely done by client or consultant

C. There is no regulatory body enforce

D. Others ……

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4. The Major Health &Safety areas to be considered during construction, Frequency, nature of accidents and causes of Injuries in construction sites.

Please Mark on the space provided.

Item No	Description	Frequency of injury and fatalities				
		Very High	High	Medium	Low	Exceptional
1	Falling from height (Serious injury of fatal injury)					
2	Falling (Objects falling from a height)					
3	Manual handling (carrying cement bags or bricks/blocks) Neck, back or arm injury					
4	Handling heavy load					
5	muscular skeleton disorder, back pain due to Bending, twisting while					
6	Falling from Stairways and ladders					
7	Scaffolding (Falling from scaffolding during construction)					
8	Excavations (Slides, collapse, not shored protection…etc.)					
9	Electricity (Electric power Accidents)					
10	Construction Hoists &Elevators and Cranes & Derrick			`		
11	Hazardous substances					
12	Noise					
13	Tools and Machinery (Drilling, Grinding, Bending machine…etc.)					
14	Fire (from electric, fuel, chemical etc.)					