



ADDIS ABABA UNIVERSITY
College of Business and Economics
School of Commerce
Department of Project Management

Assessment of Safety Management Practices in Building Construction Projects. The Case of Geom Luigi Varnero Impresa Construction P.L.C.

By:

Winta Atrsaw

GSR/8609/14

MA Project work submitted to Addis Ababa University College of Business and Economics School of Commerce in Partial Fulfillment of the Requirement for the award of Masters of Art Degree in Project Management.

Advisor

Dr. Bantie Workie(PhD.)

June, 2023

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DECLARATION

I, the undersigned, declare that the study entitled “Assessment of safety management practices in building construction projects. The case of Geom Luigi Varnero Impresa Construction P.L.C.” 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 project work has not been submitted for any degree in this university or any other universities. It is submitted for the partial fulfillment of Master of Arts Degree in Project Management.

Winta Atrsaw Tassew

Name

Signature

Date

STATEMENT OF CERTIFICATION

This is to certify that Winta Atrsaw has conducted this project work on the topic entitled "Assessment of safety management practices in building construction projects. The case of Geom Luigi Varnero Impresa Construction P.L.C." under my supervision. This work is original in nature and sufficient for submission in partial fulfillment of the requirement for the award of Master of Arts Degree in Project Management and the student has my permission to present it for assessment.

Dr. Bantie Workie (PhD)

Advisor

Signature

Date

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By: Winta Atrsaw Tassew

APPROVAL SHEET

| | | |
|----------------------------|--------------------|---------------|
| _____ Advisor | _____ Signature | _____ Date |
| _____ Internal Examiner | _____ Signature | _____ Date |
| _____ External Examiner | _____ Signature | _____ Date |

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List of Acronyms

| | |
|-------|--|
| ANSI | American National Standards Institute |
| ETB | Ethiopian Birr |
| FDRE | Federal Democratic Republic of Ethiopia |
| FFH | Falling from height |
| FIDIC | International Federation of Consulting Engineers |
| GDP | Gross Domestic product |
| GTP | Growth and Transformation Plan |
| HS | Health and safety |
| ILO | International Labor Organization |
| OSH | Occupational Safety and Health |
| OSHA | Occupational Safety and Health Administration |
| P.L.C | Private Limited Company |
| PMBOK | Project Management Body of Knowledge |
| PPE | Personal Protective Equipment |
| UN | United Nations |
| WHO | World Health Organization |

ABSTRACT

The construction industry is the foundation of both the global and Ethiopian economies, and it's one of the major employers of the work force in Ethiopia. Thus, issues with safety and health in the construction of buildings are a significant and global problem that requires careful study as they have an impact on both the productivity of the project and the lives of the employees. The aim of this research was to assess the current safety and health management practices in building construction projects under Geom Luigi Varnero Impresa Construction in Addis Ababa. Descriptive research design and a qualitative research approach were employed in this project, and both primary and secondary data were utilized. The data was gathered through semi-structured interviews from twelve respondents and supported with site observation and document review methods. The data was analyzed thematically and interpreted using the descriptive method. After analyzing the data, the findings revealed that the company has very good health and safety practices in building construction projects. The results of the study indicated that the company has a structured safety and health management system implemented throughout the organization. The health and safety management practices that are being used for safety and health management in projects are based on HS policy, an OSH plan, and a company procedure for implementing OSH. After interpreting the findings, the researcher recommended that the company concentrate on training and orienting employees based on their understanding of safety, since most minor construction site accidents result from employee carelessness or lack of awareness. Also, it should specifically allocate a portion of the project budget to health and safety concerns, both the cost of accidents and the cost of prevention.

Key words: Safety, Health, Safety management, Building construction projects

1.0. INTRODUCTION

The aim of this chapter is to provide basic information about the project. In this chapter, an introduction to the major starting point of the research was discussed. Background of the study, statement of the problem, research questions, objective of the study, significance of the study, scope of the study, limitations of the study, organization of the study, and definition of key terms are clearly defined in this chapter.

1.1. Background of the study

The construction industry is broad and active, and it is the foundation of both the global economy and Ethiopia's economy in particular. It mobilizes a huge amount of currency, resources, and labor by providing a lot of work opportunities (Fekele, Quezon & Macarubbo, 2016). Construction has the ability to have a favorable effect on short-term growth as an investment sector. As such, construction can be seen as a key element of investment plans, especially for developing economies (Dlamini, 2014).

The value added by industry in Ethiopia, including construction, as a percentage of GDP, was reported at 21.85% in 2021 by the World Bank's collection of development indicators, which is compiled from officially recognized sources. By 2025 G.C., Ethiopia is intended to be among the lower middle-income nations, a goal that will be achieved through industrialization. From 2012 to 2021, Ethiopia's GDP from Construction was 299.27 ETB billion on average, with a record high of 468.44 ETB billion in 2021 and a record low of 114.42 ETB billion in 2013 (Trading Economics, 2023).

Construction is one of the major employers of the work force in Ethiopia. An efficient and effective construction industry can enhance national competitiveness and create enormous employment opportunities. Moreover, measures were undertaken to build the capacity of the sector and to increase the contribution of the sector in the national economy. It is planned to enforce safety rules and standards in construction companies so as to provide employees' construction safety equipment for the period of GTPII (National Planning Commission, 2016).

In comparison to other industrial sectors, the construction industry is generally less organized and employs a higher proportion of unskilled employees. Construction is an industry that contributes significantly to employment in numerous parts of the world, but it is also one that is connected

with a relatively high incidence of workplace illnesses and accidents. The rate of injuries in the construction sector is higher than that of any other industry, and it is regarded as one of the most dangerous industrial activity in the world (Ramya & Ramadasan, 2016), and there are many fatalities and severe injuries associated with it (Saeed, 2017).

According to reports from the sector, the number of accidents involving construction that result in injuries and fatalities is rising. The main reasons for accidents include the unique features of the industry, human nature, challenging working environment, and poor safety management, which leads in risky work practices. Accidents cause fatalities and have a significant financial impact (Ramya & Ramadasan, 2016).

Due to the fact that thousands of people are engaged in construction industry, poor safety performance is a serious problem in the construction industry. Accidents are unplanned and unanticipated events that disrupt a planned workflow and reduce productivity. The promotion of health and safety in building projects is thus considered to be carried out by safety programs and systems as leading mechanisms. Since its implementation, accident rates have dropped and safe working conditions have been established (Buniya et al., 2021).

The PMBOK Guide (2017), which recognizes safety management as a subject area in project management, states that it is important knowledge. Safety management is the procedure used to recognize health and safety (HS) risks and implement actions to decrease the possibility of a risk materializing and to diminish or eliminate the potential consequences of identified project HS risks (Saeed, 2017).

Thus, issues with safety and health in the construction of buildings are a significant and global problem that requires careful study as they have an impact on both the productivity of the project and the lives of the employees (Guidotti, & Ivanov, 2020). Health and safety are the responsibility of everyone at work. That the organizations should be more take care about HS of their construction teams to minimize construction risks to an acceptable value. Companies should prepare employees before starting construction work and provide them with relevant information to identify and minimize risks on their HS (Saeed, 2017).

Accidents are generally unavoidable in construction projects but the number and gravity of accidents can be reduced considerably if proper safety measures are taken beforehand. Health and

safety in the context of construction industry are the discipline of preserving the health of all those involved in the construction works (Saeed, 2017). The foundation of construction site safety is effective planning and organization, as well as the assignment of clear responsibility to supervisors. Making the work site safe will require routine inspection and the provision of means for implementing corrective actions (Fekele et al., 2016).

Despite this high rate of accidents, there is still a lack of safety research in the context of the Ethiopian construction industry. The purpose of this research is to assess safety management practices in building constructions, specifically in Geom Luigi Varnero Impresa Construction P.L.C.

1.2. Statement of the problem

One of the main contributors to life-threatening situations is work-related injuries. According to estimates, there are approximately 270 million occupational accidents worldwide each year, resulting in 2 million fatalities (Sahle, 2018). According to the International Labor Organization (2005), at least 60,000 fatalities are reported at construction project sites worldwide each year. According to this, a deadly accident happens in the industry once every ten minutes. The majority of these accidents are caused by risky conduct and harmful surroundings (Guidotti, & Ivanov, 2020).

In addition to the enormous expenditures linked to accidents, there are also negative impacts on employees' health and socioeconomic status. In the construction industry, the risk of death is five times greater than in the industrial sector, and the dangers to employees are twenty times greater in developing countries than in developed ones (Sahle, 2018).

Construction industry in Ethiopia has significantly increased recently, particularly in the city of Addis Ababa. Due to increasing demand from residential and commercial customers for Addis Ababa services due to the rapid urbanization, there are now more development projects underway. Additionally, Addis Ababa is currently the site of numerous building construction projects and this has given access to employment prospects. This is therefore providing a lot of job opportunities, which will mobilize a lot of different resources, budgets, and vast amounts of human resources.

Even though it's essential, construction sites have a reputation for being very hazardous areas in which workers face the risk of dying or suffering from health issues. Work at heights, handling

loads by hand, being underground, in tight spaces, being near objects that are falling, being around loud noises and dust, being around fire, and exposure to live cables are just a few of the activities associated with safety and health risks in construction projects. Accident rates were considerably higher as a result of constructing deep foundation pits and operations at high altitude. Additionally, due to serious accidents and hazardous working circumstances, the number of permanent disabilities, severe injuries, and even death among construction workers has increased. This depressing circumstance has developed into a significant risk to the effectiveness and efficiency of building construction projects generally, as well as to the labor force and economy of the country. One of the challenges of building construction projects is minimizing accidents and fatalities by having sufficient safety performance.

Health and safety issues have been a focus of research (Cooney, 2016). Despite this high rate of accidents, there is still a lack of safety research in the context of the Ethiopian construction industry. The above problems have a very significant impact on the many project participants, team members, and the country in numerous ways. The question is what gap in the safety management practices are leading to this? In order to make recommendations and suggestions, it's critical to assess how building construction companies manage safety and health in order to identify any areas that may require improvement for better outcomes. The researcher assessed safety and health practices on building construction projects at one of the GC-1 contractors, Geom Luigi Varnero Impresa Construction, in Addis Ababa because the city is involved in numerous building construction projects and where many construction project accidents occur.

1.3. Research questions

The following basic research questions will be the focus of the study:

- What is Geom Luigi Varnero Impresa Construction's current level of safety and health management practice in building construction projects?
- What are the main safety and health measures employed by Geom Luigi Varnero Impresa Construction in the current building projects?
- What are the challenges Geom Luigi Varnero Impresa Construction faces in implementing construction safety management?
- What are the strengths and limitations of safety and health management in building construction projects at Geom Luigi Varnero Impresa Construction?

1.4. Objective of the study

1.4.1. General objective

The objective of this study is to assess the current safety and health management practice in building construction projects at Geom Luigi Varnero Impresa Construction P.L.C.

1.4.2. Specific Objectives

The study is conducted:

- To assess the major safety and health measures implemented in building construction of Geom Luigi Varnero Impresa Construction.
- To examine the challenges in the implementation of construction safety at Geom Luigi Varnero Impresa Construction
- To determine the strengths and limitations of safety and health management practice in Geom Luigi Varnero Impresa construction

1.5. Significance of the study

The assessment is helpful in presenting reality-based evidence on existing safety and health measures that protect workers against workplace illnesses and accidents in Geom Luigi Varnero Impresa construction. Addressing health and safety concerns shouldn't be considered governmental pressure because applying safety management in the construction industry will increase the success of the project in different ways. The research highlighted the significance of health and safety management in the construction industry, which should be given top priority by all organizations, particularly in the construction industry.

The major beneficiaries of this research are both employees and the company (Geom Luigi Varnero Impresa Construction P.L.C). The management of the organization should review the findings to pinpoint areas where safety and health management procedures need to be improved and implement the appropriate adjustments. The company's overall performance will be enhanced as a result of this. For the workers, it was utilized to allow access for all staff to address health and safety issues and provide safe work place to all employees, reduce recognized hazards on the job site, and protect them from injuries and accidents. Additionally, contractors will save money since

they will be responsible for paying for employee care out of their own profits by reducing risks and safeguarding their employees.

It helps other construction companies in Ethiopia; it is used for experience sharing and provides a best practice guide for safety and health as well as possible solutions for issues in those areas. Additionally, it contributes to the knowledge area for future studies on safety and health management techniques in building construction projects. This study contributes to the literature on safety management for other researchers.

1.6. Scope of the study

This study was assessing safety and health management practices in building construction projects of Geom Luigi Varnero Impresa Construction. Despite the fact that managing workplace safety is a wide topic, this project work only addresses management of building construction site safety.

Assessment of safety management in building construction can be conducted with many construction companies, but only Geom Luigi Varnero Impresa Construction P.L.C were considered for this study because of time constraints. Geom Luigi Varnero Impresa Construction is one of the leading companies capable of handling complex and challenging projects throughout the county. However, the researcher focuses on projects that are constructed in Addis Ababa. Additionally, the study will focus only on the safety and health management practices of the company; other project activities will not be considered.

The study used descriptive design and qualitative approach. The target population of the study contains only six projects. Interviews and observations are used to gather primary data, and the respondents were, employees who are professional, safety engineers, project managers, site engineers, and supervisors that are working in Geom Luigi Varnero Impresa Construction P.L.C

1.7. Limitation of the study

Only building construction projects were the subject of the study. This is due to the fact that, as previously stated, most accidents involving construction take place during building projects. However, this does not imply that other construction projects do not also require a strong focus on safety and health. And also, it is limited to Geom Luigi Varnero Impresa building construction projects that are constructed in Addis Ababa, with no coverage of other projects throughout Ethiopia. Additionally, the study is limited to the safety and health practices at Geom Luigi

Varnero Impresa Construction during the construction period; it does not include the after-construction period.

1.8. Organization of the study

This project consists of five chapters. The first chapter is the introduction, which mainly discusses the problem and objectives of the project thesis work. Chapter two deals with a literature review, which presents an overview and critical analysis of relevant literature on the topic. Chapter three discusses the research design and approach, population and sampling techniques, types and sources of data, and methods of data collection and analysis. Chapter four deals with data analysis and discussion, and in the fifth chapter, a summary, conclusion, and recommendation are presented.

At the end of the paper, a list of references used for the study is followed by the appendix section, which contains interview guidelines and observation checklists used for the study.

1.9. Definition of key terms

Safety- is the condition of being protected from harm or other undesirable outcomes through the application of hazard control to the workplace.

Health- refers to the protection of people's bodies and minds from illness caused by products, procedures, or practices used at work.

Safety management- is defined as the management function related to the safety of an industrial undertaking, including planning, developing, organizing and implementing a safety policy.

Building construction projects- is the process of constructing a new building or the modification, restoration, and maintenance of an existing building.

2.0. LITERATURE REVIEW

2.1. Introduction

The main aim of carrying out literature reviews is to gather information on a research topic and identify the basics for the research. This chapter deals with different studies that were conducted in the area of safety and health in the construction industry. The literature review begins with a theoretical literature review on health and safety in the building construction industry, followed by a briefly discussed empirical literature review related to the topic.

2.2. Theoretical Literature Review

2.2.1. The concept of safety, health, and occupational safety and health (OSH)

The line between safety and health is blurry, and the two terms are frequently used together to signify concern for an employee's physical and mental well-being at work (Hughes & Ferrett, 2016).

a) Safety

National Council of Educational Research and Training define safety as the state of being safe, the condition of being protected from harm or other non-desirable outcomes. Regular risk assessments should be conducted at retail stores to identify health and safety problems, and initiate necessary measures to eliminate or mitigate them as far as possible

In general, safety implies being aware of potential risks that can be avoided before they occur. Among the things exposed for hazards and safety concerns are the risk to human life, the loss of property, and the environment, including wildlife, flora, and biodiversity (NIOSH, 2016).

According to WHO (2014), in order to protect the health and wellbeing of individuals as well as the community, safety refers to a condition in which risks and circumstances that could cause bodily, psychological, or material harm are under control. The protection against the risk of bodily harm and from preventable accidents is typically referred to as safety.

Using sustained actions, accountability, and reducing risk to as low as reasonably practicable to mitigate potential injury, safety is defined as the application of hazard control through the workplace, person, and system (Balderson, 2016).

b) Health

As defined by the World Health Organization (WHO), health is a “state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity”. Health relates to the processes employed towards protecting people from the adverse effects of all the operations concluded within a construction and work site.

The ILO and WHO (2016) have a common definition of occupational health, which aims to promote and maintain physical, mental and social well-being of workers in all occupations. The well-being from both the short- and long-term effects of exposure to harmful working conditions is referred to as health.

In contrast to safety, which protects people from physical harm, health refers to the protection of people's bodies and minds from illness brought on by products, procedures, or practices used at work (Hughes & Ferrett, 2016).

c) Occupational safety and health (OSH)

Occupational safety and health is a key element in achieving sustained decent working conditions and strong preventive safety cultures. Nearly 80% of all ILO standards and guidelines are either entirely or partially focused on workplace safety and health-related issues (Alli, 2008). Occupational safety and health is the science of predicting, recognizing, evaluating and controlling hazards in the workplace to protect workers and the environment. It has evolved over time due to social, political, technological and economic changes. Globalization has been seen as the greatest force for change in the world of work and occupational safety and health, both positive and negative (Alli, 2008).

Occupational safety and health is a multidisciplinary activity that aims to protect and promote the health of workers, enhance their physical, mental and social well-being, and develop sustainable work environments and organizations (WHO, 2014). It is defined by the International Labor Organization 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 averse to their health in their employment, and the placing and maintaining of workers in occupational environments adapted to their individual and psychological conditions (ILO, 2016).

Occupational safety and health in the construction industry is generally recognized to be the science of anticipating, recognizing, evaluating, and controlling workplace hazards that may endanger the health and well-being of employees while also taking into account any potential negative effects on the local community and the environment as a whole (Nyirendaavwil, Chinniah & Agard, 2015).

Occupational health and safety practices are characterized by five basic dimensions (Kaynak et al.,2016). These are occupational hazards prevention, safety procedures and risk management, organizational safety support, first aid support and training, and safety and health rules. The job performance of the employees is also impacted by organizational safety support, safety and health policies, and safety procedures and risk management.

2.2.2. The concept of safety management

Safety Management is defined as the management function related to the safety of an industrial undertaking, including planning, developing, organizing and implementing a safety policy (Alli, 2008). It also includes measuring, auditing and reviewing the performance of those functions. A safety management system is a framework for managing safety in industrial projects (Alli, 2008). In order to prevent accidents that could result in property damage or personal injury, safety management covers the procedures necessary to ensure safety on the construction site. In terms of both direct and indirect costs to the industry as well as humanitarian loss, safety management is a serious concern for the construction sector.

According to Alli (2008), Safety management involves the following processes: Safety planning, Safety plan execution, and Administration and reporting. Safety planning involves a job site analysis of the hazards inherent in the work and making decisions to deal effectively with them. Government laws and regulations, contract and owner requirements must be considered in developing the project safety plan. Execution of the project safety plan involves the application and implementation of safe construction practices on site. On large construction projects, there may be a separate safety staff of several persons headed by the safety officer. Record keeping and reporting and insurance companies require periodic activity and accident reports. It is good practice to keep track of safety performance for use in improving performance and for making future service.

Analysis, evaluation, and control of safety risks are tasks that are addressed by safety management, which demonstrates the systematic application of management policies, processes, and practices. Occupational accidents are never intentional and can occur through risk being unidentified, incorrectly analyzed or the response being ineffective.

2.2.3. The concept of safety management system

According to ILO (2016), Occupational Health and Safety Management System is a network of interrelated elements. These elements include responsibilities, authorities, relationships, jobs, activities, processes, practices, procedures and resources. The management system uses these elements to set the policies, plans, programs, and objectives, and develop ways to implement these policies, plans and programs, and achieve these goals.

Occupational Health and Safety Management Systems is a combination of the planning and review, the management organizational arrangements, the consultative arrangements, and the specific program elements that collaborate to enhance performance in terms of health and safety (Pearse, Gallagher & Bluff, 2011).

Numerous construction companies manage their health and safety function by engaging in health and safety activities that are intended to reduce or eliminate the risk of hazards on their sites. A health and safety management system essentially consists of four main components: planning, executing the plan, reviewing the plan, and evaluating and improving strategy (Hamid et al. 2004).

According to the European Union (2021), the organizational structure, responsibilities, practices, procedures, processes, and resources for determining and implementing the major-accident prevention policy should be included in the safety management system. The primary purpose of the SMS is to make sure that a company handles risks associated with its business objectives in a safe way and complies with all legal requirements relating to safety. In order to prevent accidents, a systematic method makes it feasible to identify risks associated with an organization's activities and to manage them continuously (EU, 2021).

2.2.4. The concept of safety program

Construction industry is one of the most important and most jobs are among the industries in Ethiopia. Since construction activities are so varied and complex, it is crucial to consider the issues of workers' health and safety (Afzini & Neyestani, 2011).

Afzini & Neyestani (2011), stated that the most important way to reduce accidents in building construction project is having a strong safety program. Occupational Safety and Health Administration (OSHA) is responsible for developing safety programs. Safety program refers to the efforts to improve safety through an integrated set of regulations and activities (Othman, Shafiq, & Nuruddin, 2017).

A safety program is a set of specific guidelines covering the procedures and methods used at a particular construction project site. Safety programs for construction projects are divided into two categories: organizational and site programs (Afzini & Neyestani, 2011). Organizational programs include training for new forces, new laws and regulations, inspection and enforcement, safety committee, disciplinary warnings, and safety programs through audit. Site programs include having identified risks and warning signs, personal protective equipment, and fall protection. Safety is the discipline of preserving the health of those involved in civil work (Afzini & Neyestani, 2011).

2.2.5. The concept of construction projects

Ethiopian Building Proclamation (2009) stated that, construction is the process of constructing a new building or any other infrastructure or the modification of an existing building or alteration of its use by man for one purpose or another, and it is divided into residential, institutional and commercial buildings, Specialized industrial construction, and Infrastructure and heavy construction.

A construction project is an expenditure of limited resources with a clear goal, time frame, and geographic confines. The majority of construction projects are built on the ground and completely exposed to the local environment. Additionally, it ranges in complexity and size from small investments to significant ones (Afzini & Neyestani, 2011).

The study of construction focuses on two themes: Construction Technology and Construction Management (Walker, 2007). Construction Technology relates to methods and techniques used to place materials and elements at the Job site, while construction management addresses how available resources will be applied. And the management of construction is an enterprise that involves many people with diverse interests, talents and backgrounds. The project team includes

the owner, design expert, contractor, subcontractors, material suppliers, bankers, insurance and bonding companies, lawyers, and representatives from government agencies.

Walker (2007), defined construction project management is the planning, coordination and control of a project from inception to completion on behalf of a client. It involves identifying the client's objectives, setting relationships between resources, integrating, monitoring and controlling contributors, and evaluating and selecting alternatives to achieve satisfaction with the project result.

The complexities of the construction business have caused management principles to evolve more effectively and large projects involve thousands of workers, materials, machinery, and equipment. The construction management process involves the transformation of detail design into a construction plan and day-to-day coordination and control of processes onsite or in a factory (Daniel, 2020). All construction managers should have adequate competencies to ensure they are professionally fit for the construction world.

2.2.6. Safety management in construction industry

Construction industry involves risks include working at heights, excavating, making noise, breathing in dust, and using power tools and equipment. It has been rising in developing countries, which has increased the number of workplace deaths, so that safety on building sites is crucial. (NIOSH, 2016). Since the development of a construction site and other related work environments, health and safety issues have been a focus of research (Cooney, 2016).

Construction safety refers to the circumstance or state of being shielded from or unlikely to cause in danger, or danger at the construction site involving people, machinery, management, method, and environment (Afzini & Neyestani, 2011). The discipline of protecting the health of persons who construct, use, maintain, and dismantle engineering works is known as safety in construction management. Additionally, it is described as the level of risk that exists in the absence of a hazard and is determined by the conditions that could endanger people, property, and equipment (Afzini & Neyestani, 2011).

International Labor Organization (ILO, 2016) stated that the Health and safety management in the construction industry has evolved from measures adopted in accident prevention to more systematic and proactive approaches to minimizing the risk of hazards in the industry.

According to the National Safety Council, safety management is necessary for good project management because of economic, social, and legal reasons. Economic reasons include investing in a safety program to reduce accidents and increase returns. Social reasons include permanent impairment of workers and/or others, as well as death of socially important workers. Legislation law requires employers to pay compensation and conform to a reasonable standard of safety in their operation.

The Construction Industry is one of the most an employment-generating industry that requires attention to occupational health and safety of workers and employees. Noncompliance events can have costly and sometimes irrecoverable consequences for event safety and interest groups (Afzini & Neyestani, 2011).

2.2.7. Types of hazards in construction

Construction is often severely affected by natural phenomena such as changing weather and climatic conditions. The working environment that not constant and varies may produces several hazardous situations. The construction industry has often been described as an industry characterized by fragmentation. Hazards in construction are typically of four classes; chemical, physical, biological and social (Weeks & James, 2011). Chemical hazards are often airborne and can appear as dusts, fumes, mists, vapors or gases. Exposure usually occurs by inhalation, but some may settle on and be absorbed through the intact skin. Chemicals can also be ingested with food or water, or inhaled by smoking. Several illnesses have been linked to the construction industry, such as bronchitis, skin allergies, and neurologic disorders (Weeks & James, 2011).

Construction projects are exposed to physical hazards such as noise, heat and cold, radiation, different weather conditions, vibration, and barometric pressure. These hazards can be encountered in extreme conditions. Exposure to infectious micro-organisms and toxic substances biological hazards (Weeks & James, 2011). And social hazards in the construction industry stem from the social organization of the industry, which is intermittent and constantly changing. This can lead to intense pressure to become more productive and lack of stable and dependable networks of social support (Weeks & James, 2011).

The physical injury hazards and the ill-health hazards are the two categories into which various scholars have separated health and safety risks. The risk of physical harm includes potential

fatalities. A risk of illness can only be discovered over a lengthy period of time and will eventually result in sickness or death.

2.2.8. Hazard control measures

Proactive and reactive measures are the two categories into which the actions to be conducted against the hazards can be classified (Scatterling, 2019). Proactive safety measures involve using safety solutions to prevent accidents before they happen, which also include precautionary measures and their implementation. It includes Safety training, Safety program, Inspection and checklist, and Personal protective equipments (PPE). Proactive safety measures involve risk identification, communication about safety, comprehensive safety education and training, and lone worker monitoring solutions. These measures help organizations be more prepared for whatever happens, saving time and money, and eliminating issues before they occur. They are forward-thinking and consider the big picture (Scatterling, 2019). Being proactive means anticipating accidents, being prepared, minimizing response times, decreasing the number of injuries that occur in the workplace, and as a result, reducing the number of worker's compensation claims.

For instance, focusing on formwork structure, doing laboratory test and choose wisely in material selection we can take proactive measure in construction project. Formworks (Temporary Structures) are necessary for the construction of permanent structures, and should be planned and coordinated with the same thoroughness as permanent structures. Safety should be the priority (Nemati, 2007). By doing the laboratory test during construction we can minimize the severity of accident and increase the quality in the construction site (Kishore, 2015). Construction organizations should integrate the materials supplier selection process into the supply chain management environment to ensure the availability of bulk materials. Mistakes made in supplier selection can be dangerous for construction safety (Benton &McHenry, 2010).

Leading indicators are proactive, preventive, and predictive actions that provide information about how well your safety and health plans are performing. They track the factors that lead to accidents, illnesses, and other difficulties, and they indicate potential issues with the company safety and health strategy. Whereas, lagging indicators track the frequency and occurrence of past events, such as the amount or frequency of accidents, illnesses, and fatalities (OSHA, 2019).

Leading indicators enable the company to take preventive action to address that failure or hazard before it results in an incident, whereas lagging indicators can notify the company of a failure in a particular area of the company safety and health plan or the presence of a hazard. A good strategy employs lagging indicators to assess efficacy and leading indicators to promote change (OSHA, 2019).

Leading indicators have the potential to significantly improve workplace safety and health outcomes by reducing worker fatalities, injuries, and illnesses. Employers can use leading indicators as a useful tool to achieve countable, long-lasting changes to workplace safety and health outcomes. Employers who employ leading indicators have a significant competitive advantage over other companies and may increase important components of their safety and health initiatives while also improving overall organizational performance. Additionally, they reduce the costs of production, workers' compensation, and other incident-related legal and regulatory expenses (OSHA, 2019).

Reactive measures are those that are taken in response to an accident, such as providing medical care and reporting and analyzing the accident. The success of reactive strategies depends on how prepared workers and employers are to deal with unexpected issues, but this is not enough to ensure the safety of all employees. Reactive safety measures involve saving money, but the direct and indirect costs of a workplace injury are significant and can take a toll on long-term profits. Reactive safety measures are often passive and fail to identify the root cause of an accident, which can have a significant impact on employee morale and satisfaction. They also send a negative message to workers that the company only cares about its profits (Scatterling, 2019).

2.2.9. Personal protective equipments (PPE)

Employers are required by the Occupational Safety and Health Administration (OSHA) to protect their workers from workplace dangers that could result in injuries. In order to manage or eliminate hazards, OSHA advises using engineering or work practice controls; nonetheless, employers are still required to provide personal protective equipment (PPE) to their staff. PPE is equipment that is worn to reduce exposure to various risks (OSHA, 2023).

The Requirement for PPE

Employers and employees must work together to ensure a safe and healthful work environment. Employers are responsible for performing a hazard assessment, providing appropriate and

adequate PPE, training employees in the use and care of PPE, maintaining PPE, and periodically reviewing, updating and evaluating the effectiveness of the PPE program. Employees should properly wear PPE, attend training sessions, care for, clean and maintain PPE, and inform a supervisor of the need to repair or replace PPE (OSHA, 2023).

The Hazard Assessment

OSHA stated that, a hazard assessment is essential for protecting employees from physical and health hazards in the workplace. Physical dangers can include anything that move, change in temperature, have intense lighting, roll or pinch objects, have electrical connections, or have sharp edges. Overexposure to toxic dust, chemicals, or radiation is a health hazard. To detect potential risks in the following categories: fall hazards, impact, penetration, compression, chemical, heat/cold, harmful dust, light or optical radiation, and biologic, the assessment should start with a walkthrough survey of the facility (OSHA, 2023).

The most important details during a walkthrough survey are sources of electricity, motion, high temperatures, chemicals, harmful dusts, light radiation, potential for falling or dropping objects, sharp objects, biologic hazards, and unprotected edges. These details should be taken into account when conducting a walkthrough survey of a facility.

To establish the appropriate PPE types needed at the worksite, the employer should compile and analyze data. To protect employees from risks, they should choose PPE that offers a level of protection more than what is necessary. Additionally, they should routinely assess the workplace for any modifications to the environment, machinery, or operational practices that might result in occupational hazards (OSHA, 2023).

Standards to Select PPE

OSHA requires that all PPE clothing and equipment must be of safe design and construction and maintained in a clean and reliable fashion. Employers should examine how well PPE fits and feels while choosing the right products for their workplace. OSHA requires that many categories of PPE, such as eye and face protection, head protection, foot protection, and electrical rubber insulating equipment, meet or be equivalent to standards approved by the American National Standards Institute (ANSI).

Training Employees in the Proper Use of PPE

Employers must train employees who must use PPE to know when and what is necessary, how to put on and take off, how to adjust and wear it, the limitations, and proper care, maintenance and disposal of PPE. If an employee is not displaying the correct comprehension and skill level in the usage of PPE, retraining is necessary (OSHA, 2023).

Classification of PPE based on OSHA

Eye and Face Protection

OSHA requires employers to ensure that employees have appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, potentially infected material or potentially harmful light radiation. Facial protection includes protective glasses that cover the eyes and the area around them completely, and a plastic face shield in case of working near materials that are likely to be volatile or scatter. Types of eye and face protection include safety spectacles, goggles, welding shields, laser safety goggles, face shields, welding operation, and laser operations. Eye accidents are common in jobs like breaking, cutting, drilling, chipping, dry grinding, welding etc (OSHA, 2023).

Head Protection

Wearing a safety helmet or hard hat is an important safety precaution and one of the easiest ways to protect an employee's head from potential head injuries. Employers must ensure that their employees wear head protection if any of the following applies: objects falling from above, bumping their heads against fixed objects, or accidental contact with electrical hazards. Hard hats should resist penetration by objects, absorb the shock of a blow, be water-resistant and slow burning, and have clear instructions explaining proper adjustment and replacement of the suspension and headband (OSHA, 2023).

Foot and Leg Protection

Employees should wear protective footwear when working with heavy objects, sharp objects, molten metal, hot, wet or slippery surfaces, and electrical hazards. Workers must have their work-boots equipped at all times and their footwear must be in accordance with approved safety criteria and specifications (OSHA, 2023).

Hand and Arm Protection

Hand and Arm Protection is essential for employees to protect themselves from potential hazards such as skin absorption, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts,

punctures, fractures and amputations. Protective equipment includes gloves, finger guards, arm coverings or elbow-length gloves. They are constructed using a wide range of materials and are intended to resist various industrial risks (OSHA, 2023).

Body Protection

Employers are required to ensure that their employees wear appropriate body protection while performing their jobs. Examples of workplace hazards include potential impacts from tools, machinery and materials, and hazardous chemicals. Protective clothing such as overalls, aprons, vests, protective belts, etc. are used to protect the bodies of workers in the work environment and provide safety that normal clothing would not provide. Equipment of respiratory device protection varies depending on the type of contaminant. Skin is vulnerable to a variety of hazards in construction, leading to skin diseases. Full sleeved shirts and trousers provide protection against many of the hazards, but shielding layers are necessary for ionizing radiation (OSHA, 2023).

Hearing Protection

Employee exposure to excessive noise depends on a number of factors, such as the noise level, duration of exposure, and whether it is generated from one or multiple sources. Hearing protectors reduce only the amount of noise that gets through to the ears, and the type of noise must not exceed 140 db. The noise level in some areas on construction sites are often above the level which causes sensory hearing loss to workers in the vicinity. Common forms of hearing protection include: Single-use earplugs, Pre-formed or molded earplugs, and Earmuffs, which are used to reduce noise levels to acceptable levels that do not cause hearing harm to workers (OSHA, 2023).

Personal Fall Protection Systems

Employers utilize personal fall protection systems (PFPS) to protect workers from falling or to safely stop an employee's fall. They must be compatible and meet certain strength requirements, and anchorages must be capable of supporting at least 5,000 pounds for each employee attached. Major accidents in construction are due to falls from heights. Safety belts and lanyards attached to a strong point above the working position will serve the purpose of safety (OSHA, 2023).

Medical Services and First Aids

First aid and medical facilities should be made available in construction sites according to the size and number of workers. Employers must make sure that first aid supplies and medications are accessible. First-aid is a form of primary care that is given for injuries until a more permanent

medical solution can be found. These arrangements minimize the possibility of potential risk on the injured person.

2.2.10. Accident cost

Accidents cause human life losses, loss of materials, and injuries to workers, increasing the cost of construction and decreasing the margin of profit for contractors. Construction accident costs are broadly classified as direct and indirect costs (Althaqafi & Elssy, 2015). The direct costs are those expenses carried by employers and are directly quantified in financial terms and some of the direct expenses may be covered by an insurance policy. If the workers are insured, then in case of accident compensation to be given is covered by the insurance company and the value of other losses can be suitably computed using quantity analysis. However, it's not possible to cover the indirect costs through an insurance company (Althaqafi & Elssy, 2015).

Direct costs include temporary or permanent injury to a worker, medical expenses, injured worker compensation, cost of man-hours for the work destroyed, loss of equipment, and loss of material. Indirect costs include transportation, wages paid to injured workers for time not worked, cost incurred due to delays, overtime, loss of efficiency of crew, education for replacement worker, cleanup, repair and/or replacement, cost for rescheduling, cost of legal assistance, and intangible costs like increased staff turnover and depressed employee morale (Althaqafi & Elssy, 2015).

2.3. Empirical Literature Review

2.3.1. Construction safety and health in Ethiopian context

Construction in developing countries is more labor-intensive than in the developed world, without a major difference between large & small contractors, unsafe conditions exist in many sites in Ethiopia. Because of this, there are several risks for workers. Similar to this, there are also inadequate medical facilities and poor sanitation (Tarekegin, 2020).

Ethiopia has invested a significant amount of its budget in the building industry as its primary engine for economic growth. To satisfy the aspirations of the country, there is a lack of experience, knowledge, and skill. When attempting to reduce waste, protect the environment, and ensure public safety, safety should always come first. The country's budget comes partly from foreign loans, and

proper use of this financial resource will support the nation's capacity to pay its debts (Mebrat, 2018). Particularly in Ethiopia, this sector mobilizes an enormous amount of various resources and budgets that embraces huge manpower of different professions by creating a large job opportunity (Fekele et al., 2016).

Limenh (2010) stated that, due to unsatisfactory working conditions and a lack of safety precautions, the working conditions of construction workers in Ethiopia are terrible. Due to triangle employment agreements involving building contractors, subcontractors, and subcontractors, the majority of injured workers do not obtain compensation. Injuries generally are unreported, but specialized medical treatment or compensation is unavailable. Workers consider accidents due to their own negligence, but major accidents involving the death of a worker may be reported due to financial expenses and litigation (Limenh, 2010).

In Ethiopia, it is not unusual to see a terrible disaster result in death next to a construction site. Despite the statistical case for emphasizing the problem, it remains neglected by employers and authorities who are mandated to enforce workers' rights (Sahle, 2018). Incidents occur due to inadequate safeguards to protect against hazards by employers and poor enforcement by the authorities. Accidents are frequently caused by unstable wood scaffolding and a lack of PPE, such as safety ropes and helmets. Employers need to have a safety policy for their workers and inspections and follow up on safety measures by authorities must be strict. Losing workers to injury or illness can cause significant disruption and cost to employers, as well as the workers and their families (Sahle, 2018).

One of the fundamentals of global human rights is being protected and Ethiopia is recognized as a UN member nation through ILO. The Ethiopian constitution incorporates the fundamental ideas of SH from various developed and developing countries' experiences. This constitution serves as the framework for the nation's OSH laws for relevant governmental bodies (Tarekegin, 2020).

Despite the fact that construction companies with more than ten years of experience in the local market should be familiar with the country's safety and health rules, numerous companies don't have a professional safety department that prioritizes the health and safety of their employees. (Fekele et al., 2016).

According to reports, accidents involving the building industry in Ethiopia have resulted in numerous fatalities and significant injuries among both construction workers and non-workers, including children. Such accidents can harm property and machinery, take away from productive work time, raise insurance prices, and ruin one's reputation and confidence.

Due to poor working conditions and a lack of safety measures, construction accidents happen often in Ethiopia. Falling from height (FFH), working without personal protective equipment (PPE), trench collapse, faulty or improperly operated equipment, being struck by an object, electric shock, and insufficient site supervision are the main causes of accidents (Fekele et al., 2016). Due to the construction sector's explosive growth and the high incidence of accidents and injuries at work, this industry faces significant challenges (Hailemarkos, 2020).

To make construction sites safe for workers, ongoing improvement is essential. Progress will progressively result in improved levels of safety and healthy work environments for construction site employees by initially concentrating on accomplishing protective targets, monitoring performance, and assessing outcomes (Sahle, 2018).

2.3.2. Safety and health laws and enforcement practice in Ethiopia

Employers must have a written safety policy to set safety and health standards. Based on that, both domestic and international laws and rules are made. OSH laws in Ethiopia was enacted at different times, almost all laws are adopted from most European countries, especially France and the United Kingdom (Tarekegin, 2020). Some of the country's legal documents are indicated below:

Article 42 Rights of Labour of the FDRE Constitution spells out that workers have the right to reasonable limitation of working hours, rest, leisure, periodic leaves with pay, remuneration for public holidays, and a healthy & safe work environment (Labour Proclamation, 2019).

According to Ethiopia's civil code, Article 2548, the employer is responsible for taking the appropriate steps to protect the employee's life, physical integrity, health, and moral standing. These steps must be dictated by the particulars of the work. Similar to this, Article 2549 of the code made it clear that an employer is responsible for any accidents an employee suffers as a result of their work.

The Ethiopian government developed and approved numerous legislations to ensure the safety and welfare of employees. At this time, Labor Proclamation No. 1156/2019 is the primary national law

governing labor-related matters. The Proclamation No. 1156/2019 applies to all businesses with one or more employees (Labour Proclamation, 2019). It addresses a wide range of issues and one of the issue is occupational safety and health. Under article 12, 5 & 6, the employer and worker's obligation is clearly stated as the employer is responsible for taking all the necessary OSH measures. In article 93, the law provides the obligations of workers about the required cooperation and putting in to practice the Regulation and instruction given by the employer to ensure safe health and working conditions at workplaces.

The Council of Ministers of the Federal Democratic Republic of Ethiopia (FDRE), discussed and made amendments to the national occupational SH policy and strategy prepared by the MoLSA, to create a safe and healthy working environment in Ethiopia. This policy provided basic principles about the prevention and protection of the workplace from occupational accidents and injuries (MoLSA, 2014).

Ethiopian Building Proclamation No. 624/2009 ratified in 2011 addressed fundamental issues about building construction. Article 7 states that a building officer is empowered to order the inspection of exempted buildings and order the demolition or rectification of such buildings if public safety is at risk. Article 30 states that any building or components thereof must be designed according to acceptable building design codes to ensure safety, comfort, and free services. According to Article 53, any building owner who builds or induces the construction of his building in any other way is subject to a 5- to 10-year prison sentence and a fine of 20,000 to 50,000 Birr.

The International Federation of Consulting Engineers (FIDIC) stated in Clause 2.3 states as the employer shall be responsible for ensuring his workers and other contractors on the site for the concern of SH at the site. And Clause 4.1 on contractors' general obligations states the SH concern as the contractor shall be responsible for the adequacy, stability, and safety of all site operations and construction methods. Likewise, clause 4.8 is about safety procedures. Additionally, the General Conditions of Contract in clauses 21–25 and FIDIC in clauses 19–25 specify the obligations of the parties involved in building projects undertaken in Ethiopia.

2.3.3. Integration of health and safety with project management

One of the oldest industries that is organized on a project basis is the building construction industry (Sunke, 2008). Integration of safety and health management into construction processes requires shared responsibility between key participants in a construction project, including designers and owners, to reduce the severity. The project participants require to think safety and health throughout the phases of a project. Construction accidents can be prevented by taking appropriate steps in all phases of the project life.

In real practice, organizations often run different teams for each process while simultaneously managing safety and projects. Throughout projects, there is a regular meeting between both teams to go through and evaluate safety performance. An OHS policy and a safety plan must be developed by safety teams, which are also in charge of carrying them out, evaluating their effectiveness, and revising them as necessary. However, not all tasks and applications in projects are entirely handled by the safety teams (Althaqafi & Elssy, 2015).

In order to determine if health and safety in the construction phase may be improved during the early phases of project management, certain major difficulties in those periods that must be resolved were pointed out. The construction phase's safe and dangerous conduct is indeed affected by early health and safety investigations. To improve H&S in the construction phase, the primary problems that need to be addressed are a lack of competence, a lack of prioritizing, and a lack of consequences for the players participating in the early project phases (Asgard & Jorgensen 2019).

A well-organized HS management is in charge of carrying out the policy and monitoring and evaluating its effectiveness. Althaqafi and Elssy (2015) make a substantial contribution by combining project management and safety management procedures. It has four parts:

The Initiation phase of a construction project includes the OHS policy and stakeholders' commitment from safety management. To achieve OHS policy, objectives, and targets, OHS planning is included in the planning process. When the project is in execution phase, the project teams are responsible for putting the OHS plan into practice, monitoring OHS performance, and taking preventative and corrective measures. And finally during the project completion phase, the teams are responsible for assessing and revising the OHS plan for the next project.

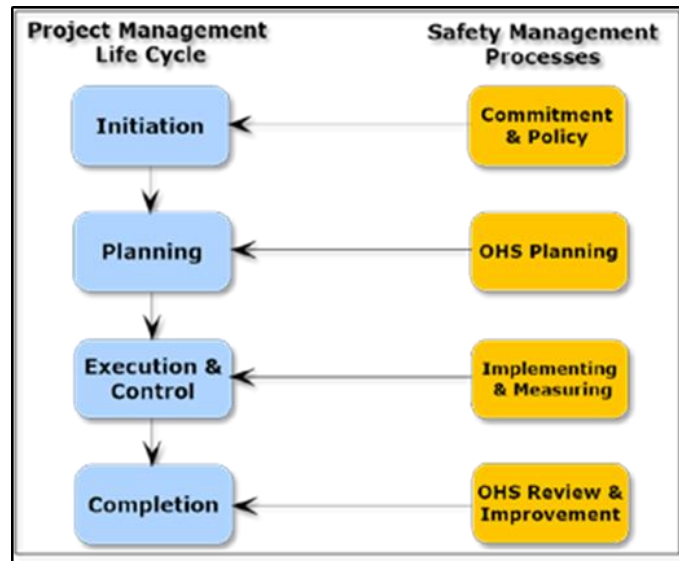


Figure 2.1. A proposed model to integrate Safety Management into Project Management (Althaqafi & Elssy, 2015)

2.3.4. Causes of accidents in construction projects

The causes of accidents in construction remain an attractive topic for researchers in construction management, as it can have a significant impact on the reduction of accidents. Accidents are unanticipated occurrences that frequently lead to harm or destruction and interrupt with a typical activity. They might occur during site investigation, survey of a project, and project implementation. A lot of accidents occur during the implementation of construction projects, which may affect efficiency of the project. Thus the main causes of accident in the industry are well known.

OSHA statistics show that in US four causes were responsible for 582 workers' deaths in 2017, including Falls from height, struck by object, electrocutions, and caught-in or between. To develop a strategy to avoid these accidents, it is necessary to know the existing causes.

The causes of accidents on site are individual factors, site conditions, falling hazards, unsafe working conditions, struck by tools, equipment and falling objects, trenching and excavation hazards, scaffolding accidents, construction vehicle accidents, stepladder misuse, electrocutions and power tool accidents, slips and trips, fire (Ramya & Ramadasan, 2016). Also Poor safety awareness from top leaders, lack of training, organizational commitment, technical guidance,

uncontrolled operation, unwillingness to input resources for safety, certified skill labour, unsafe equipment, lack of first aid measures, and rigorous enforcement of safety regulation are the main causes of accidents (Ramya & Ramadasan, 2016).

Faulty tools, ignore safety regulations, improperly maintained scaffolding, lack of experience, improper handling and storage of flammables, poor handling of tools and equipment, worker fatigue and boredom, improper supervision, management attitude, workers' operating environment, natural causes, inadequate management of the work environment, flaws in design details and specifications, and flawed construction techniques are some of the factors that contribute to accidents on construction sites (Kolo, 2015).

Accidents are always preceded by the unsafe act of employees or hazardous conditions in the workplace (David, 2020). An unsafe act is poor practice carried out at work that could lead to injury or ill-health. An unsafe condition is a poor physical condition in the workplace that can lead to injury or ill-health. Factors such as missing guards, defective equipment, inadequate lighting, exposed electrical cables, damaged flooring, trailing cables, faulty steps, excessive dust and fumes are formulated to affect jobsite safety management in constructional projects.

American Safety Council stated that, generally, accidents may occur due to either unsafe conditions or unsafe acts. Unsafe acts include working without authority, failure to warn others of danger, leaving equipment in a dangerous condition, using equipment at the wrong speed, disconnecting safety devices, using defective equipment, using equipment the wrong way or for the wrong task, failure to use or wear personal protective equipment, and failure to lift loads correctly. Unsafe conditions include inadequate guarded areas, inappropriate personal protective equipment, hazardous procedures, and inadequate illumination. To reduce unsafe conditions, engineering control, administrative or organizational controls, and using personal protective equipment can be used.

By choosing people with the abilities and skills needed to accomplish a job, certain solutions can be developed for lowering the probability or negative effects of human errors. This will lead to fewer mistakes being made and proper staff training (Mohammad et al., 2010).

2.3.5. Challenges in safety management implementation on construction

Implementing safety management practice in the construction industry is a way of minimizing safety hazards, reducing injuries and deaths, eliminating costs associated with poor safety performance, and protecting construction organization's reputation (Buniya et al., 2021).

To enhance the implementation of safety programs in the construction industry, four major obstacles must be overcome (Buniya et al., 2021). First, a toxic work environment brought on by a lack of safety resources, a lack of commitment to safety, and a lack of accountability for safety. The second is a lack of safety awareness, which is supported by a lack of safety training, knowledge, particularly among senior management levels, and safety controls. Third, the absence of a safety management program is evidence of poor governance. Fourth, because the construction sector focuses on finishing projects as quickly and inexpensively as possible, industry norms do not encourage the introduction of safety procedures (Buniya et al., 2021). Weather conditions, complexity of design, owners, project duration, safety and health policy, safety signals, signs and symbols, role of government and engineering societies are all important factors in influencing safety and health performance in construction.

2.4. Research Gaps

From the above literature review, the researcher identified a gap in the industry, such as a shortage of research on safety and health management practices in the building construction industry, especially in Addis Ababa, Ethiopia, where it mobilizes a huge amount of currency, resources, and labour by providing a lot of work opportunities (Fekele et al., 2016). The construction industry involves numerous risks, and they have been rising in developing countries, which has increased the number of workplace deaths, so that safety on building sites is crucial (NIOSH, 2016). Due to different conditions related with the level of economic development, the results from studies undertaken in developed countries may or may not apply to a developing country like Ethiopia.

A few studies have been done in relation to safety and health management in Ethiopia. Thus far, most of the articles only focus on different construction injuries and analyze accidents in different building construction projects, and the existing studies in Ethiopia focus on identifying the risk variables causing accidents in industries. However, the majority of them didn't study safety and

health management in building construction. Since the development of a construction site and other related work environments, health and safety issues have been a focus of research (Cooney, 2016). This study, in contrast to other studies, aims to assess safety and health management on building construction projects, as there is a shortage of research done on safety and health management practices in the industry.

3.0. RESEARCH METHODOLOGY

3.1. Introduction

The science of studying how research is conducted scientifically is known as research methodology. It is a collection of methodical procedures used to address research problems and serves as a manual for conducting research (Igwenagu, 2016). The aim of this section of a study is to explain how a researcher conducts the project. This chapter provides a brief description of the project work methods, such as research design and approach, population and sampling techniques, sources of data, data collection instruments, and data analysis methods related to the study.

3.2. Research approach

Plans and processes for doing research are known as research approaches, and they cover everything from general assumptions to specific techniques for gathering and analyzing data. There are three types of research approaches: qualitative, quantitative, and mixed approaches. (Creswell, 2009).

According to Creswell (2009), qualitative research is a way to examine and understand the meaning that individuals or groups attribute to social or human issues. It also focuses on qualitative phenomena, or phenomena that have to do with quality or kind. To assess safety and health management practices in building construction projects in Geom Luigi Varnero Impresa construction, the researcher was used qualitative research method. For gaining as much depth and detail-oriented information as possible from a respondent and providing insights that are specific to the objective of the study.

3.3. Research design

Research design is the plan, framework, and strategy for an investigation to answer research questions (Cohen et al., 2007). The research design is the master plan or blueprint for collecting and analyzing information, and is the conceptual structure within which research is conducted (Kothary, 2004).

Research design is broadly classified as descriptive, correlational, explanatory, exploratory and experimental (Kumar, 2011; Creswell, 2009). A research study that is categorized as a descriptive study aims to give information on an issue or try a systematic description of a situation, problem, phenomena, service, or program. The main objective is to describe what is typical with respect to

the issue or problem under study (Kumar, 2011). The descriptive research design was used in relation to the study. Because the main intention of the research is to investigate the existing situation of safety and health management practices in Geom Luigi Varnero Impresa construction, it helps to understand how different groups respond and to ascertain the research object's prevailing conditions and underlying patterns.

3.4. Population and sampling technique

Target population

The term "population" or "universe" refers to the totality of observations, which serves as the parent group from which a sample is to be taken (Pandey, 2021). The population of the study was all projects that Geom Luigi Varnero Impresa Construction P.L.C takes on in Ethiopia as well as throughout the world.

The target population is the specific, conceptually bounded group of potential participants to whom the researcher may have access that represents the nature of the population of interest (Pandey, 2021). The target population for the study was active projects currently under Geom Luigi Varnero Impresa Construction P.L.C in Addis Ababa, Ethiopia. These projects were six.

Sampling method

The sample design, also known as the sample selection method, is up to the researcher to choose. A sample design is a predetermined strategy chosen before any information is actually gathered in order to choose a sample from a certain population (Kothary, 2004). Non-probability sample includes convenience sampling, quota sampling, dimensional sampling, purposive sampling and snowball sampling (Kothary, 2004). In order to create a sample that suits their objectives, researchers use the qualitative research approach of "purposeful sampling," in which they select cases based on their judgment of their typicality or features (Kothary, 2004). For this study, because of the study population, the purposive sampling method is appropriate. The justification for selecting this form of sample design is that is used in order to access 'knowledgeable people', i.e. those who have in-depth knowledge about particular issues.

3.5. Source of data

The sources of the data for the study were primary and secondary sources of data (mixed types), even though it mainly focuses on primary data. Primary data were collected from selected Geom

Luigi Varnero Impresa construction employees through interview results and the researcher's observation of the construction site. And, secondary data were used from documents that were already collected by the organization (Geom Luigi Varnero Impresa Construction).

3.6. Data collection instrument

The primary data were gathered using interviews and observations. The data used in this study were gathered from the main parties who participated in the Addis Ababa building construction project at Geom Luigi Varnero Impresa Construction. The secondary data came from reports and document reviews that are related to the thesis topic.

Observation

There are two types of observation: participant observation and non-participant observation. In participant observation, the researcher engages in the group's activities in the same way as its members, whether or not they are aware that they are being watched. whereas non-participant observation refers to the researcher's position as a spectator who observes and records the group's actions without participating in the group and then makes inferences about them. (Cohen et al., 2007). For this project work non-participant observation was used to see people act more naturally and get a more reliable observation because the researcher is less involved.

Interview

Semi structured interviews are conversations in which the researcher has a set of questions to ask and an idea of topics to cover (Fylan, 2005). For this study, semi-structured interviews were selected to encouraged interviewee to open up on certain predefined topics and it enables the researcher to gather in-depth information and evidence from interviewees.

3.7. Data Analysis

Data analysis involves organizing, accounting, and explaining data to identify patterns, themes, categories, and regularities. Also, data analysis often starts during the data gathering phase of qualitative research (Cohen et al., 2007). A qualitative research method called thematic analysis is used to identify, analyze, and present themes or patterns in data. Through interpretations, it properly arranges and summarizes the data set in detail, giving a deeper understanding of the information (Boyatzis, 1998). For this study, the researcher used the thematic analysis method to analyze the implementation of safety and health management in the case of Geom Luigi Varnero

Impresa construction and interpreted both primary and secondary data (interview, observation, and document review) using the descriptive method.

3.8. Ethical Considerations

The majority of research uses human participants, hence, it is crucial that human research ethical permission has been acquired. Prior to starting to collect data from participants who are humans, it is crucial to have their approval (Fleming & Zegwaard, 2018). This study takes into account every ethical concern that must be taken into account while doing scientific research. The researcher got a support letter from the university and submitted it to Geom Luigi Varnero Impresa Construction. After getting official confirmation from the general manager to undertake this study, the researcher contacted the responsible persons related to the project work. The procedure was realistic and free of bias, and the study's findings were based on the qualitative information obtained from interviewees. The researcher gave the relevant information to the respondents before starting data collection. In order to safeguard the confidentiality of the data they offer, interviewees are not asked for their identities and are informed that their responses will be handled with extreme confidentiality. Additionally, after receiving their full acceptance, only willing participants were given the interview; those who refused were not contacted. Furthermore, the researcher is doing everything carefully throughout the interview to avoid misleading or ambiguous statements.

4.0. DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

In this chapter, the data presentation, analysis, and interpretation of the collected data gathered from the interview, observation, documented source, and literature in accordance with the objectives of the study were indicated and reviewed. This section presents detailed information on safety and health management practices in building projects in Addis Ababa under Geom Luigi Varnero Impresa construction.

This chapter has three sections: the first part deals with general information about the projects, the next part contains general information about the data gathered, and lastly, the rest of the parts are the analysis, that are categorized in four main themes, and discussion parts.

4.2. General information about the projects

4.2.1. Geom Luigi Varnero Impresa Construction's building construction projects in Addis Ababa

Geom Luigi Varnero Impresa Construction P.L.C is a construction company located in Addis Ababa, Ethiopia. The company is one of the leading companies capable of handling large and challenging projects throughout the county. Geom Luigi Varnero Impresa Construction is a Grade 1 contractor (GC-1) with more than 65 years of experience in the construction industry (From Varnero's main office).

This study was used on active building construction projects currently under Geom Luigi Varnero Impresa Construction P.L.C in Addis Ababa. This includes all building projects that are in the construction and renovation phases, it does not include building projects in the closure or starting phases. During the data collection period, Geom Luigi Varnero Impresa Construction had a total of eleven projects in Addis Ababa. From all, Varnero has four projects that are in the project closure phase. These are National Bank, Alfaraj P.L.C, the Ministry of Mining, and Meles Zenawi Park. Additionally, it has one project in the starting phase, which is the St. Joseph School Maintenance Project. Because those projects are in the closure and starting phases, they are not used in this study.

Geom Luigi Varnero Impresa Construction has seven active projects in Addis Ababa used for this study. The national palace projects are under one safety structure so this study uses them as one, so a total of six projects are taken.

Table 4.1. Active projects under Geom Luigi Varnero Impresa Construction P.L.C.

| No | Name project | Project | Location |
|-----------|--------------------------------------|-------------------------------|------------------|
| 1 | National Palace | Renovations on the palace | 4 kilo |
| | | Construction of a car museum | |
| 2 | Holy Trinity Church | Renovation | 4 kilo |
| 3 | Lycee Guebre Mariam (LGM) School | Renovation and extension | Piassa |
| 4 | International Community School (ICS) | Construction work | around Sarbet |
| 5 | Raxio | Construction of a data center | around Goro |
| 6 | National Tobacco | Construction | around Koyefeche |

4.2.2. Current status of the projects

The current statuses of active projects managed by Geom Luigi Varnero Impresa Construction is are indicated.

1. The National Palace projects are both renovation and construction, with restoration work both inside and outside of the palace without changing the former possession. The renovation of the palace and construction of the basement are going well, and the construction project for the car museum in the national palace yard is in the process of constructing the foundation part.
2. The current status of the Holy Trinity Church project is restoration work both inside and outside of the church without changing the former possession because it is one of Ethiopia's historical heritage. The restoration has four parts. These are structural, architectural, scripture, and painting restoration works.
3. Lycee Guebre Mariam's (LGM) renovation and extension project is in the structural work. It has reached 70%, only two floors are left.

4. The International Community School (ICS) construction work is to build G+8 apartment for the teachers and two swimming pools for both adults and children. The project is almost done with structural work and starts a finishing work within the data collection period.
5. The current status of constructing a data center project for Raxio is the same as ICS, it is almost done with structural work and starts a finishing work.
6. National Tobacco construction project has reached 85% and it's starting a finishing and installation work.

4.2.3. Total/ average number of employees

In the construction industry, most of the employees are not permanent because these former employees who formerly worked for the company may leave or work on different projects, making it difficult to know the exact number of employees. In Geom Luigi Varnero Impresa Construction's active projects, there are around 1500 employees. In the National Palace Project, both the restoration and constriction there are around 300 employees. Around 70 employees were hired under the Holy Trinity Church Restoration Project. Lycee Guebre Mariam (LGM), International Community School (ICS), Raxio, and National Tobacco Projects have a total of 96, 280, 114, and 260 employees, respectively.

4.3. General information about the data sources

4.3.1. Interview participants

Ten to fifteen interviews were planned to be conducted until data saturation was reached. Data saturation occurs when there is enough information to conduct the study, since it is no longer possible to gather new information (Fusch & Ness, 2015). The researcher decided on this method, because it enables the collection of the data required to address the research questions.

Twelve respondents were interviewed from active projects under Geom Luigi Varnero Impresa construction during the data collection time. These are: one project manager, four safety engineers, two site engineers, one General safety manager, one electrical engineer, one foreman, and two daily laborers. The researcher gives a code to interview participants to easily identify them in the study. Participants' code, gender, and work experience are listed in the table below.

Table 4.2. background of interview participants

| No | Interviewee job title or responsibility in the Project | Code | Work experience | Gender |
|----|--|------|-----------------|--------|
| 1 | Project Manager | A | 17 | M |
| 2 | General safety manager | B | 10 | M |
| 3 | Safety engineer-1 | C | 6 | M |
| 4 | Safety engineer-2 | D | 29 | M |
| 5 | Safety engineer-3 | E | 10 | M |
| 6 | Safety engineer-4 | F | 7 | M |
| 7 | Site engineer- 1 | G | 52 | M |
| 8 | Site engineer- 2 | H | 10 | M |
| 9 | Electrical engineer | I | 3 | M |
| 10 | Forman | J | 15 | M |
| 11 | Daily labourer-1 | K | 16 | M |
| 12 | Daily labourer-2 | L | 3 | F |

4.3.2. Site observation and document review

The researcher conducted site observation on all active projects by preparing an observation checklist, which helps evaluate and document the company's safety practices while workers are doing certain tasks related to building construction, and taking photos for the reliability of the data.

Also, the researcher reviews documents related to safety and health in the projects. Varnero's policies and regulations, project OHS action plans, HS procedures, contract documents, company's observation checklists, OHS risk assessment reports for every work, accident and incident reports, work permit reports, different checklists, OHS violation, induction briefing documents, training and toolbox documents, feedback documents from consultant, safety data sheet, HSE procedure and others are reviewed.

4.4. Current safety and health management practices

4.4.1. Workers definition of safety

A clear understanding of the meaning of safety has a vital role in the construction project to implement the exact safety and health measures, ensure the workers and project's safety, and prevent any injury. The researcher raised the question, "What is your definition of safety?" for key informants at the beginning of the interview.

"Safety means protecting employees from workplace injury and illness." [Interviewee- B]

"Safety is one of the most basic things needed to work. When we say safety, it consists of project safety, employee safety, and environmental safety." [Interviewee- A]

"Safety means protecting and ensuring the wellbeing of workers. The success of the organization came from the workers, so their safety is one of the priorities. When we focus on safety, profitability and productivity of the company will definitely increase, workers will get motivated to work, and it will also have a positive impact on cost." [Interviewee- D]

According to WHO (2014), in order to protect the health and wellbeing of individuals as well as the community, safety refers to a condition in which risks and circumstances that could cause bodily, psychological, or material harm are under control. All of the respondents shared the above definition of safety, and the interview result shows that they have a good understanding of safety. It helps keep the construction process running smoothly by eliminating potential hazards.

4.4.2. health and safety management practices, tools and techniques that are being used for safety and health management

The researcher raised the question, "What are the health and safety management practices you use on the building construction sites? What are the tools and techniques that are being used for safety and health management in the current building projects?"

"In this project, the safety management practice is very strict, and we give high concentration because the client is very strict and concerned about safety." [Interviewee-C]

"We do have a HS policy, an OSH plan, and a procedure; based on these, we are implementing OSH. Also, we use risk assessment tools, inspection checklists, and training formats as tools and techniques." [Interviewee- B]

"The safety engineer trains the workers and gives guidelines on how to work on this construction project, and we provide different types of PPE based on the worker's responsibility for their work in this project." [Interviewee- A]

“We provide PPE whenever needed, use warning tape, and use proper scaffolding for work at heights.” [Interviewee- H]

All respondents share the above response, and interviewees G and F provide additional concepts:

“... and also I share my experience to the workers.” [Interviewee- G]

“...we give induction training when the worker is a newcomer” [Interviewee- F]

The daily labourers stated their safety tools and practices they personally use on the site.

“I use the given PPE, arrange the working space, and I’ll focus on my work before I start my work.” [Interviewee-K]

“I only use PPE.” [Interviewee L]

Based on the Interviewee-C response, they are strict and place a high concentration on safety management practices. As presented in the above interview responses, the health and safety management practices, tools, and techniques that are being used for safety and health management in projects are based on HS policy, an OSH plan, and a company procedure for implementing OSH. Also, safety engineers use risk assessment tools, inspection checklists, and training formats as tools and techniques to train the workers and give guidelines on how to work on the construction projects. The company provides PPE based on the worker’s responsibility for their work on this project. Additionally, workers share their experiences and learn from each other.

The daily labourer supports the above results by responding to the health and safety tools and practices he personally uses on site.

“I use the given PPE, arrange the work place, and I’ll focus on my work before I start it, and we also use our experience.” [Interviewee- K]

Results of health and safety management practices based on site observation and document review:

The renovation projects are handled with a high level of care as they are considered national heritage and to minimize exposure to dust, the work area is protected by plastic sheeting. The repairs or renovations in older buildings have a special and detailed plan and use additional safety measures to make them last without changing the former possession. There is a special concern for construction noise in the school projects; they are doing noisy work after school or on weekends.

They have safe steel scaffolding installed at the very beginning of the project or maintenance work, providing support and elevation and enabling workers to carry out their tasks safely. And to ensure safety, frames and panels are braced by cross, horizontal, or diagonal braces. Scaffolding offers support and elevation and enables workers to carry materials and conduct their work during the construction process. In addition, ladders are properly placed and secured, and stairs are equipped with standard safety measures, including temporary handles.

First aid kits and emergency equipment are readily available on site, with first aid offices staffed by professional nurses, and fire extinguishers are functioning, accessible, and regularly inspected, giving the appropriate training on how to use them effectively. In the National Palace project, they have checked the fire drill (a technique for practicing how to leave a building in case of fire or other emergencies) with the Addis Ababa Fire Brigade. Adequate facilities are provided for eating, resting, and washing, arranged in a tidy manner. Waste containers are provided and used properly, ensuring proper disposal of waste materials.

To reduce on-the-job accidents and injuries and maximize productivity, the company's safety and health rules are visibly posted, and warning and safety signs are posted as required throughout the site, conveying important messages. Also, floor holes and openings (i.e., manholes, lift openings, and others) are marked, covered, and protected to prevent workers from tripping and/or falling into them. The company provides relevant personal protective equipment (PPE) to workers and visitors and uses a PPE code to identify managers, visitors, and workers. For the managers, a white helmet and light green vest are worn, and a yellow helmet and orange vest are worn by the workers.

The company form a safety committee to help employees and management work together to identify safety problem, develop solutions, review incident reports and evaluate the effectiveness of the company's safety program. The committee is made up of management designated representatives and employee-elected representative. The formulation is made according to the National Safety Committee Formulation Directive.

The work area is well organized and protected, providing a conducive environment for workers. Similarly, clear walkways are designated for workers to ensure safe movement, the work area is well-lit, and pauza lights are installed in underground areas. Equipment, tools, and materials used for the project are inspected, stored properly, and organized in designated spaces. Also, electrical terminal boxes are covered to protect them and people from potential electrical hazards.

There are alarms and assembly points at the project sites. These alarms ring three times a day: in the morning for toolbox training or to start the work, in the afternoon for lunch time, and in the evening for exit time. When these alarms ring without the above three reasons, it means that there is an emergency in the workplace, so everyone immediately gets out of work and meets at the assembly point. This is to provide a secure space for everyone at work.

4.4.3. written safety guidelines

The researcher raised the question, “Does your site have formally written safety guidelines that construction workers should follow while performing their tasks? Tell me briefly about it.”

“As a Varnero construction company, we have a written safety guideline that all Varnero workers should follow while performing their tasks. However, on this specific site, we don’t have a written guideline specific to this project. But in large projects, they have their own guidelines in addition to the company’s guidelines.” [Interviewee- A]

“We have guidelines as a company, and this project also has specific guidelines based on the contract document for each and every working activity. We identified that by practicing guidelines for every work condition, we reduce accidents.” [Interviewee- D]

“Yes, we have written safety guidelines for each work. For example, we have guidelines for excavation, work at height, how to work, electrical work, and general housekeeping guidelines.” [Interviewee- B]

“Our written policy guides our safety while we are working on any activity.” [Interviewee- F]

In building construction projects in Addis Ababa under Varnero Construction, all projects use the company’s safety guidelines, and some projects use additional guidelines that are constructed based on the contract document. As a company, by practicing safety work guidelines for every job, it reduced the incidence of accidents.

The document review supports the respondents’ answers, every project has a formally written safety policy, safety work guideline, or site-specific safety plan, depending on the project. And also based on site observation, companywide safety policies are implemented in every project. Employees are required to comply with all company safety rules and are encouraged to actively participate in identifying ways to make the company a safer place to work.

4.4.4. Awareness, training programs and instruction related to safety and health issues

Proactive safety measures involve risk identification, communication about safety, comprehensive safety education and training, and lone worker monitoring solutions (Scatterling, 2019). According to OSHA employers must train employees who must use PPE to know when and what is necessary, how to put on and take off, how to adjust and wear it, the limitations, and proper care, maintenance and disposal of PPE.

The researcher asked if the company provided awareness, training, and instruction on safety and health issues to its workers and how often they provided the training. All of the respondents from Varnero Construction reflects their company give the required training in health & safety.

“We provide awareness and training programs through our safety engineer. Any worker that is new to this site has taken induction training before he starts any work, and we also have 15–30 minute toolbox training every two weeks related to safety. Additionally, if the safety engineer sees any gaps, he will provide training whenever it is needed.” [Interviewee- A]

“We have a 5-minute toolbox training every day, and we check the physical status and readiness of the employee. If anything there is any gap, we report it to the managers.” [Interviewee- E]

“We have an everyday checkup, and every Monday we have a brief toolbox discussion. It helps to minimize risks and increase the employee's awareness.” [Interviewee- D]

“Every week on Thursday, we have an induction and awareness program.” [Interviewee- H]

“The training programs and instructions will help the employee to work with safety with a little follow-up, and it reduces the manager's time spent controlling the workers.” [Interviewee- C]

Interviewee B and G share the same idea with interviewee A. In addition, interviewee F, I, and J share the same idea with interviewee H, which implies that they have a toolbox trading for their workers every week.

The daily labourers also support the above finding:

“Yes, I took safety training when I first joined this site, and every week there is an orientation about safety in the project.” [Interviewee- L]

The above responses indicate that the organization offers or provides an orientation before employees start working. Adequate training of all employees will be given by Safety Officer

assisted as needed by the hazard communication program coordinator. Workers who have received training are better equipped to participate actively in hazard control initiatives and implement organizational changes that will improve workplace safety. And also reduces the manager's time spent controlling the workers.

In the documentation, the researcher gets detailed data about the induction briefing, training, and toolbox sessions that are given by the safety officers at all sites of the projects.

4.4.5. personal protective equipment (PPE)

The researcher asked if the organization provided personal protective equipment (PPE) and listed the PPEs. When it comes to PPE, interviewee C stated that "everyone should wear PPE before entering the site." The rest of the respondents agreed with interviewee C and listed available PPE on their sites.

"The company provides PPE for both the employees and the visitors. The basic PPEs are a helmet, vest, and safety shoe. And in accordance with the working conditions, we provide a belt, safety overalls, plastic and leather gloves, eyeglasses, a mask, and an ear plug (10–15 dB)." [Interviewee- D]

"As a company, we use a PPE code to identify managers, visitors, and workers. We use a white helmet and light green vests for managers and a yellow helmet and orange vests for workers." [Interviewee- D]

The daily labourers also support the above finding:

"Yes, the organization provides PPE. For example, since my responsibility at this site is carpenter, they provide me with a helmet, lightning jacket, gloves, safety shoes, safety overalls, and safety belt for my work." [Interviewee- K]

"The organization provide all PPE except safety overalls." [Interviewee- L]

According to OSHA, PPE is equipment that is worn to reduce exposure to various risks. The findings from the interview results show that the company provides adequate PPE for both the employees and the visitors and use a PPE code to identify managers, visitors, and workers. Additionally, the researcher observed that the company provided the required PPEs, and from the

document review, the researcher got the information that the safety engineers took over PPEs from the main office and distributed them to the workers with their signatures.

4.4.6. safety officers and their responsibility in the projects

The researcher asked the respondents if they have a safety officer, what his responsibilities are, and how useful is it to have a safety officer on site? The respondents answered:

“Yes, we have. His responsibility is to manage workers if they use their PPE properly and use measures if they are not implemented inappropriately.” [Interviewee- A]

“Our site has a safety officer. It helps the project by checking the work is done by taking proper safety measures, it reduces accidents, and all workers wear PPE at least they know he is there.” [Interviewee- I]

“There is a safety officer on all projects. Some of the safety officer's responsibilities are to make sure OSH standards are implemented at the site, do risk assessments and inspections of HS, follow implementation, make the employees aware, develop a safety crew whenever necessary, and prevent accidents. By avoiding accidents, it minimizes illness and increases productivity by reducing loss of time.” [Interviewee- B]

“We do have a safety officer, and it is useful to prevent accidents, increase productivity, and see every movement with the eye of safety while site engineers mostly focus on the construction progress.” [Interviewee- H]

“The safety officer is the responsible and accountable body, regardless of the safety of the site.” [Interviewee- D]

“We are organizing and preparing the site safely so that the project managers and site engineers can focus on their work.” [Interviewee- E]

“It uses for the sake of the company name because it prevents accidents on the site and makes the company competitive with other contractors in the bid process.” [Interviewee- F]

The daily labourer also support the above finding:

“Yes, we have a safety officer on site, and he checks our safety practices daily. We also have a weekly meeting to discuss our safety practices throughout the week and he guides us how to work safely in the projects” [Interviewee- K]

The above results showed the presence of a safety and health officer at every work site. The researcher observed that the site engineers play a vital role in the project's and the construction's safety. Based on the responses, the responsibility of the safety engineer is to make sure OSH standards are implemented at the site, do risk assessments and inspections of HS, follow implementation, make the employees aware, develop a safety crew whenever necessary, and prevent accidents. By avoiding accidents, it minimizes illness and increases productivity by reducing lost time. Since construction activities are so varied and complex, it is crucial to consider the issues of workers' health and safety (Afzini & Neyestani, 2011). The use of a safety officer is that it helps the project by checking that the work is done by taking proper safety measures; it reduces accidents and ensures that all workers wear PPE and use measures if they are not implemented inappropriately; it organizes and prepares the site safely so that the project managers and site engineers can focus on their work; and it is used to protect the company's reputation since it reduces workplace accidents and helps the business compete favorably with other contractors during the bid process.

4.5. Accidents and incidents in the project and their prevention methods

4.5.1. major causes of accidents at building construction sites

Accidents are always preceded by the unsafe act of employees or hazardous conditions in the workplace. (David, 2020). The researcher raised the question, “What are the major causes of accidents at building construction sites?”

“There are two major causes: unsafe acts and unsafe conditions. Unsafe acts are related to workers' negligence, like carelessness and not using PPE properly, and unsafe conditions are related to the employer's lack of commitment to checking PPE, training programs, and anything related to safety.” [Interviewee- B]

“The major causes of accidents are employees' carelessness and lack of knowledge.” [Interviewee- F and H]

“Mainly, carelessness is the cause. Because he has worked for years, he has the mentality that accidents don't occur to him, which is wrong.” [Interviewee- E]

“Employees are not using PPE effectively is a major cause of accidents at building construction.” [Interviewee- D and I]

This indicates that the respondents believed that the major reasons of accident on construction sites are due to employee carelessness and lack of safety knowledge, not using PPE effectively. It implies that the most construction workers do not have enough awareness or knowledge about health and safety. The above responses are included in the below literature. The causes of accidents on site are individual factors, site conditions, falling hazards, unsafe working conditions, struck by tools, equipment and falling objects, trenching and excavation hazards, scaffolding accidents, construction vehicle accidents, stepladder misuse, electrocutions, and power tool accidents, slips and trips, fire (Ramya & Ramadasan, 2016).

4.5.2. Key measures taken to prevent workers from having accidents

The Construction Industry is one of the most employment-generating industry that requires attention to occupational health and safety of workers and employees (Afzini & Neyestani, 2011). International Labor Organization (ILO, 2016) stated that the Health and safety management in the construction industry has evolved from measures adopted in accident prevention to more systematic and proactive approaches to minimizing the risk of hazards in the industry. The researcher raised the question, “What safety measures are implemented at construction sites to safeguard workers from accidents?”

“We provide effective PPE, orientation programs, and effective monitoring of workplace safety to ensure workers wellbeing.” [Interviewee- A]

“Mainly, we provide awareness and training programs in our sites. As a safety officer, we use five techniques: elimination, which is removing any hazards by assessing risks at the site; substitution, which is replacing hazards; engineering controls, which isolate workers from any hazards mostly related to providing appropriate scaffolding; administrative controls, which mean changing workers perceptions of safety; and lastly, protecting employees by providing PPE. In addition, our safety policy and regulations are specifically designed to protect our workers from building construction site accidents” [Interviewee- B]

“We took an engineering and preventive measures to prevent our workers from accident.” [Interviewee- F]

“We prevent our workers from accidents by providing PPE and creating a comfortable environment for them.” [Interviewee- H]

Afzini and Neyestani, (2011) stated that the most important way to reduce accidents in building construction project is having a strong safety program. From the interview, the researcher learned that the company used five techniques to prevent its workers from having accidents. The first one is elimination, which is removing any hazards by assessing risks at the site and providing awareness and training programs; the second one is substitution, which is replacing hazards; the third one is engineering control, which isolates workers from any hazards by using engineering techniques, for example, by providing appropriate scaffolding; the fourth one is administrative control, which means guiding workers perceptions of safety and taking administrative measurements whenever needed; and lastly, by providing PPE. OSHA stated that, a hazard assessment is essential for protecting employees from physical and health hazards in the workplace. And from a review of documented sources, the company's safety policy and regulations are specifically designed to protect our workers from building construction site accidents and ensure safety. Also, the contract document of the project Specifically and unambiguously stated preventive measures.

4.5.3. Any accidents that occur in the projects

The researcher raised the question, “If any accidents have occurred in this project? (Permanent/Temporary)”. The interview results are grouped into two categories: some of them say there is no accident at their site, and the rest state that there is some minor accident.

“There were no major accidents that occurred on our site, but sometimes there are some minor accidents like stepping on nails, and bleeding on fingers.” [Interviewee- I]

“There are minor accidents that occurred in this project, like lacerating, sharp material cutting, hard material stepping on nails, and dust in the eye.” [Interviewee- D]

“Until now, there was no accident on our site.” [Interviewee- G]

The daily labourer also supports the above finding:

“Thanks to GOD there is no major accident in this site, but sometimes minor accident like stepping on nails occurred.” [Interviewee- K]

Based on the findings from the interviewee, there have been no accidents in some of the projects, but there have been minor accidents like lacerating, sharp material cutting, hard material stepping

on nails, bleeding on fingers, and dust in the eye at some sites. Additionally, during the researcher's project site observation time, no accidents occurred in all projects. And the documentation of each site shows that the project faces minor accidents in most cases. Even if the accidents are minor, they reduce the capacity of workers and prevent them from working for a limited period of time. This reduces the productivity of the project.

4.5.4. Accident and incident reports

The researcher raised the question, "Are all accidents and incidents documented and reported to the concerned body? If not, what do you think is the reason behind it?"

"Yes, it is immediately reported and circulated with administration, consultants, and contractors representatives." [Interviewee- E]

"Yes, it must be immediately reported to managers, and if it is a major accident within 24 hours, the accident must be reported to the insurance company. By the way, all Varnero's workers have insurance." [Interviewee- H]

"In our site, accidents are immediately reported, the nurse gives first aid to the injured person, and it is used by us to refer to the document for doing risk assessment, hazard identification, risk prevention and control." [Interviewee- E]

The daily labourer stated a new idea:

"Yes, but sometimes we don't go to the nurse for small accidents so those are not reported." [Interviewee- L]

The rest respondents shared the above response. Regarding the interview result, almost all injuries and accidents are reported to the concerned body and used as a document for risk assessment, hazard identification, risk prevention and control. During the interview, the researcher noted that when accidents happen on site, the foreman reports the accident to the safety engineer, and the professional nurse will give first aid to the injured worker. And the nurse checks the level of the accident, prepares a document, and gives it to the safety engineer. During the document review, the researcher checks the weekly and monthly reports of accidents at the sites.

4.5.5. Cost of accident

The researcher asked if projects had a cost of prevention and accident. All respondents shared the same answer and stated that "yes, we do have a cost of prevention and a cost of accident, but not

proportionally divided into costs of prevention and costs of accidents." And Interviewee-B added in the above response,

"I don't think so, but we have direct (medical cost and loss of time) and indirect (delay and moral) costs when there are accidents that occur at our sites." [Interviewee- B]

Althaqafi and Elssy (2015) supported the Interviewee-B response by stating that construction accident costs are broadly classified as direct and indirect costs.

The researcher couldn't see any documents regarding cost for the sake of the company's confidentiality.

4.6. safety and health monitoring practice

4.6.1. safety and health performance monitoring practice

The researcher raised the question, "How is safety performance monitored for the building construction project? Do Managers actively monitor the safety and health performance of their projects and employees through reports?"

"In this project, the management is very strict, and there is a team of five: two consultants, one client, and two contractors. They meet every week or every 15 days and discuss the project's performance, and one of the points of discussion is the current safety performance of the project." [Interviewee- D]

"Yes, our project is very large, and we have five contractors who work for one client. These five contractors work together to ensure the project's safety, and they have a team that checks the project's safety every day and reports the results." [Interviewee- C]

"Yes, they review, monitor, and report the results as per client request." [Interviewee- B]

"Yes, they are all focused on safety. In addition to the managers, the consultants also report to us if there is any gap in the project's safety." [Interviewee- A]

"When I was in the national tobacco project, there was a safety cab with a total of 48 employees, and we had a standby truck to dispose of unnecessary trash. There is the best monitoring practice in that project, and it is a good experience for all employees who are working on that project. Compared to that, we don't have a group to monitor for this project, and I, the safety engineer, have a responsibility to all." [Interviewee- E]

According to the respondents, the management team is very strict, and the upper-level management has commitment and involvement in safety and health activities with active monitoring practices. They meet on a regular basis and discuss the current safety performance of the project.

The National Tobacco Project has the best safety practices, and all employees are mentioned during the interview session. There are some of National Tobacco's former workers who are working on different projects now and proudly say that they got so much experience regarding to safety on that project. According to the respondents, management regularly monitored the progress of the programs and promoted and supported worker engagement in health and safety measures.

4.6.2. Coordination of Safety and Health policies with other human resource policies

The researcher asked if companies integrate safety and health policies with other human resource policies to protect workers' wellbeing.

“On our site, if the employees are not behaving well on the site, like not using PPE effectively, there is a guideline for violation of 200 dollars or 2000–3000 ETB, or we punish them by minimizing their working hours because they are paid based on their working hours.”
[Interviewee- H]

“If anyone is in charge of any injury in himself or any other worker, we use administrative measures.” [Interviewee- C]

“Yes, it's a part of the human resources document. For example, there is a violation when the worker does not use PPE based on HR instruction rules and regulations, and based on that, workers will be punished.” [Interviewee- B]

When respondents were asked if their company coordinates health and safety policies with other human resource policies, almost all of the respondents shared a similar answer. The company integrates its HS policies with other human resource policies to ensure the well-being of its workers. This has increased the project's productivity in a positive way. The respondents mainly associate this with the punishment process. However, during the document review, the researcher noted that the company applied international and national conventions, laws, regulations, directives and code practices. The human resource policies are one of them, and the HS policies

are integrated with these human resource policies, especially FDRE Labour Proclamation Number 1156/2019, which is widely used for integrating those policies.

4.6.3. A review method of safety and health management practice

According to Alli, (2008) Safety management involves the following processes: Safety planning, Safety plan execution, and Administration and reporting. The researcher raised the question, “During the construction period of your project, how are the safety and health aspects reviewed? periodically or frequently? Explain the process.”

“The project safety and health are reviewed on a daily basis.” [Interviewee- D]

“Safety and health aspects of the site are reviewed frequently every week.” [Interviewee- H and A]

“Safety and health-related things are actively reviewed and monitored whenever needed.” [Interviewee- B]

Respondents stated that managers actively monitor the performance of projects and workers through reports. There is a difference between projects in the monitoring system; some of them are reviewed on a daily basis, some of them are reviewed weekly, and others are reviewed daily as well as weekly. During the document review, the researcher reviews a well-organized document regarding safety and health management practices, especially in larger projects.

4.6.4. construction works that need more focus or emphasis in safety and health management

The researcher asked which construction phase of safety and health management practices should be given more attention. Most of the respondents agreed that all construction work needs more focus or emphasis on safety and health management practices. And add some points regarding their opinion:

“All of the work needs focus, but the excavation work is constructed properly and ready for the next steps for the worker’s safety, and as an engineer, if the excavation is not properly worked, the structure could be at risk of failure and may not be stable and durable.” [Interviewee- H]

“Needs more focus in working at heights.” [Interviewee- F and C]

“We must have worked on every phase of construction, especially the high and excavation phases, because in the excavation work the soil will collapse, so there must be a retaining wall.” [Interviewee- E]

“According to studies: FFH, electrical contact with high tension lines, excavation work, housekeeping, and traffic accidents related to heavy duty machinery.” [Interviewee- B]

“We have to focus on each and every detail, but scaffolding and crane restoration are essential and need more focus.” [Interviewee- G]

“Needs focus in the ladder mount process.” [Interviewee- I]

Interviewee-D answers from a new perspective:

“All but need focus on mobilization for both new places and new employees to create cultural development.” [Interviewee- D]

The daily labourer stated that:

“Most of the time accidents occurred in the construction industry when workers are working at height. So that it needs more focus.” [Interviewee- K]

Safety and health and management practices are required throughout the construction phases of every building construction projects. However, the attention in each phase might be unlike. As respondent answered, working at height, excavation, scaffolding and crane restoration, electrical contact with high tension lines and ladder mount process requires more focus on health and safety management practice among the others. The researcher observes that all workers related to the above working area focus on their safety, and the safety officer gives an induction training regarding these areas. Because of this, the document review shows that there is no major accident related to this.

4.7. Challenges in implementing construction safety and health management

4.7.1. The main challenges in implementing construction safety and health management

Implementing safety management practice in the construction industry is a way of minimizing safety hazards, reducing injuries and deaths, eliminating costs associated with poor safety performance, and protecting construction organization's reputation (Buniya et al., 2021).

The researcher raised the question, “What are the main challenges in implementing construction safety and health management?”. There are several challenges mentioned by the interviewees:

“The main challenges in implementing a safety and health management system come from the material supply and employees. Sometimes there is a material shortage in PPE at the site. This is

because some PPEs are not available in the market because the factory stops manufacturing them, so the office will face a major challenge in providing PPE to the workers. For example, there was a lack of safety shoes in the country, and at that time the office couldn't provide them. The contract agreement forced the contractor to provide PPE, so the company imported safety shoes to fill this gap. Because of it, it causes disadvantage the company financially. The second one is that workers do not easily understand the use of safety in construction projects, and they are very careless; they don't want to wear the given PPE properly. Because of that, the management team will punish the misbehaving workers, and some workers are dismissed from the site.” [Interviewee A]

Additionally, interviewee B adds on the second challenge that interviewee A arise

“The main challenge is that the employer is less committed to safety-related areas related to the construction works. Most of the time, employees act like their employers. So the company should be more committed to the safety of the workers in order to be more productive.” [Interviewee B]

Interviewee-H shares the same idea with the above respondents

“The understanding of workers is very low, even though you train them and give them attention. They do not listen to you, especially when they are newcomers. They don't think the accidents are happening to them; they even tell you that they have worked in this industry for a long time, so they know how to handle things, and this is completely wrong.” [Interviewee H]

Interviewee-D mentioned another point

“I think there are three challenges in most cases. The first one is the management system, which considers safety as a secondary thing. The second one is that employers do not use PPE effectively; most of them are careless. The last one is PPE supply and quality. There is sometimes a shortage of PPE supply, and when the material is assessable again, the quality is reduced.” [Interviewee D]

Interviewee E raises a new idea from the rest

“The safety contract plays a significant role in ensuring safety. If it is not forced to do safety on the site, then it will be the second thing on the site, so when the contract paper is prepared, they have to be committed.” [Interviewee E]

Based on the responses, the main challenges in implementing a safety and health management system are related to the four areas. Those are from the management, employee, material, and contract documents. The implementation challenges are shown below using a fishbone diagram.

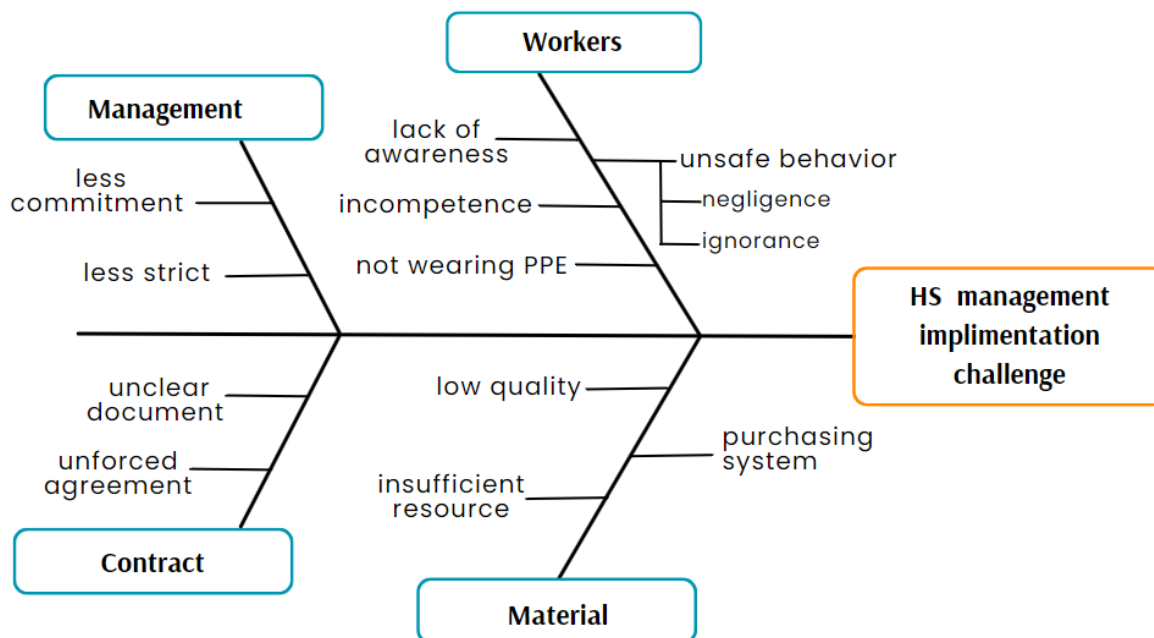


Figure 4.1. a fishbone diagram for HS implementation challenges (own survey,2023)

4.7.2. The responsible party to ensure the safety and health of workers

The researcher asked who should be responsible for ensuring the safety and health of workers.

The International Federation of Consulting Engineers (FIDIC) stated in Clause 2.3 states as the employer shall be responsible for ensuring his workers and other contractors on the site for the concern of SH at the site.

“Everyone is responsible for ensuring the safety and health of the project workers, from high-level managers to daily labourers.” [Interviewee- D]

“Everyone who works under the project is responsible for safety, but most of the employees think it’s only the safety officer’s responsibility. For example, if any accident happens in the project, everyone thinks there is a safety officer in the project, so why do accidents happened? by forgetting their responsibility.” [Interviewee- E]

Based on the above responses, from top managers to daily labourers, everyone is responsible for ensuring the safety and health of the project workers. From the observation, the researcher noticed that some of the workers are very concerned with safety, and they are making comments to each other if they see any inappropriate things, even if they are not safety officers. According to the

document review, the contractor is responsible for the project's safety. Finally, making construction sites safe and healthy is not just the responsibility of the safety engineer, all parties involved in the project must contribute what is needed at the time.

4.8. Discussions

The Ethiopian government developed and approved numerous legislations to ensure the safety and welfare of employees. The company applied both international and national conventions, laws, regulations, directives, and code practices in order to protect the workers and the project's safety. Nearly 80% of all ILO standards and guidelines are either entirely or partially focused on workplace safety and health-related issues (Alli, 2008). Similarly, the company follows strict safety management practices and develops policies, guidelines, and regulations to protect workers from accidents.

The results showed that the company has a structured safety and health management systems implemented throughout the organization. Safety management includes measuring, auditing, and reviewing the performance of those functions (Alli, 2008). The findings revealed that the management team is very strict, and the upper-level management has commitment and involvement in safety and health activities with active monitoring practices, and they keep track of safety performance for use in improving performance and making future services.

Organizational programs include training for new forces, new laws and regulations, inspection and enforcement, a safety committee, disciplinary warnings, and safety programs through audit. Site programs include having identified risks and warning signs, personal protective equipment, and fall protection (Afzini & Neyestani, 2011). The findings indicate that the company's safety program includes all the literature mentioned above and the safety program is implemented on every project.

Occupational health and safety practices are characterized by five basic dimensions (Kaynak et al., 2016). These are occupational hazards prevention, safety procedures and risk management, organizational safety support, first aid support and training, and safety and health rules. The results indicate that the company's safety and health practices are considered in the above five dimensions that are stated in the literature.

All Varnero's projects have proactive safety measures, including safety training, a safety program, inspections and checklists, and PPE. And the proactive measures involve risk identification, communication about safety, comprehensive safety education and training, and lone worker monitoring solutions (Scatterling, 2019). The result shows that the company used all the above proactive measures to protect workers. In addition to this, the company also used five techniques to prevent its workers from having accidents. These are elimination, substitution, engineering control, administrative measurements, and providing PPE.

Leading indicators track the factors that lead to accidents, illnesses, and other difficulties, and they indicate potential issues with the company's safety and health strategy. whereas lagging indicators track the frequency and occurrence of past events, such as the amount or frequency of accidents, illnesses, and fatalities (OSHA, 2019). The company focuses on leading indicators for protecting employees from physical and health hazards in the workplace and to significantly improve workplace safety and health outcomes by reducing worker fatalities, injuries, and illnesses, even though lagging indicators are also used to assure the workers safety by tracking documents. A good strategy employs lagging indicators to assess efficacy and leading indicators to promote change (OSHA, 2019).

Employers who employ leading indicators have a significant competitive advantage over other companies and may increase important components of their safety and health initiatives while also improving overall organizational performance (OSHA, 2019). Based on the researcher's observation, by implementing effective safety and health management in the projects, the company gains the competitive advantage to win big projects throughout the country.

Employers are required to provide personal protective equipment (PPE) to their staff members (OSHA, 2023). The company provides relevant PPE to workers and visitors and uses a PPE code to identify managers, visitors, and workers. Accidents are always preceded by the unsafe acts of employees or hazardous conditions in the workplace. (David, 2020). However, the findings indicate that the major reasons for accidents on construction sites are the unsafe behavior of workers, employee carelessness, lack of safety knowledge, and not using PPE effectively.

To enhance the implementation of safety programs in the construction industry, four major obstacles must be overcome (Buniya et al., 2021). These are a toxic work environment, a lack of safety awareness, the absence of a safety management program, and the fact that the construction

sector focuses on finishing projects as quickly and inexpensively as possible (Buniya et al., 2021). Except for the absence of a safety management program, all of the above challenges have occurred in the company. Based on the responses, the main challenges in implementing a safety and health management system are related to the lack of commitment and strictness of the management team, unsafe behavior of employees, insufficient material supply, and unclear contract documents.

Althaqafi and Elssy (2015), which combine project management and safety management procedures, have presented a four-phased model. The initiation phase of a construction project includes the OHS policy and stakeholders' commitment to safety management. To achieve OHS policy, objectives, and targets, OHS planning is included in the planning process. When the project is in the execution phase, the project teams are responsible for putting the OHS plan into practice, monitoring OHS performance, and taking preventative and corrective measures. And finally, during the project completion phase, the teams are responsible for assessing and revising the OHS plan for the next project. Likewise, the findings of the study imply that the company uses the same technique to integrate HS management and the construction management of the projects.

The interview, site observation, and document review results align each other, which implies that the data was reliable. And most of the literature emphasizes the construction accident, however, in the case of this company, there were only minor accidents that occurred during the construction work. It implies that the company has a well-organized safety management practice and by implementing proper application of safety practices, accidents can be mitigated.

5.0. SUMMARY, CONCLUSION AND RECOMMENDATION

The aim of this chapter is to summarize the study's overall findings and provide a conclusion and recommendation of the research objectives. It provides an overview of the major findings drawn from the data analysis. The next section draws a conclusion from the findings on the safety and health management practices used in Geom Luigi Varnero Impresa construction. Based on these findings, the researcher later offered recommendations for the company, workers, government, and upcoming researchers.

5.1. Summary of findings

The general finding of the study shows that the company has very good health and safety practices in building construction projects in Addis Ababa. The National Tobacco Project has the best safety practices, and almost all employees mentioned during the interview session. The findings are organized in three parts in a systematic manner to show the results clearly:

Based on the interview result:

The interview result shows that all of the respondents have a good understanding of safety. The company has a strict and place a high concentration on safety management practices. The health and safety management practices that are being used for safety and health management in projects are based on HS policy, an OSH plan, and a company procedure for implementing OSH. Also, safety engineers use risk assessment tools, inspection checklists, and training formats as tools and techniques to train the workers and give guidelines on how to work on the construction projects. The company provides PPE based on the worker's responsibility for their work on this project. Additionally, workers share their experiences and learn from each other.

All Geom Luigi Varnero Impresa Construction projects use the company's safety guidelines, and some projects use additional guidelines that are developed based on the contract document. The results indicate that, the company gives the required training in health & safety and provides an orientation before employees start working.

When it comes to PPE, the company provides adequate PPE for both the employees and the visitors and use a PPE code to identify managers, visitors, and workers. And every site has a safety engineer, who is responsible to make sure OSH standards are implemented at the site, do risk

assessments and inspections of HS, follow implementation, make the employees aware, develop a safety crew whenever necessary, and prevent accidents.

The respondents believed that the major reasons of accident on construction sites are due to employee carelessness, lack of safety knowledge, and not using PPE effectively. The company used five techniques to prevent its workers from having accidents. These are elimination, substitution, engineering control, administrative measurements, and providing PPE. Based on the findings in some of the projects, there have been minor accidents like lacerating, sharp material cutting, hard material stepping on nails, bleeding on fingers, and dust in the eye at some sites. Regarding the interview result, almost all injuries and accidents are reported to the concerned body and used as a document for risk assessment, hazard identification, risk prevention and control.

The management team is very strict, and the upper-level management has commitment and involvement in safety and health activities with active monitoring practices. They meet on a regular basis and discuss the current safety performance of the project and actively monitor the performance. The company integrates its HS policies with other human resource policies to ensure the well-being of its workers. Most of the respondents agreed that all construction work needs more focus or emphasis on safety and health management practices. Working at height, excavation, scaffolding and crane restoration, electrical contact with high tension lines and ladder mount process requires more focus on health and safety management practice among the others.

Based on the responses, the main challenges in implementing a safety and health management system are related to the four areas. Those are from the management, employee, material, and contract documents. Furthermore, from top managers to daily labourers, everyone is responsible for ensuring the safety and health of the project workers.

From the interview, certain limitations were identified. The company didn't allocate a portion of the project budget specifically for health and safety concerns, considering both the cost of accidents and the cost of prevention.

Based on the site observation:

The researcher conducted site observation on Geom Luigi Varnero Impresa Construction's active six building construction projects by preparing an observation checklist. During the observation, the researcher noted the following:

The company has a structured safety and health management system implemented throughout the organization. Through observation, renovation projects are handled with a high level of care as they are considered national heritage and there is a control of construction noise, especially in the school projects. Safety and health rules of the company are visibly posted, and warning and safety signs are posted as required throughout the site, conveying important messages. Also, floor holes and openings are marked, covered, and protected to prevent tripping and falling accidents. The company provides relevant Personal Protective Equipment (PPE) to workers and visitors. The work area is well-organized and protected, providing a conducive environment for workers. Similarly, clear walkways are designated for workers to ensure safe movement, the work area is well-lightened, and pauza lights are installed in underground areas.

First aid kits and emergency equipment are readily available on site, with first aid offices staffed by professional nurses, and fire extinguishers are functioning, accessible, and regularly inspected. Adequate facilities are provided for eating, resting, and washing, arranged in a tidy manner. Waste containers are provided and used properly, ensuring proper disposal of waste materials. Additionally, for emergency purpose there are alarms and assembly points at the project sites to provide a secure space for everyone at work.

Equipment, tools, and materials used for the project are inspected, stored properly, and organized in designated spaces. Also, electrical terminal boxes are covered to protect them and people from potential electrical hazards. In addition, safe steel scaffolding is installed at the beginning of projects or maintenance work, providing support, elevation, and enabling workers to carry out their tasks safely. Ladders are properly placed and secured, and stairs are equipped with standard safety measures, including temporary handles.

From the site observation, certain limitations were identified. There was a common issue in almost all projects where electric cables were passed on the ground, posing a risk of trapping accidents for workers. And some warning signs are damaged, so they were not able to provide the exact message.

Based on the document review:

The researcher reviews a well-organized document regarding safety and health management practices, especially in larger projects where the company places a high value on the safety of its

employees. The company applied international and national conventions, laws, regulations, directives, and code practices. And every project has a formally written safety policy, safety work guideline, or site-specific safety plan, depending on the project. The company's safety policy and regulations are specifically designed to protect workers from building construction site accidents and ensure safety. Additionally, the contract document for the project stated preventive measures and HS procedures.

The project OHS action plan tries to clearly identify roles and responsibilities for the implementation of safety procedures and standards for employees. The policy listed the responsibilities of all practices depending on their work on the project. And the company has an observation checklist filled out by the safety officer in order to see the gaps in the project. There are also feedback documents that are given from the consultant to the contractor in order to improve site safety.

To reduce injuries, illnesses, and fatalities in the workplace, there are OHS risk assessment reports for every job before it is done, and they prepare work permit reports for risky jobs. During the document review, the researcher checks the weekly and monthly reports of accidents at the sites. Accidents and incidents are reported to the safety officer and project manager immediately after they occur, and the report shows that minor accidents occur on most projects.

The projects have detailed data about the induction briefing, training, and toolbox sessions that are given by the safety officers at scheduled times at all sites of the projects. And other documents like HSE procedures, safety data sheets, and different checklists show the company's concern for safety. Finally, the researcher couldn't see any documents regarding costs for the sake of the company's confidentiality.

5.2. Conclusion

The main objective of this study was to assess safety and health management practices in building construction projects, taking Geom Luigi Varnero Impresa Construction P.L.C. construction sites in Addis Ababa as a case study. The researcher came to the following conclusion after analyzing and discussing the study's findings with the response of how they related to the study's objectives:

The general finding of the study shows that the company has very good health and safety practices in building construction projects in Addis Ababa, and other contractors could take a lesson from

the company regarding safety management. The company has a structured safety and health management system implemented throughout the organization. Especially the National Tobacco Project, which has the best safety practices, and almost all employees mentioned during the interview session.

The company follows strict safety management practices, and all Geom Luigi Varnero Impresa Construction projects adhere to the company's safety guidelines. The company's safety policy and regulations are specifically designed to protect workers from building construction site accidents and ensure safety. The health and safety management practices that are being used for safety and health management in projects are based on HS policy, an OSH plan, and a company procedure for implementing OSH. Also, safety engineers use risk assessment tools, inspection checklists, and training formats as tools and techniques to train the workers and give guidelines on how to work on the construction projects. The company provides PPE based on the worker's responsibility for their work on this project and also gives the required training in health and safety and provides an orientation before employees start working. And every site has a safety engineer who is responsible for and accountable for the project's safety. Safety and health rules of the company are visibly posted, and warning and safety signs are posted as required throughout the site, conveying important messages. In addition, first aid kits and emergency equipment are readily available on every project site.

The main challenges in implementing a safety and health management system are related to these four areas. Those are from employee carelessness and lack of understanding, PPE supply shortages, a less committed management system, and not specific contract documents. Furthermore, from top managers to daily laborers, everyone is responsible for ensuring the safety and health of the project workers.

From the interview and site observations, certain limitations were identified. The company didn't allocate a portion of the project budget specifically for health and safety concerns, considering both the cost of accidents and the cost of prevention. Additionally, there was a common issue in almost all projects where electric cables were passed on the ground, posing a risk of trapping accidents for workers and some warning signs are damaged, so they were not able to provide the exact message.

5.3. Recommendation

The following recommendations are offered in accordance with the study's findings in order to benefit the company, its workers, the federal government, and upcoming researchers who want to conduct additional research in this area.

5.3.1. For the company

- In order to improve the company's safety management practices, there should be more focus on training and orientation of workers in terms of safety, as the majority of construction site accidents are caused by workers' negligence or ignorance. And also, a worker's award could be launched in the company for workers who are role models by wearing PPE appropriately and by following standard procedures.
- As a contractor, the company should specifically allocate a portion of the project budget to health and safety concerns, both the cost of accidents and the cost of prevention, as well as a sufficient budget for safety and health implementation.
- Since the findings showed that one of the challenges to implementing safety and health management is that the employer is less strict and less committed compared to the construction work, the company should be more strict and committed to safety and health-related management systems.
- The company should check the warning signs periodically and change them since some warning signs are damaged during construction and they are not able to provide the exact message to the project workers as well as visitors.

5.3.2. Workers

- Since their lives and well-being are at risk, construction workers should put safety and health first. To protect themselves from workplace fatalities, follow the health and safety rules, and safeguard one another at work, they must be alert, aware, and motivated to take steps.
- They must also use the personal protective equipment that has been given to them properly, show particular attention when working in dangerous conditions, and request any necessary equipments from their direct managers and supervisors.

5.3.3. Client

In the contract preparation process, the client must establish guidelines in place that enable the contractor to enforce safety policies, rules, and regulations, provide personal protective equipments, and train workers before they sign the contract to reduce the risk and enhance working conditions during the project. Additionally, any construction contracts must include a sufficient budget for necessities related to safety and health. This can reduce the implementation of safety and health management challenges related to the contract.

5.3.4. Government

- To improve the construction safety management practices, the government should take the initiative in developing the relevant regulations and enforcing them by funding the concerned body. Additionally, it should enforce strong safety and health policies and standards, monitor their application through routine and unexpected inspections, and protect the health and safety of workers.
- To ensure that workers receive safety orientation and training, the Ministry of Labour and Social Affairs should collaborate with construction companies. And also, the government should provide an experience sharing program related to safety and health management systems between contractors.
- The government should provide a reward and punishment system for disciplined construction companies, and contractors must provide a safety audit report as part of their qualification.

5.3.5. Further research

- Research could be done to determine how safety-related issues impact the price, schedule, and quality of construction projects, which results in inadequate or insufficient health and safety management system.
- This study was based on building construction projects. Since safety management systems are a broad area of research, it may also be applied to other construction projects to improve the safety of highways, railways, hydraulic dams, bridges, and other types of infrastructure.
- Research might be done to assess the present safety and health practices on construction projects, taking into account all stakeholders in the industry, including clients, consultants, contractors, government, and insurance companies.

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APPENDIX

Appendix I: Interview guideline

Date of interview: _____ Interviewee Code: _____

Introduction

My name is Winta Atrsaw. I am a master's program student at Addis Ababa University in the project management department. I am assessing safety and health management practices in Geom Luigi Varnero Impresa Construction, and I would like to talk to you specifically about it. The interview is in a semi-structured format and takes less than 40 minutes. I'll be taking some notes and also taping during the session to get an accurate and efficient document for the study. All responses will be kept confidential and the interview responses will only be for educational purpose.

- Do you have any other questions regarding what I just explained?
- Are you willing to participate in this interview?
- A. General questions about the background of the interviewee
 - Job title or responsibility in the Project
 - Work experience
 - Gender (filled by the researcher)
- B. Interview questions for key informants in Geom Luigi Varnero Impresa Construction
 - General review on the project
 1. Current Status of the project
 2. What is the total/average number of employees? (optional)
 - Safety and health practice in the organization
 3. What is your definition of safety?
 4. What are the health and safety management practices you use on the building construction sites? What are the tools and techniques that are being used for safety and health management in the current building projects?
 5. Does your site have formally written safety guidelines that construction workers should follow while performing their tasks? Tell me briefly about it.
 6. Does the company provide awareness, training programs and instruction related to safety and health issues to the workers? How often?
 7. Does your organization provide personal protective equipment (PPE)? Like what?
 8. Is a safety officer assigned to your construction site? What is their responsibility? How useful is it to assure safety in the project?
 - Accidents and incidents in the project
 9. What are the major causes of accidents at building construction sites?

10. What safety measures are implemented at construction sites to safeguard workers from accidents?
 11. Do building construction sites have safety policies and site-specific strategies designed to protect workers from accidents?
 12. If any accidents have occurred in this project? (Permanent/Temporary)
 13. Are all accidents and incidents documented and reported to the concerned body? If not, what do you think is the reason behind it?
 14. Do your projects have cost of prevention and cost of accident?
- Monitoring practice
 15. How is safety performance monitored for the building construction project? Do Managers actively monitor the safety and health performance of their projects and employees through reports?
 16. In order to protect the wellbeing of workers, does your company integrate its safety and health policies with other human resource policies?
 17. During the construction period of your project, how are the safety and health aspects reviewed? periodically or frequently? Explain the process.
 18. In your point of view, which construction phase of safety and health management practices requires more attention or emphasis?
 - Challenges
 19. What are the main challenges in implementing construction safety and health management?
 20. In your opinion, who should be the responsible party in your company to ensure the safety and health of its workers?

C. Interview questions for building construction workers in Geom Luigi Varnero Impresa Construction

1. Is a safety officer assigned to your construction site? How often does the safety officer check your health and safety practices on the project?
2. Have you ever take a health and safety training at this site?
3. Does your organization provide Personal Protective Equipment (PPE)?
4. In which area of work do health and safety problems usually arise?
5. What kind of illness or injury has happened at this site during your stay?
6. What are the health and safety tools and practices you personally use on site?

At the end of the interview:

- Is there any question you would like to raise, or is there any information you would like to add on safety and health management?
- Would you possibly recommend anyone else I can interview? It could be safety engineer, project manager, supervisor, site engineer, electrical engineer, and others.
- Thank you so much for your cooperation.

Appendix II: Observation checklists

Conducted date: _____

| No | Checklists | Yes | No | N/A | Remarks |
|----|--|-----|----|-----|---------|
| 1 | Have a health and safety management structure in the organization | | | | |
| 2 | Relevant PPEs are being used in appropriate, functional, and capable ways to protect workers | | | | |
| 3 | Warning signs are posted where required | | | | |
| 4 | Visible Health and Safety Rules are posted | | | | |
| 5 | Holes and openings are covered or marked | | | | |
| 6 | Equipment and tools are inspected before use and stored properly | | | | |
| 7 | Any materials and electrical tools are safely stored | | | | |
| 8 | Electrical terminal boxes equipped with required covers | | | | |
| 9 | Safe scaffolding and frames and panels braced by cross, horizontal or diagonal braces | | | | |
| 10 | The placement of ladder is proper for the job and secure | | | | |
| 11 | Stairs are equipped with standard | | | | |
| 12 | First aid kits and emergency equipments are available on site | | | | |
| 13 | Fire extinguishers are functioning and accessible, tagged with an inspection date and user guide | | | | |
| 14 | Sufficient lighting | | | | |
| 15 | The placement of ladder is proper for the job and secure | | | | |
| 16 | Hazardous substances are stored safely and properly labeled | | | | |

| | | | | | |
|----|--|--|--|--|--|
| 17 | Accessibility of safe buck-hoists (construction elevators) | | | | |
| 18 | Safe place to eat, rest, and wash | | | | |
| 19 | Waste containers provided and used | | | | |
| 20 | Passageways and walkways clear | | | | |
| 21 | Accidents and incidents are registered daily | | | | |
| 22 | General neatness of work area | | | | |
| 23 | Well-organized and protected site | | | | |

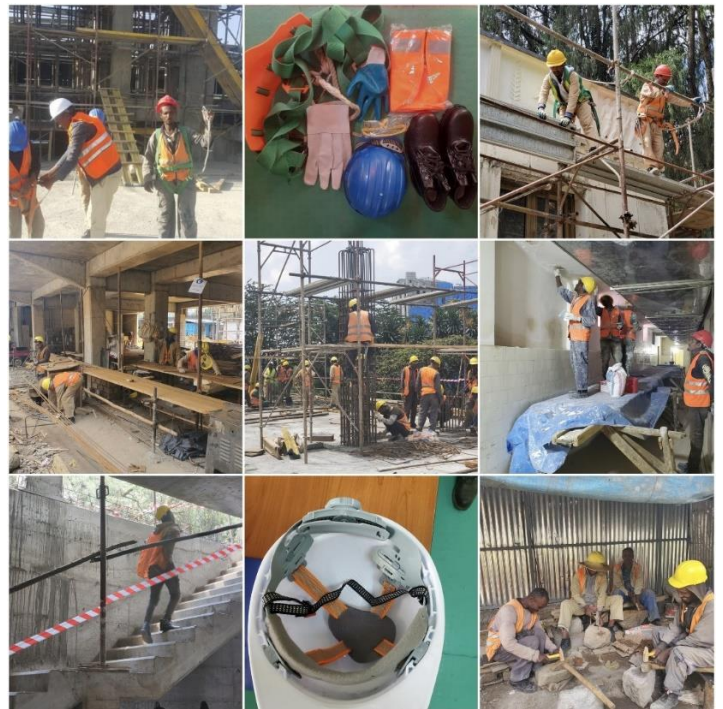
Other:

Appendix III: Site observation pictures

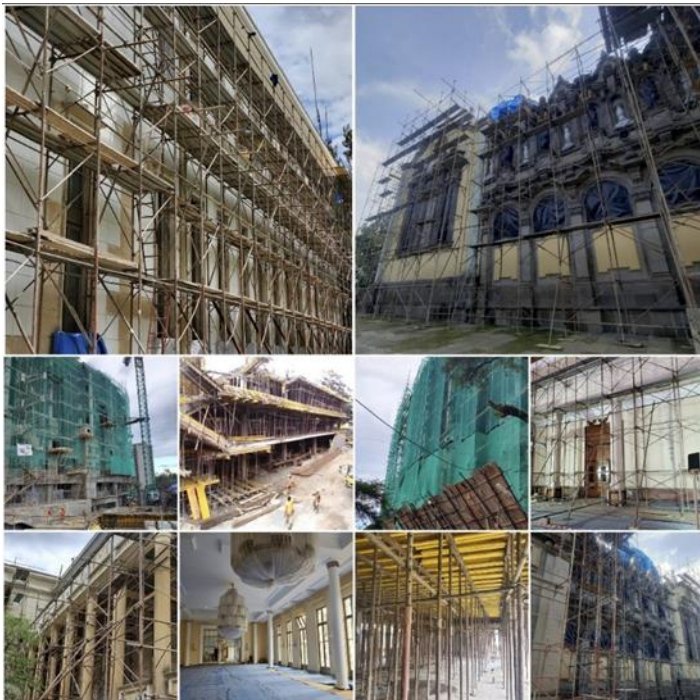
Warning signs



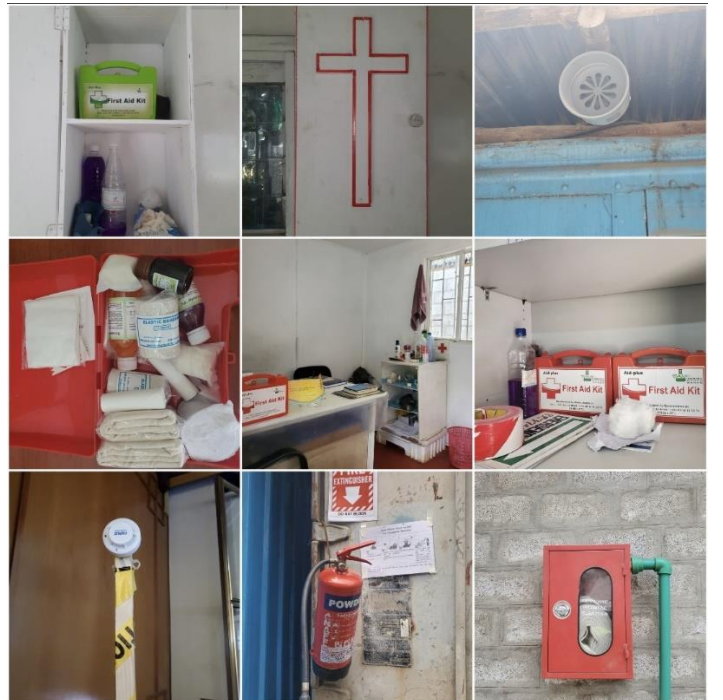
PPE



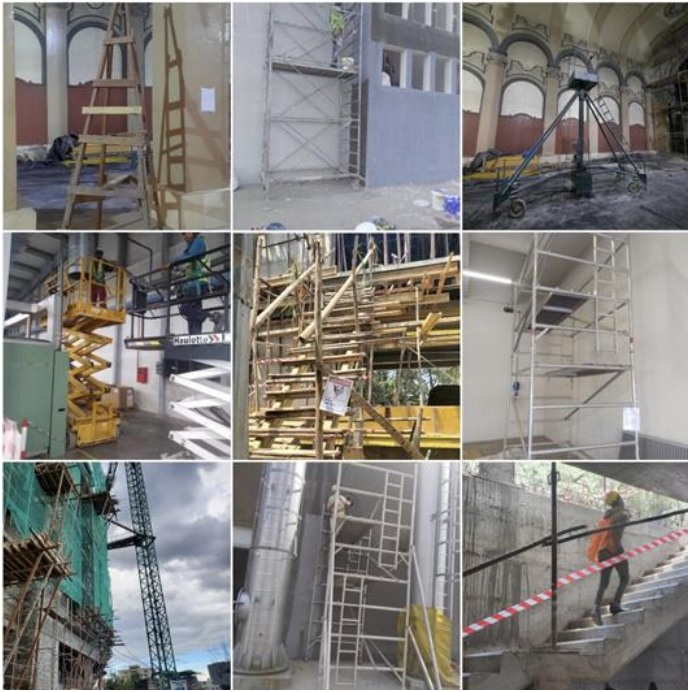
Scaffolding



First aid and emergency equipment



Stairs and ladders



Housekeeping



Electric plugs



Covered holes and openings

