



**ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
SCHOOL OF COMMERCE**

**Assessment of Project Safety Management Practices in Construction
Projects: The case of Elmi Olindo Construction PLC.**

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of the requirements for Master's of Arts Degree in Project
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Declaration

I, Samuel Kenneth, declare that the thesis entitled “Assessment of Project Safety Management practices in construction projects: The case of Elmi Olindo construction PLC.” is my original work. I have carried out the present study independently with the guidance and support of the research advisor, Worku M. (PhD). This study has not been presented for a degree in any other university and all sources of materials used for the study have been duly acknowledged.

Samuel Kenneth: _____
Signature **Date**

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This is to Certify that the thesis prepared by Samuel Kenneth, entitled: Assessment of Project Safety Management practices in construction projects: The case of Elmi Olindo construction PLC. submitted in partial fulfillment of the requirements for the degree of Master of Arts in Project Management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Acknowledgements of Dedication

First and foremost I would like to thank God, the Creator and Giver of all knowledge, wisdom and understanding.

I would like to express my deep and sincere gratitude, to my project advisor, Dr. Worku M. for his assistance, direction and the valuable support throughout the research of this study.

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LIST OF ACRONYMS

GDP	Gross Domestic Product
HSE	Health and Safety Executive
ILO	International Labor Organization
NYU	New York University
OSH	Occupational Safety and Health
PLC	Private Limited Company
PPE	Personal Protective Equipment
UK	United Kingdom
USA	Unites States of America

ABSTRACT

The construction industry is said to be one of the most unsafe and risky industries. This is especially true in the developing countries. One of the reasons is because safety issues are considered a low priority compared to cost, quality and schedule. The major objective of this study is to assess project safety practices in construction projects in Addis Ababa, Ethiopia under the contractor Elmi Olindo construction PLC. The research methodology used in this study is descriptive research. So, for the descriptive method, closed-ended questionnaire survey was used to collect the data from a population of 48 employees from the company with engineering background from 9 construction projects in Addis Ababa and the census method was used. Accordingly, the study findings found that there is adequate availability of safety signals, signs and barricades; safety equipment & first aid on the site on the construction projects. It also found that more needs to be done particularly on; management commitment on safety performance being monitored and safety training of personal on the site. It concluded that Safety behaviour has a significant influence on the safety practices, with wearing PPE and safety experience of the worker being effective for safety on the site. The study suggests that further research on safety practices should be carried out on other construction projects like dams and roads, and on other stakeholders in the construction industry.

KEY WORDS: *Safety climate, Safety behaviour, Enforcement Techniques*

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CHAPTER ONE: - INTRODUCTION

1.1) Background of the study

The construction industry is an important part of the economy in many countries and often seen as a driver of economic growth especially in developing countries. In developed countries like UK and USA, the construction industry contributes 4.21% and 4.1% respectively from the Statista Research Department in 2019. In developing countries like Kenya, construction contributed approximately 6% to the country's GDP in 2017 and for Nigeria it is 3.2% of its GDP in 2015. Typically, construction industry contributes to 11% of gross domestic products (GDP) in most developing countries (Giang and Pheng, 2010). From this it can be show that the construction industry in both the developed and developing regions contributes a large portion of the GDP. In sub-Saharan Africa, the construction industry has been growing 5% from a study about construction growth in Africa (Alagidede et al., 2016).

The construction industry in 2016 in Ethiopia contributed 15.9% of the GDP of the country according to the 2017 African economic outlook, and in 2017-2018 it accounted for 18% of the GDP. This shows that the construction industry plays a larger role in the Ethiopia economy as compared to other countries like Kenya and Nigeria, and so forms an extensive part in Ethiopia's GDP.

However, the construction is also a hazardous industry whether in developed or developing countries and contributes to significant numbers of occupational accidents and ill health globally. While developed nations have demonstrated commitment to achieving a reduction in accident numbers in industrial settings, the same cannot be said of developing countries, particularly Sub-Saharan Africa. (KHENI, 2008)

Many construction activities inherently have safety risks, such as working at height, working underground, working in confined spaces and close proximity to falling materials, handling load manually, handling hazardous substances, noises, dusts, using plant and equipment, fire, and exposure to live cables.

In Kenya, for example (MUIRURI et al., 2014) while safety is discussed on the project site, there is little emphasis on safety during budget allocation. It goes on to show that safety measures on the site are not enough and also there is a lack of commitment by the management. In Ethiopia, information regarding safety and injury rates is rare. Prior studies

are very limited. From (Fekele et al., 2016), noted that accidents and injuries are mainly caused by unsafe behavior and unsafe conditions at the site, another noted there is very limited information with regards to injuries and also very limited safety measures on the site.

From the study by (Awolusi et al., 2016) noted that the construction industry in developed countries and also in the USA, has in recent years been experiencing a movement away from safety measures based on retrospective data or lagging indicators such as accident rates and compensation. Many modern approaches promote a shift to using proactive measures and upstream or leading indicators such as hazard identification and observed percent safe behavior. These approaches are focused on current safety activities to establish the safety performance of a system rather than system failure.

However, the safety culture of the construction industry (MUIRURI, 2014), in developing countries does not promote health and safety. The practices of competitive tendering and award of most public contracts to the lowest bidder in many developing countries compels contractors to drive their prices low while cutting costs which in turn affects health and safety.

1.2) Problem statement

Past studies in the construction industry like (SAEED, 2017) show that construction projects create frequent possible threats to the lives of employees, and serious injuries are frequent. The construction industry is considered as being risky with frequent and high accidents rate and ill-health problems. The construction industry has therefore earned the reputation of being a dangerous or highly hazardous industry because of the disproportionately high incidence of accidents and fatalities that occur on construction sites around the world. (Smallwood and Haupt, 2008).

The safety performance of the construction industry has consistently been below that of most other industries (Hinze, 2003). Preceding studies like (Ahmed et al., 2007, Hinze, 2003, Razuri et al., 2007, Choudhry et al., 2008), focus on safety management practices and their implications in the construction industry in developed regions. In developing regions, safety is often neglected on construction sites and rarely managed.

From the few prior studies in developing regions, a number of safety issues include inadequate personal protective equipment; poor maintenance of personal protective gear; lack

of top management support in the management of safety in construction sites; lack of adequate funds from the budgeted cost; corruption; and illiteracy of the workers about safety. Very few studies about safety on the construction industry in Ethiopia, like (Fekele et al., 2016) which researched about safety evaluation in the prequalification phase of public bidding and safety issues in the country, but from experience and literature reviewed in the safety in the construction industry in Ethiopia, not enough has been studied in this area and given more priority on safety management especially compared to budgeted cost or schedule of the projects. Little research for the construction industry in Ethiopia has been carried out on safety climate and safety behavior for the contractors on the construction sites at implementation. And so, much still needs to be done in the area of safety, because accident and injury rates are still an enormous obstacle in the construction industry. And so, a more comprehensive outlook is needed to give more importance to safety practices by addressing whether contractors add it into the overall implementing it in the building construction projects.

Elmi olindo PLC started over 70 years, and has experience in building construction projects and is currently a GC-1 contractor. Its capacity has grown to undertake major projects with professional execution. Some of its construction projects that the contractor has done include: Lalibela restoration, Royal Netherland Embassy, Ethiopian airlines new catering facility, British Council, etc.

As in many construction industry contractors, Elmi Olindo face challenges in safety on the construction projects. Such as; the workers behavior towards the safety rules the company and of the country, the availability of and usage of PPE (Personal Protective Equipment), safety guardrails on higher floors.

This research will try to determine the safety management practices within the company to assess the safety behavior of the workers, the overall safety climate and Enforcement techniques.

1.3) Research questions

1.4.1) Specific question

What are the major factors that influence safety climate at Elmi olindo construction plc?

What are the enforcement techniques on safety regulation of Elmi olindo construction plc?

What are the major factors that influence the safety behavior at Elmi olindo construction plc?

1.4) Objectives of the Study

1.4.1) Main Objective

The main objective of this study is to assess the safety management practices in Elmi Olindo construction PLC., at its construction building projects in Addis Ababa.

1.4.2) Specific Objectives

The research will be conducted:

- To identify the major factors of the safety climate in Elmi Olindo construction PLC.
- To examine the enforcement techniques on safety regulations at Elmi Olindo construction PLC
- To identify the major factors of safety behavior in Elmi Olindo construction PLC.

1.5) Significance of the study

The study's significance is to have an understanding of the safety practices in Elmi Olindo construction PLC. It is done to have a clear understanding of the state of safety management at the company. Having had an understanding, the addition of this research would benefit:

- In order for the construction industry to provide a safer working environment for the workers in the construction site.
- Lower cost for the construction industry, because having an understanding of the overall safe climate can lead to fewer accidents
- Future scholars will benefit from this study as it will provide literature material for future research; the findings of this study will add to the body of knowledge on safety management practices on construction sites.
- For Ethiopia and developing regions, it can provide solely needed research in an area where adequate information about safety practices in the construction industry is scarce.

1.6) Scope of the Study

The research will be bound on assessing safety practices on building construction projects that are constructed by the Elmi Olindo plc in Addis Ababa. The research is bound by the major factors of safety climate, safety behavior of workers, and the enforcement techniques on safety regulations. The other related factors of safety management will not be included on this particular study. The location is based on the convenience of the researcher.

Questioner data collection is to be limited to Elmi Olindo construction PLC building projects located at Addis Ababa.

Chapter 2: Literature Review

2.1 Introduction

The main aim in carrying out the literature reviews is to gather information on the research topic. The study begins with a detailed theoretical literature review on safety practices in the construction industry focusing on the safety climate, then the worker safety behavior and the enforcement techniques used to enforce safety regulations in the construction industry, then it moves on to the empirical review done and the factors that affect safety climate, safety behavior, and finally the enforcement techniques.

2.2 Theoretical review

2.2.1 Safety management of construction projects

Construction safety management is a method of controlling safety policies, procedures and practices on construction site (abas, 2020). The construction management should consider a safety culture and safety climate is important aspect should be concerned. A safe jobsite is one very important aspect of being a project manager. Construction is also one of the most hazardous industries. (Wu et al., 2015) in a study done in 21 Chinese contractors, states that large numbers of accidents in the industry results in workers deaths, injuries, and work related illness as well as other direct and indirect heavy losses and incurring additional costs to the project due to compensation an lost work hours.

Delivery construction project should not only have time, cost, quality as performance criteria, (Jitwasinkul et al., 2010) but that the client should broaden their concern to advocate site safety as importance of wellbeing. Thus, development and promoting occupational safety in construction industry have been conducted by cooperative endeavors from all stakeholders as basic.

Safety issues by (Choudhry, 2008), have been gaining importance throughout the construction industry, particularly in the developed countries like UK. Many construction companies around the world are implementing safety management systems to reduce injuries, and to provide a safer work environment in the construction sites. Because construction site accidents are considered common, there is a great deal of obligation to maintain a safe

worksite and to take care of their workers. One way this can be done by providing safety budget in the planning.

Good safety procedures reflect in having a significant influence on the safety performance of construction safety in site. According to (Wu et al., 2016) in a study about different stakeholders safety leadership impact on the workers in construction sites, noted that leadership commitment to the physical and psychological wellbeing to the workers on the site can motivate them to work their tasks in a safe manner.

In (Sunindijo et al., 2013) notes, that a theoretical understanding on safety in a construction project helps project management personnel realize that safety is actually an important part of the project. The study goes on to note that when project management personnel know about the importance of safety, they are more likely to act in a safe manner and also implement safety measures that promote safety on the site.

Safety concerns (Choudhry et al., 2008) in a study done in China and Hong Kong in particular, is said to have gained importance throughout the construction industry. The study also noted that many construction companies that operate around the world are implementing safety management systems to reduce injuries, and to provide a safer working environment in construction sites. Although significant improvements have taken place in recent times, (Ahmed et al., 2007) states that the safety record in the construction industry still continues to be very poor especially in developing countries where policy makers pay very little consideration to the issues of safety on the sites. In Ethiopia, (Tadesse et al., 2016) that there is a lack of safety standards in the construction industry as compared to other industries and also that there is a lack of safety programs.

The safety performance of the construction industry is said to be consistently been below that of most other industries and that it is one of the most hazardous industries to work in. For example, from (Chakraborty et al., 2007) in a study done in Bangladesh construction industry, found that for the majority of contractors, profit is the key concern and unsafe conditions exist on many sites, with the laborers exposed to numerous hazards doing their tasks on the site.

More enforcement of regulations and the need for effective and efficient management of safety and safety management systems have developed as a means of monitoring the risks of hazards at the construction sites. In developed regions, (Rawlinson et al., 2010) noted that the

construction sector of Great Britain has implemented a series of regulations for the safety on the sites as a result of increased priority by the authorities and clients wanting to hire contractors.

In a study conducted by (KHENI et al., 2008) in Ghana construction industry, revealed that there is a considerable discrepancies in contractors' safety practices. The internal influences, the contractors' decisions to improve safety included size of the organization, growth performance, management experience in safety issues and number of years the business has been operating. It is not only internal influences but also external influences between contractors on safety practices. For example, the study pointed out that some of the things that can hamper safety management practices in the construction industry can be: schedule pressures, little education among workers for the management to conduct training, the stifling office system in the organization.

In an evaluation of the USA construction industry (Hinze, 2003) studies about safety performance in construction sites and identified that safety practices were linked with an improvement on safety performance in the construction sites.

Safety performance measurements can either be reactive or active monitoring. The former means identifying and reporting on incidents, and learning from errors, whereas the latter provides feedback on performance before an accident or incident occurs. Safety metrics are into two categories: (1) leading indicators, which are measurements linked to preventive actions; and (2) lagging indicators, which are linked to the outcome of an injury or accident. (Awolusi et al., 2016)

In achieving a good safety record, (Hinze, 2003) showed that contractors that those who have safety officers on the site, where more likely to also have a better safety performance and if new workers are hired, they receive safety training. It also notes that when there is management commitment to safety, the safety monitoring of the sites improves as well. Also a site safety plan that properly accounts for the hazards on the site is a very effective method for as pertaining site safety. Another study in Ethiopia (Fekele et al., 2016), concluded that the improvement of safety working conditions depends upon the major stakeholders working together, including: government, contractors, consultants and workers at the site. Safety management involves the functions of planning, identifying problem areas, coordinating, controlling and directing the safety activities at the work site, all aimed at the prevention of accidents and injuries. The study also stated; Effective safety management has three main

objectives: to make the environment safe; to make the job safe; and to make worker safety conscious.

In (Sunindijo et al., 2013) in a study about the concept of safety management in construction, notes that there is an interrelationship between different safety components within a project; and that through the application of safety theoretical skill by education, training, gives project management personnel an understanding of implementing safety procedures required in the project sites. In it, the study goes on to state that when proper safety procedures are implemented, cost can also be a factor as having too many safety measures can inflate the cost but too few can increase hazards and accidents occurring at the site, and so it is a balancing act. Furthermore, safety theoretical skill enables the management to aid them identifies safety hazards and risks of the project.

2.2.2 Safety climate in construction industry

Safety climate refers to a particular aspect of organizational climate that focuses on those shared perceptions of organizational policies, procedures and practices that serve as an indicator of the importance of employee safety. Safety climate is defined by the workplace health and safety of Australia, as “the professed value placed on safety in an organization at a particular point in time as set and conveyed by the management team.” Another definition by (Mosly, 2019), refers to safety climate as “the organization that sets the safety policies, procedures, rules as conveyed by the management and supervisors.”

It's been reviewed by (Zohar, 2009) that “managers or leaders are the ones that ‘create’ the safety climate in the organization.” But another study, after conducting an extensive research about safety climate definition (Schwatka et al., 2016); found that none of the researchers defined safety climate with a specific population. Thus, one can see that all construction organization stakeholders must have a unified safety goal. A lot of attention has been focused on safety climate, as it reveals the factual significance of safety in an organization (Chan, 2014).

The study by (Zohar, 2009), by reviewing various studies reflected that; the relationship between leadership and safety climate has been largely explained as an extension of the management concern for the workers wellbeing. It goes on to note that supervisors and management who have a good working relationship with the workers, have an increased

awareness of the risks and hazards of the site and would want psychological and physical welfare safety for the workers on the site.

Safety climate is a practical tool, as it can facilitate the recognition problems that might be seen vital to improving safety. It has been widely used and considered as a reliable indicator to measure safety practices and assess safety performance in the construction industry from a research done in Australia in a road contractor company (Litherland et al., 2001). Safety climate is also seen as a leading indicator and a practical tool to identify trends, establish benchmarks, and reveal areas of weakness on safety.

Many studies have found that safety performance and safety climate are associated, in that safety climate is a major way to predict safety performance. The benefits of safety climate can be plenty especially if it is developed and evaluated properly, as it is regarded more proactive in giving safety information than traditional ways of measuring safety. In a study by (Mosly,2019); reviewed a research undertaken in Hong Kong suggested that “safety climate could be implemented as a significant investigative tool for assessing and enhancing site safety for construction sites.” It concluded that measuring safety climate could evaluate the way safety functions on a construction site, and can alert the organization of hazards and risks that may happen due to safety system failures. Moreover in another study (Zhou et al.,2011); that examined safety in the Chinese construction industry, it was shown that the most effective way of measuring safety climate factors was “constituting safety regulations and rules, together with the provision of more safety training and promotions.”

According to (Hinze, 2003) some of the prominent factors can be: Demonstrated management commitment, Safety planning, Orientation and training, Rewards and incentives. From this it is shown that the management commitment to safety is one of the more important ones.

2.2.3 Enforcement Techniques of Safety Regulations

Enforcement techniques are part of safety management. In one study (Wilson,2006), notes that the ILO (International labour organization) formulates international labor standards in the form of conventions and recommendations, thereby setting minimum standards for basic labor rights. The ILO conventions embark on occupational safety state; to guide all

countries in the promotion of workplace safety and in managing OSH programs. (MUIRURI,2014) notes that an organizational framework must be set up to facilitate the implementation of the policy.

The construction industry in a study done by (Enshassi et al., 2004) which researched about construction site injuries in Palestine noted; should be interested in safety regulations and implementation for humanitarian and economic reasons. In humanitarian terms, if accidents occur, a construction firm and/or its employees may suffer pain and/or loss of life due to an accident. In addition, its safety record will be lower and there may be a loss of the firm's reputation. In economic terms, an effective safety management program may be profitable for a construction firm. This is because accidents have high direct (medical, worker's compensation) and indirect (reduction of productivity, job schedule delays, rework) costs.

In developed countries like the EU (Alli, 2008) there is a lot of emphasis on occupational safety in the construction industry which has been shown to reduce accidents that occur on site. However, (Cotton et al., 2005) noted that the institutional and legal governance frameworks on occupational health and safety in developing countries have little impact. From (Muiruri, 2014) which studied about construction sector in Kenya, that enforcement of safety regulations remains a problem in developing countries due to scarce resources available to government institutions responsible for occupational safety supervision. Also, as noted by (Ali, 2008); Occupational injuries and accidents are all caused by preventable factors which could be eliminated by implementing measures and methods that already exist. A lot of developed countries have a robust and well-developed occupational safety and health (OSH) management and this is shown by having less accident and injures rates, while an increasing proportion of occupational injuries in the world are occurring in developing countries.

In a guideline about OSH management system by the International labour office (ILO,2001), it gave general guidelines for nations to follow on OSH management, such as:

- promote the implementation and integration of OSH management systems as part of the overall management of an organization;
- facilitate and improve voluntary arrangements for the systematic identification, planning, implementation and improvement of OSH activities at national and organization levels;
- promote the participation of workers and their representatives at organization level;

- implement continual improvement while avoiding unnecessary bureaucracy, administration and costs;
- ensure that the same level of safety and health requirements applies to contractors and their workers as to the workers, including temporary workers, employed directly by the organization.

In Ethiopia, the (labour Proclamation No.1156/2019), guides the worker-employer relations. It has a section on part seven occupational safety and health and working environment. It has certain obligations for both the employer and worker. Some of those pertain to the safety regulations that organizations need to follow.

For the employer there is: 1.Compliance with the occupational safety requirements, 2.Take appropriate steps to ensure that workers are properly instructed and notified concerning the hazards of their respective occupations; and assign safety officer; and establish an occupational health and safety committee; 3.Provide workers with protective equipment, clothing and other materials and instruct them of their use; 4.Register employment accidents...

For the workers there is: 1. Co-operate in the formulation of work rules to safeguard the workers' health and safety; 2. Make proper use of all safety devices and other appliances furnished for the protection of his safety; 3. Observe all health and safety instructions issued by the employer ...

Although the labour laws on safety for organizations is present, (Muiruri, 2014) notes, the enforcement techniques are not adequate and that the construction industry doesn't place a high priority on safety regulations but that many contractors place other objectives over safety and many don't plan and allocate cost for it in their projects.

2.2.4 Safety behavior of workers in construction projects

Safety behaviors are actual behaviors that individuals perform at work. Safety-related behavior includes a range of activities performed (Kapp, 2011) by individuals to maintain a safe workplace incorporating individuals' actions of complying with established safety rules and procedures as well as workers' behaviors that help sustain and improve the overall level

of safety in the workplace, such as volunteering for safety committees or providing suggestions on ways to improve safety in the construction sites.

The safety behavior means (Choudhry, 2014) states, “is the discernible action, because discernible practices are what matters more for workers’ safety on construction sites.” Safety behavioral approach addresses how people behave on the construction site towards safety.

In one study that discusses impact of organizational climate on safety behavior, (Neal et al., 2006), differentiated safety behaviors into safety participation and safety compliance. Safety participation contributes to safety in work site by workers attending meetings and helping coworkers voluntarily, although it likely does not promote personal safety directly. In contrast, safety compliance denotes mandated behaviors that should be conducted to maintain the safety of workplace, such as wearing personal protective equipment (PPE) and complying with safety rules and procedures.

From (Lardner et al, 2002), in a study about promoting safety behavior in industries including construction in the United Kingdom stated that, it has become widely accepted that effective risk control depends in part on the behavior of individuals at all levels within an organisation. Essential, what matters is how well the organization supports its system. Safety measures or techniques based on behavior can improve safety record by promoting behavior that encourages safety on the site.

In (Lardner et. al, 2002) also notes that; “organizations should select behavioral safety programmes which match their level of organizational maturity because a mismatch is one reason why behavioral safety programmes fail.” It is therefore important for organizations to establish that they are ready to implement a behavioural safety programme and to identify any potential problems they may encounter. In order for an organization to cope with the potential problems, it needs to be able to identify obstacles before executing the programme. For example, if reorganization is likely to occur during the implementation of the programme, then the programme could be delayed until after the reorganization.

The behavioral based approach, (Manjula et al., 2014), as this study indicates is to focus on the observable, measurable behavior critical to safety at the construction site. The study notes that in construction sites with poor rates of safety records, with proper application of safety behavior based programs can improve safety performance on the site by a reduction in injuries.

In many studies, like (HSE , 2002) which is the Health and safety executive in the UK; it has been estimated that most of the accidents on the construction site can be attributed to unsafe acts. It revealed that 80–90% of all workplace accidents and incidents can be attributed to unsafe behaviors. In another study (SAEED, 2017) which studied the accidents and injuries rates in the construction sites in Iraq and the UK, notes that 90% of accidents were the result of unsafe behavior.

(HASSAN, 2007), notes that many accidents that occur in the building construction sites were due to inadequate adherence of workers to work procedures. The most common form of accident on the construction project is said to be falling from a height (SAEED, 2017).

It is critical that workers of an organization play a key role in contributing in the overall construction site project. Another study (Meldrum, 2009) which researched about construction workers engagement in safety in the UK, states that without the willing involvement of workers at all levels in the organisation a safe working environment cannot be certain.

In (Choudhry,2014) in a research done on a construction contractor in Hong Kong, lists examples of unsafe behavior like not holding the handrail when ascending or descending stairs, not storing equipment after completing a task. From the same study; the triggers for behaving unsafely include a wide range of management system faults that are associated with each incident. These triggers commonly include: getting the job done, meeting excessive production targets, competing priorities, tight construction schedule, lack of training and lack of adequate availability of equipment or materials. Other triggers are often in the direct control of front line-management and or employees such as poor housekeeping and using personal protective equipment (PPE).

In (SAEED, 2017) lists some reasons of unsafe behavior: A worker notices a dangerous condition but he does not do anything to correct it, an individual performing the work in faulty way or unsafe manner due to lack proper training, a worker may disregard the safety conditions and then an accident may occur. Others which are commonly included are: competing priorities, tight construction schedule, and lack of availability of PPE (Personal protective equipment) or materials.

Safety behavior can also be reflected by good attitude. Many workers and managers see construction as a rough job for tough, self-reliant people. (Enshassi et al., 2002) notes in

research within Palestine construction sector; that it is widely believed that building to tight deadlines at low cost is incompatible with high safety standards.

If unsafe conditions are present, (Choudhry, 2008) with a study done on 20 construction projects in Hong Kong, goes on to state that the workers accept the risks present at the construction because it has become normalized; and so, due to normalization, workers perform their tasks with the risks and hazards. In this situation, construction site accidents cannot be exclusively attributed to the unsafe work practices of workers. It gives the impression that rather than attributing the blame for accidents and injuries to construction workers, one must pay attention to and view the injury from the worker's perspective.

It was demonstrated by (Choudhry, 2014) who studied a construction company in Hong Kong, that safety behavior could be improved by systematically monitoring safety-related behaviors and providing feedback with goal setting and training. Goal setting coupled with feedback were better than feedback alone; and participative goal setting was more effective than assigned goal-setting.

Research in other regions was conducted on safety behavior including goal setting and feedback techniques (Svensson et al., 2006). From studies done, an important technique to have better site safety is behavior-based methods. And also, (HSE, 2002) behavioral safety methods improve safety risk control by promoting behaviors critical to safety. It is likely to be used to promote the safe behaviors which will prevent workers in the construction site from being injured.

2.3 Empirical Literature Review

2.3.1 Safety climate in construction industry

Many studies have identified safety climate factors across various industries, although there is no consensus of the factors, there are common factors across many studies that have been reviewed. Measuring the safety climate on construction sites should be encouraged by employers, to recognize and resolve organizational and management problems of safety before the incidence of safety accidents (Cigularov et al., 2013). Safety climate is linked to safety performance. From (Andersen et al., 2017), safety climate can predict the levels of safety performance. Studies have shown that safety climate and safety performance share a positive relationship. From Ethiopia, there is (Fekele et al., 2016), which found that

contractors in the country do not provide solutions to all necessary the safety issues and that safety training is true only to a certain extent. It also found that workers were not well-provided with basic information for safety checklists on scaffolding and cranes.

Previous studies have pointed out different factors that affect the safety climate of safety construction projects. These factors include:

2.3.1.1 Management commitment to safety

It is about the management, and that it should ensure that sufficient resources is allocated for safety activities and that regular safety meetings and training are in place. Because effective exhibited leader commitment will increase the likelihood of a good safety record. It is to motivate and inspire the workers to work towards achieving a particular goal or outcome by sending clear and consistent messages about the importance of safety in the construction project. And so, when employees believe management cares about their personal safety, they are more willing to co-operate to improve safety performance. In addition, such meaningful management actions in support of safety help to create the positive working environment that motivates safe work behaviour and raises safety expectation (Mosly, 2019); (Hinze, 2003)

2.3.1.2 Safety work rules

To identify if the company has a set of safety work rules that govern the safety of the employees at the construction site. Safety work rules are needed to induce a safer work environment for the workers. They are the rules the construction sites need in order to perform tasks in a safe and orderly manner. For example, proper handling and storage, fire depressant system in place. It is necessary to have a plan and reserve storage areas for materials so that multiple movement of material is avoided. Lay down areas, staging areas, and warehouses are used for material storage and they are generally located as close to work as possible. Proper equipment with trained personal for handling materials, and a plan for the materials can reduce the cost and timetable and the task can be done in safety, since about one-third of construction projects can be related to material handling. (Wu et al., 2015) ;(Ahmad et. al., 2007)

2.3.1.3 Safety Project Planning

Safety planning is vital to project safety. There are two types of safety planning. One consists of pre-project planning and the other consists of pre-task planning. When planning is done, whether at the project or task level, it is important that safety be addressed along with the other aspects of performing the work, as safety cannot be addressed as a distinct and separate issue. Safety simply must be integrated into the planning process. One means of integrating safety into the project is by preparing a site-specific safety program. Like having easy site accessibility will keep the morale of the equipment and vehicle drivers high, minimize the chance of accidents, and save time in manoeuvring to access and leave the project. In large projects, proper planning is required for the roads leading to the nearest highway, internal roads, and parking lots. (Razuri et. al., 2007); (Ahmad et. al., 2007)

2.3.1.4 Communication

Open communication between management and the worker at the construction project to facilitate prompt report of and response to unsafe conditions. To communicate formally the safety work rules. It should ensure that the workforce understands that there are identified and as yet unidentified hazards on site. Increased awareness of which can be achieved via regular oral and written communication. (Mosly, 2019); (Glendon et al., 2001)

2.3.1.5 Safety training

Safety training helps by bringing increased competence and capability to contribute training programs that are put in place to develop workers' knowledge and skills on safety at work that leads to improving their safety understanding and the skill to do the task assigned to them in a safe manner. After conducting a traditional training needs analysis, the organisation should develop a training plan to develop the skills, abilities and behaviors required by employees to positively affect safety on the site. Also having training certificate for certain machinery can contribute to increased safety on site by proper use of the machinery. (Hinze, 2003); (Fang et al., 2006)

2.3.1.6 Safety Signals, Signs and Barricades

Safety signs on the construction projects are there to give information on the safety hazards of the site. Barricades are there to restrict passage to that particular part of the project to the qualified personal. (Ahmed et al., 2007)

2.3.1.7 Safety equipment (personal protective equipment)

It is an important part of the safety in construction sites. The contractors have to provide sufficient protective clothing and equipment for workers, insulation boots and special gloves for workers where there might be electrical hazards, safety belts and lines, safety helmets, are some of the prominent equipment needed to ensure a reduction in injuries. It's organizations responsibility to provide those to the workers for they enable the worker to safely perform his work. (Mosly, 2019); (Glendon et al. , 2001)

2.3.1.8 Safety value and reward system

It is an incentive system that can be used to reward workers with compensation or bonus for a good safety record and doing the task in a safe manner. It reflects the concern the company has for the safety of its workers. Identify and communicate behaviour requiring recognition. Identify and publicly recognise individuals who undertake desired behaviour (Mosly, 2019);(Hinze, 2003)

2.3.1.9 Safety program documentation procedures

It is for the contractors' capacity to create and develop procedures that document the safety hazards, and keeps them for future use, as a basis for future safety project planning. Documentation is a useful tool in identifying risks and hazards at the construction project. (Mosly, 2019); (Glendon et al., 2001)

2.3.2 Safety behavior of workers in construction projects

(HASSAN, 2007) notes the prominent factors that affect safety behavior in construction projects awareness and perception of the workers toward safety, such as: supervisor's role,

personal role, co-workers influence, risk taking behaviour (root causes of accidents rather than treating the visible symptoms, i.e. risky behaviours.) and obstacles to safe behaviour.

Another study (Choudhry, 2008) was studying why workers in construction sites engage in unsafe behaviours, he noted that management involvement and toolbox talks are the most effective factors for site safety in construction.

From Ethiopia, a study by (Tadesse et al., 2016), found that injuries among construction workers is a serious problem, and that wearing PPE (personal protective equipment) on the site reduces injuries. It found that there is low safety awareness among workers.

Previous literatures have pointed out different factors that affect the safety behavior of safety construction projects. These factors include:

2.3.2.1 Worker's colleagues' influence

No worker wants to be highlighted with a bad reputation, in case of safety or otherwise. It may psychologically affect the worker not to fall out of the group by working safely, if their co-workers follow the safety protocols and work safely during construction. And so, effect of workers on their colleagues can have a positive or negative safety actions and will be transferred to workers from their colleagues. (HASSAN, 2007) ;(Mosly, 2019)

2.3.2.2 Work pressure and intensity

Work pressure at the site can affect the safety climate, in that a lot of pressure on the construction project can lead to unsafe decisions to be made by the employees of the organization. It is common that the work pressure is high when the deadlines are nearing. As a result lack of thought to perform work safety is observed among the workers, due to their urging to take shortcuts while performing their tasks. Experts point out that when the company has to finish a planned project on time, workers have to perform the task quickly in order to get the job done rather than work safely. (Mosly, 2019); (Choudhry, 2008)

2.3.2.3 Safety competence and experience

Ability of individual to carry out the right thing at the right time by using his/her sense, experience and skills to evaluate the hazard conditions and make a proper safety decision. Identify and specify workforce safety skill and competency requirements. It can assess in knowing whether the workers understand the safety work rules. And so, more experienced

workers in the industry are, the less likely to be behaving unsafe manner while they work. Knowledge on safety also has a key part in safety behaviours of employees. Also if the workers don't, or even worse, don't want to understand why or how safety matters in construction, there is a bigger chance of them behaving unsafely during their work hours. (Choudhry, 2008); (Mosly, 2019)

2.3.2.4 Wearing PPE (protective personal equipment) and personal accountability

Wearing the PPE at the construction projects, can lead to a reduction in the number of injuries at the site. The equipment may be there but the workers have to wear them, their presence does not guarantee that the behaviour will occur. And following the safety work rules relies on the personal role of the workers. construction workers that wear hard hats, gloves, safety goggles, and various other safety equipment while on the job are less likely to have an injury; construction sites are dangerous, for example: sites have heavy and sharp objects, scaffolds on different heights and floors, contact with electricity , and a number of other potentially hazardous elements. (HASSAN, 2007); (Choudhry, 2008)

2.3.2.5 Project duration

A tight schedule at the construction project can lead to unsafe behaviour of the workers due to the pressure upon them. It can lead to workers in making unsafe decisions. (Choudhry, 2014); (Enshassi et al., 2004)

2.3.2.6 Safety supervision and guidance

Supervisors capable of allocating work that matches worker's skill, identifying hazard conditions and making the environment safe by communicating with workers and listening to them and be sure all workers follow the safety rules and find solution for the occurring safety problem. (Seo et. al., 2004); (Wu et al., 2015)

2.3.2.7 Working site environment and weather conditions

Weather conditions can have an effect on the workers in the construction site. For example, in hot conditions the worker may have a headache, fatigue, excessive thirst, profuse sweating, which can affect his ability to continue the task at hand. (Choudhry, 2008)

2.3.2.8 Unsafe behaviour of the workers

Unsafe behaviour is said to contribute 90 % of accidents on the construction project.

Risky or unsafe behaviour by the workers can lead to being: struck by an object, falling from a height (Falling from stairways, ladders and scaffolding), slipping and tripping, Excavations (Slides, collapse, inadequate shored protection), contact with Electricity (Electric power Accidents), Construction Elevators and Cranes (sudden dismantling). (HASSAN, 2007); (SAEED, 2017)

2.3.3 Enforcement techniques of Safety Regulations in construction industry

A structure that clearly defines the duties and responsibilities of the various levels as far as safety is concerned, is a necessity. It should ensure that safety is integrated rather than separated thereby facilitating total commitment to safety. In a study done by (Dingsdag et al., 2008), who studied about enforcement among other things noted in the discussion that, there is a “general desire from the workforce to see more enforcement of safety and more inspections conducted by management staff and probably also a more involved role by the safety and health regulators’ inspectorate.” Although the study also noted that respondents saw government inspectors as having one of the least influential roles in determining how safe the work site is. By not regularly enforcing safety itself, the contractor is sending the message to the site workers that safety has a low significance. Hence, those who hold a safety critical position must be trained and motivated to inspect regularly and systematically and enforce techniques of safety regulations.

From Ethiopia, a study by (Fekele et al, 2016), found that there is no adequate first aid on some of the sites it researched and that when clients select contractors a safety audit is rarely included as a priority.

The factors that can affect enforcement (MUIRURI et al., 2014) on a site includes: Safety officer, supervisor / Foreman, worker, safety Committee, safety Representatives, safety audits, personal protective equipment (PPE) provided, although the study states that PPE is “rarely inspected and this means that construction workers work without anyone confirming that they are in the right protective gear.” Given that most of the workers do not have the requisite safety training it is possible that they are unaware of the role of personal protective

equipment hence inspection for the same is important to ensure compliance and proper use. Factors that affect enforcement techniques are:

2.3.3.1 Safety officer

Having a safety officer is a useful way of enforcing the safety regulations at the construction project. They enforce the wearing of PPE, that guardrails are installed, that signs and barricades are setup, etc. To carry out the functions for safety on the site, the safety officer should have experience of the construction industry and should be properly trained and qualified and, where such exists, should be a member of a recognized professional safety body. (MUIRURI et al., 2014)

2.3.3.2 Safety audit

Safety audit on construction sites are a key aspect in enforcement of safety. The safety officer at the construction project can conduct a review of the safety condition of the site and make recommendations on what needs to improve. The company can also make arrangements and establish and maintain safety by ensuring that all persons are competent to carry out the tasks in safety. (MUIRURI et al., 2014); (Razuri et. al., 2007)

2.3.3.3 Inspection of PPE

The inspection of PPE is important because it can find that the equipment may need maintenance or even to replace it with new equipment. Like for example, for the safety googles, safety boots, safety line, etc. on the construction site. (MUIRURI et al., 2014)

2.3.3.4 Accident reporting

Accident reporting is important to the safety on the construction site in that it can help for the future; in order to know and plan for it. (Hinze, 2003)

2.3.3.5 First-Aid Provision

First aid is an important aspect of the safety team task in that it can help in prevention of major injury if administrated properly. If first aid is available on the site, it can be the first response during an accident, and can maintain the injured part and can be a major help if additional professional health services are needed.

2.3.3.6 Inspection by the health and safety agencies

This is to inspect if the contractor is violating the Labour proclamation of the state.

2.4 Conceptual framework

In the conceptual model shown below, both the dependent variable and independent variables are described. More precisely, the model for this project work consists of three variables, namely the independent variables (Safety Climate, Safety behavior, enforcement Techniques) and the dependent variable (Safety practices). For Safety Climate there are 9 key aspects: Management commitment to safety, Safety work rules , Safety Project Planning, Communication, Safety training, Safety Signals, Signs and Barricades, Safety equipment (personal protective equipment), Safety value and reward system, Safety program documentation procedures. For Safety Behaviour there are 8 key aspects: Worker's colleagues' influence, Work pressure and intensity, Safety competence and experience, Wearing PPE (protective personal equipment) and personal accountability, Project duration, Safety supervision and guidance, Working site environment and weather conditions and Unsafe behaviour. For Enforcement Techniques there are 6 key aspects: Safety officer, Safety audit, Inspection of PPE, Accident reporting, First-Aid Provision, Inspection by the health and safety agencies.

The 3 variables under this project work were related to safety practices by the study in that they are reliable indicators for the safety practices of the company; in the following manner as illustrated here below.

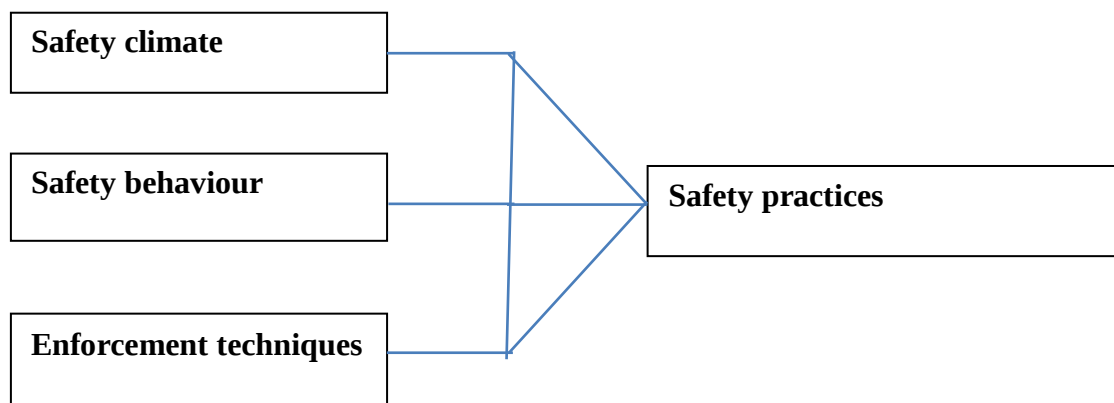


Fig. 2.1:- Conceptual framework for the assessment of safety practices

Chapter 3:- RESEARCH METHODOLOGY

This part discuss the research design, research process, study population, sources, tools and procedures of data collection and method of data analysis to be employed for the study.

3.1 Research Design

According to NYU (New York University), a research design is a systematic plan to study a scientific problem. The design of a study defines the study type (descriptive, correlational, semi-experimental, experimental, review, meta-analytic) and sub-type (e.g., descriptive-longitudinal case study), research questions, hypotheses, independent and dependent variables, experimental design, and, if applicable, data collection methods and a statistical analysis plan. Research design is the framework that has been created to seek answers to research questions.

The research type that was used in this research is the descriptive research. Descriptive research is a scientific method which involves observing and describing the behaviour of a subject without influencing it in any way. The descriptive research will portray an accurate profile of people, events or situations (Robson, 1993). Descriptive research defines questions, people surveyed and the method of analysis prior to beginning of data collection. Descriptive research seeks to determine the answers to who, what, when, where and how questions but not why questions.

3.2 Research approach

To assess the safety management practices in building construction projects in Addis Ababa at Elmi Olindo construction P.L.C., For this purpose a questionnaire is to be used and quantitative data is to be obtained through the questionnaire. The data is to be collected through these methods and was analysed and presented.

3.3 Study Population

The population of the study comprises 48 employees of the company that are engaged in the building construction projects (Project Managers , Safety engineer, Project engineers, Site engineers, & others) with engineering educational background within the nine projects in Addis Ababa. Census method is to be used. This method is to be used because of the

manageable size of study population and it can eliminate any potential bias occurring through sampling techniques; and so the 48 employees will be targeted.

It was limited to the company employees at the construction projects in the company because of accessibility of data and constraint of time of the research. However, the 48 employees of engineering background can still provide reliable information about the safety practices of the company because they are directly involved in the construction sites and hence can have in-depth knowledge; they are the company's projects' personal team and so know what is happening and can have an understanding on safety in the construction sites and its implementation.

3.4 Data collection and Instrument

This study targets building projects which are constructed by Elmi Olindo construction P.L.C located in Addis Ababa. The data to be used in this study is to be gathered from 48 employees of the company using questionnaire survey. A questionnaire survey is adopted for collecting data from a large group of people in a relatively short amount of time. It is useful for gaining information that is difficult to discuss (Gerhardt, 2004). The questionnaire is adopted from previous literatures about safety management, which were consolidated in a structured manner and will be administrated to the respondents.

3.5 Data analysis

After the primary and secondary data gathering procedures are complete, the collected data is to be checked through different phases (editing, coding, data entry and data analysis), and data is to be analysed using SPSS (Statistical Packages for the Social sciences) statistical package.

The questionnaire is composed four parts. The first part of the questionnaire gives the general information about the company and current project. The second part, contains questions about the current safety climate in the projects, is to be identified. The respondent are to answer in scale rating: 5 = strongly agree, 4 = agree, 3 = neutral, 2= strongly disagree, 1 = very strongly disagree. The third part is Enforcement Techniques which is also to be answered in scale rating: 5 = strongly agree, 4 = strongly agree, 3 = neutral, 2= disagree, 1 = strongly disagree. The fourth and final part contains the safety behaviour and is also a (1-5) rating , which also contains a rating for causes of injures due to unsafe behaviour with rating done by; low, medium, high and exceptional will be analysed.

3.6 Reliability and Validity

In order for the research results to be considered accurate, its findings must be both reliable and valid. Validity refers to how well or how accurate an instrument measures what the researcher wants to evaluate. Effort will be made to ensure the content validity of the data collection instrument so as to assure that the survey questions represent topics that will be measured and are accurate (Gerhardt, 2004).

Reliability is about consistency of a measure. If the same result can be consistently achieved by using the same methods under same circumstances, the measurement is considered reliable. Cronbach's α is the most commonly used test to determine the internal consistency of a measure. The Cronbach's α result is a number between 0 and 1. An acceptable reliability score is one that is 0.7 and higher (Heale et al., 2015). This study's Cronbach's Alpha was 0.83 which is beyond the acceptable level. Therefore the study can be used in further analysis

In an effort to avoid problems related to validity and reliability, previous literatures from research papers and articles from relevant journals and research institutes were used in the questionnaire survey that directly and indirectly relate to safety management were reviewed, examined and adopted.

3.7 Ethical considerations

Ethical conduct states that it is the responsibility of the researcher to assess carefully the possibility of harm to research participants, and to the extent that it is possible, the possibility of harm should be minimized. The researcher will exercise utmost caution while administering the data collection instruments to the respondents to ensure their rights and privacy is upheld.

CHAPTER 4: DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter analyses the results of collected data from the questionnaire, and literatures in four major sub topics on safety management practice. The topics are on a grade one contractor which is Elmi Olindo construction PLC in building projects in Addis Ababa. The analysis have four parts, the first part, deals about the General information /description of respondents, the cost of the projects; the second part contains information on the safety climate on the projects, the third part shows the enforcement techniques on safety regulation on the sites, the fourth part is about the safety behaviour that affect safety on the project sites. This is to reorganize the data in a systematic manner so that they are clear and unambiguous to be understood and hence to be analyzed. The methods of analyzing are by using means and std. deviation. Tables are used because this method of data presentation is more preferred among others, as it provides easier understanding and clearer picture of information to be delivered.

4.2 Data presentation

The analysis of the main questionnaire distributed for the purpose of this research is presented in this chapter. The analysis presents statistical results of the collected questionnaire based on quantitative method. The following section explains the number of survey questionnaires distributed to the projects of the construction company and provides a general picture of the response rate.

The questionnaire was designed and distributed to investigate the safety management practices in building construction projects held by Elmi Olindo Construction PLC in the Addis Ababa sites. 48 copies were distributed to Project managers, safety engineers, project engineers, and others (site engineers, quality engineers, electrical engineers, sanitary engineer and others employees in each project sites).

From the 48 questionnaires, about 42 questionnaires were filled out and returned, representing 87% response rate. Despite several follow ups about 13% failed to respond. According to (Mugenda & Mugenda, 2003), a response rate of 50% was deemed adequate for analysis and reporting, and that a response rate of 70% and over was considered very good. Thus, the study returned a very good response rate at 87% and that can be considered adequate for analysis and reporting.

The questionnaire consists of 4 parts in total. The responses to each question are analyzed as a whole so that an overall view of the safety practices in Elmi Olindo construction is presented. The purpose of each question is stated while carrying out the analysis and the result is demonstrated using appropriate tables.

4.3 General information of the company

This section outlines the findings on the demographic characteristics of the sample, which includes job title of respondent, educational background, year of experience, cost of project.

The analysis of the demographic data of respondents is summarized below:

Table 4.1: Frequency Analysis of Respondents' Demographic profile

General information		Count	Frequency	Percent
Job	Project Manager	8	8	19.0%
	Project engineer	12	12	28.6%
	Safety Engineer	4	4	9.5%
	Others	18	18	42.9%
	Total	42	42	100.0%
Education	Msc/MA	8	8	19.0%
	Degree	30	30	71.4%
	Diploma	4	4	9.5%
	Others	0		0.0%
	Total	42	42	100.0%
Experience	less than 5 years	10	10	23.8%
	5-10 years	17	17	40.5%
	11-15 years	15	15	35.7%
	greater than 15 years	0		0.0%
	Total	42	42	100.0%

Cost of the project	less than 250 mill	16	16	38.1%
	250-500 mill	23	23	54.8%
	500 mill- 1 billion	3	3	7.1%
	greater than 1 billion	0		0.0%
	Total	42	42	100.0%

As it is indicated in Table 4.1, 19% of persons who filled out the questionnaire were project managers of the sites and 28.6% were Project engineers. Besides, 9.5% and 42.9% of the questionnaires were completed by safety engineers and others employees of the company respectively. Here we can see that safety engineers are a relatively small number compared to the other professions.

From the education of the respondents as shown on table 4.1; 19% have MA/MSc, 71.4% have a degree and 9.5% have a diploma. This can be seen that the vast majority have a degree or higher. The experience of the respondents; 23.8% have less than 5 years (from between 1-5 years), 40.5% have between 5-10 years, 35.7% have 11-15 years of experience. This show that most of the respondents have experiences greater than 5 years and are first degree holders and implies that respondents involved in the study have some amount of work experience in the construction industry.

In the table above, shows that the respondents; none have projects that cost greater than 1 billion ETB and about 38.1% of the projects have a cost of less than 250 million, 54.8% of the projects have 250-500 million ETB and 7.1% of the projects have 500 million-1billion ETB. This indicates the projects have a lot of money invested and that the projects needs safety professional.

4.4 Safety climate

For the safety climate, there is 9 key aspects that were assessed, namely; Management commitment to safety, Safety work rules , Safety Project Planning, Communication, Safety training, Safety Signals, Signs and Barricades, Safety equipment (personal protective equipment), Safety value and reward system, Safety program documentation procedures

The respondents were asked to give their opinions on safety climate that affect safety practices within the company. The responses were measured by a five point Likert scale;

1.Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree. The following statements were presented to the respondents to establish the extent to which they agreed with the statements on the effects of safety climate.

4.4.1) Management commitment to safety

Table 4.2: Management commitment to safety

Corporate safety goals for the company				
strongly disagree	disagree	Neutral	agree	strongly agree
4.8%	9.5%	33.3%	40.5%	11.9%
Managers monitor the safety performance				
strongly disagree	disagree	Neutral	agree	strongly agree
11.9%	23.8%	31.0%	31.0%	2.4%

On Management commitment to safety, for the respondents 2 statements was given, with 42 respondents, the mean of 3.45 & 2.88 with an avg. mean of 3.16, putting it in 7th place. From the table above indicates that just over half (52.4%) agreed or strongly agreed that the company had safety goals but only 33.4% agreed or strongly agreed that there safety performance is monitored. The finding of the study did not match with the finding of (Mosly, 2019); (Hinze, 2003) on management commitment to safety; in which effective exhibited leader commitment will increase the likelihood of a good safety record, is one of the key aspects of safety climate.

4.4.2 Safety rules and Safety project planning

Table 4.3: Safety rules and safety project planning

Safety work rules				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	7.1%	26.2%	52.4%	14.3%
Safety project planning: site specific plan implementation				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	19.0%	28.6%	52.4%	0.0%
Safety project planning: layout of site for safety aspects				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	2.4%	31.0%	47.6%	19.0%

On safety work rules with, is in 3rd rank according to the respondents that the company adds to the safety climate, with a mean of 3.74; with the respondents strongly agree or agree at 66.7% with the statement that the company has safety work rules for the construction projects, and 26.2% neutral with 7.1% disagree. This shows that two-third of respondents agreed that the company has some form of work rules on safety and that the neutral response from respondents shows that it is put in place at an ad-hoc basis or haphazardly at the site. According to (Wu et al., 2015) states that: safety work rules are needed to induce a safer work environment for the workers, by providing rules for example, for material handling and storage of hazards material.

Safety project planning in the company was presented to the respondents with 2 statements; namely if there is a site specific safety planning for the site in that the safety plan is implemented or actually put to action on the site and whether the layout of the site is considered for safety aspects. With a mean for the statements respectively of 3.33 and 3.83, and avg. mean of 3.58, putting it in 5th place. The respondents agreed or strongly agreed 52.4% and 66.7% with the 1st and 2nd statement respectively. This shows that according to the respondents, the company has a safety project planning, although more agreed that there is layout of the site for safety than for a specific plan for safety on the site. From studies like (Razuri et. al., 2007), it is said that having a safety planning is vital to project safety. Safety alongside with cost, schedule should be planned. That the layout planning of the site not only for cost but also for safety, can reduce injuries on the site.

4.4.3 Communication and safety training

Table 4.4: Communication and safety training

Communications				
strongly disagree	disagree	Neutral	agree	strongly agree
2.4%	7.1%	33.3%	38.1%	19.0%
Safety training: orientation training				
strongly disagree	disagree	Neutral	agree	strongly agree
2.4%	16.7%	40.5%	35.7%	4.8%
Safety training: equipment training on safety				
strongly disagree	disagree	Neutral	agree	strongly agree
2.4%	33.3%	35.7%	21.4%	7.1%

On Communication; that the company provides awareness with written information about safety rules and procedures, with a mean of 3.64 is strongly agreed or agreed with 57% of respondents, putting it in 4th place; although about 33.3% are neutral and about 10% disagree with the statement. According to (Mosly, 2019), communication is one of the aspect of safety climate and that it shows that open communications between the upper management and the workers at the site is beneficial to having a safer working environment.

On the safety training aspect, on safety orientation training and equipment operation training machinery on safety, with means of 3.24 and 2.97 respectively and avg. mean of 3.1, placing it 8th. For the 2 statements, respondents agreed with 40.5% and 28.5% respectively. This shows that less than half of the respondents agree that safety orientation for personal and equipment safety training is adequate within the company. For the neutral response of safety orientation training for personal, shows that it is carried out but not enough is done or inadequate safety training. Like management commitment, safety training (Hinze, 2003), is also a key aspect, in which safety training increases or enhances the capability and skill of workers and with the increase in safety skill can lead to do tasks in safe manner.

4.4.4 Safety Signals, Signs and Barricades & Safety equipment

Table 4.5: Safety Signals, Signs and Barricades & safety equipment

Safety Signals, Signs and Barricades				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	0.0%	19.0%	42.9%	38.1%
Safety equipment: (PPE) policy				
strongly disagree	disagree	Neutral	agree	strongly agree
2.4%	7.1%	23.8%	54.8%	11.9%
Safety equipment: Adequate PPE on site				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	2.4%	26.2%	42.9%	28.6%

The study found that among the respondents; that Safety Signals, Signs and Barricades are implemented in the projects with a mean of 4.2, with 81% of the respondents either strongly agree or agree with the statement that the company puts up safety signs, signals and

barricades around risky sections of the site, ranking it first. According to the study, the company puts up adequate amount of signal, signs, and barricades in the project sites. According to studies like (Ahmed et al., 2007), safety signs, barricades on the construction projects are there to restrict movement to hazards and dangerous parts of the sites for personal who are not supposed to be there by giving information on the safety dangers on that parts of the site, it can prevent injuries and accidents on the site.

In second rank is safety equipment on the site with an avg. mean of 3.82; there are 2 statements that were given to the respondents, namely about the policy towards PPE (personal protective equipment) and adequate of PPE on the site. For the 1st statement, with 66.7% of the respondents strongly agree or agree with the statement that the company has a PPE policy on the site, with 23.8% neutral and 9.5% strongly disagree or disagree. For the 2nd statement that the company provides adequate personal protective equipment (PPE) on the project site more (71.5%) of respondents strongly agree or agree, with 26.2% neutral. This means that the majority of respondents agree that the company has a PPE policy and that it gives adequate amount of PPE on its project sites. From studies like (Mosly, 2019) states that: PPE is an important part of the safety in construction sites. The company should have adequate PPE to protect the personal from injuries even if an accident occurs by providing protective like clothing and equipment for workers, insulation boots, googles, etc.

4.4.5 Safety value and reward system & safety documentation procedures

Table 4.6: Safety value and reward system & safety documentation procedures

Safety value and reward system (safety incentive system)				
strongly disagree	disagree	Neutral	agree	strongly agree
35.7%	33.3%	14.3%	16.7%	0.0%
Safety program documentation procedures				
strongly disagree	disagree	Neutral	agree	strongly agree
4.8%	21.4%	19.0%	33.3%	21.4%

According to the study, Safety value and reward system is last in the rank with mean of 2.1; with only 16.7% agreeing with the statement that safety incentives are given to workers. From studies like (Mosly, 2019), incentive system for a good safety record and can reflect the concern the company has for the safety of its workers.

For Safety program documentation procedures, with a mean of 3.45 placing it in 6th place. With about half (54%) of respondents either strongly agreed or agreed that the company has a written safety program manual. So according to the respondents, some of the project sites don't have an explicit safety manual on the site. To develop safety studies like (Mosly, 2019) assess that, procedures that document the safety hazards, and keeps them for future use, as a basis for future safety project planning.

4.5 Enforcement Techniques on Safety Regulations

For enforcement techniques, there are 6 key aspects, namely Safety officer, Safety audit, Inspection of PPE, Accident reporting, First-Aid Provision, Inspection by the health and safety agencies. The respondents were asked to give their opinions on these aspects. The responses were measured by a five point Likert scale: 1.Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree.

4.5.1 The enforcement techniques on safety practices

Table 4.7: The enforcement techniques based on the respondents

Safety officer				
strongly disagree	disagree	Neutral	agree	strongly agree
9.5%	21.4%	4.8%	35.7%	28.6%
Safety review				
strongly disagree	disagree	Neutral	agree	strongly agree
11.9%	16.7%	26.2%	35.7%	9.5%
Inspection of PPE				
strongly disagree	disagree	Neutral	agree	strongly agree
14.3%	23.8%	40.5%	21.4%	0.0%
Accident reporting				
strongly disagree	disagree	Neutral	agree	strongly agree
2.4%	0.0%	35.7%	42.9%	19.0%
First-Aid Provision				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	0.0%	16.7%	42.9%	40.5%

Safety enforcement agencies				
strongly disagree	disagree	Neutral	agree	strongly agree
28.6%	38.1%	33.3%	0.0%	0.0%

The table 4.7 reveals that for enforcement techniques, the respondents strongly agree or agree with 83.4% that adequate first aid is provided on the project site; and with a mean of 3.76, putting it in 1st place. First aid in the project site according to various studies; is an important aspect of the safety team task in that it can help in prevention of major injury if administrated properly.

As for accident reporting, with a mean of 3.76 putting it in 2nd place; respondents either strongly agree or agree 62% that there is some form of accident reporting when there is an incident on the site. From (Hinze, 2003), Accident reporting is important to the safety on the construction site in that it can help for the future planning of risks and to mitigate them.

From the table above, on safety officer and safety review, with a mean of 3.52 and 3.14 putting them in 3rd and 4th place respectively according to respondents. With either strongly agree or agree at 64.3% and 45.2% respectively. From this, the majority of respondents agree, that the company does provide some form of a safety officer, but that only less than half say there is a safety review on the site. From (Muiruri et al., 2014), having a safety officer is a useful way of enforcing the safety at the construction project by monitoring the workers and that safety audit on construction sites are also a key aspect in enforcement of safety by making an evaluation of the safety issues of the site and make comments and recommendations on what needs to improve.

According to the table 4.7, inspection of PPE and safety enforcement agencies visit sites for inspection on safety, with means of 2.69 and 2.04 respectively, respondents strongly disagreed or disagree 39% and 66.7% for the statements, placing them both in last place. The neutral response for inspection of PPE shows that although inspection is carried out, it is not enough and that inspection is haphazardly done. From studies like (Muiruri et al., 2014), the inspection of PPE is important because it can find that the equipment may need maintenance or even to replace it with new equipment. Safety enforcement agencies go to sites to see if violations are occurring based on the labor proclamation.

4.6 Safety behaviour

For safety behaviour, there are 8 key aspects, namely Worker's colleagues' influence, Work pressure and intensity, Safety competence and experience, Wearing PPE (protective personal equipment) and personal accountability, Project duration, Safety supervision and guidance, Working site environment and weather conditions and Unsafe behaviour. The respondents were asked to give their opinions on these aspects. The responses were measured by a five point Likert scale: 1.Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree.

4.6.1 Safety behaviour on safety practices

Table 4.8: Safety behaviour based on the respondents

Worker's colleagues' influence				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	4.8%	35.7%	52.4%	7.1%
Work pressure and intensity				
strongly disagree	disagree	Neutral	agree	strongly agree
2.4%	0.0%	42.9%	45.2%	9.5%
Safety competence and experience of a worker				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	0.0%	21.4%	61.9%	16.7%
Wearing PPE (protective personal equipment)				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	0.0%	9.5%	33.3%	57.1%
Tight project schedule				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	2.4%	23.8%	47.6%	26.2%
Extreme weather conditions				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	7.1%	26.2%	52.4%	14.3%
Evaluation from a supervisor on safety				
strongly disagree	disagree	Neutral	agree	strongly agree
0.0%	0.0%	28.6%	47.6%	23.8%

From the table above on safety behaviour, from the statements on the table above, the 1st rank is for wearing PPE (personal protective equipment) with mean of 4.47, which the respondents either strongly agree or agree 90.7% that wearing PPE at the site is effective for safety. The study shows that PPE at the site can be very effective on the site. Which matches with various studies like (Choudhry, 2008); that wearing the PPE at the construction projects, can lead to a reduction in the number of injuries at the site and that the PPE may be there but the workers have to wear them.

The study also shows that tight project schedule, the safety competence and experience of a worker and safety evaluation of the workers by supervisors have similar means of 3.9762, 3.9524, and 3.95. The majority of the respondents agreed with the statements that having a project duration that is severely limited can lead to unsafe behaviour, and that experience in safety with evaluation from a supervisor on safety can lead to better safety at the site. The study matches with studies done like (Choudhry, 2014) ;(Seo et. al., 2004); that experience and skills can be needed to evaluate the hazard conditions on sites can make a proper safety decision and that supervisors make sure all workers follow the safety rules. Tight schedule is also shown that it can lead to unsafe conditions and behaviour on the site.

Extreme weather conditions with a mean of 3.78 is in 5th place; with respondents either strongly agree or agree with the statement that certain weather conditions has an influence on the safety of the workers at 66.7% and 26.2% neutral. From (Choudhry, 2008), for example, in certain hot weather, the personal may have a headache, fatigue, excessive thirst, profuse sweating, which can affect his ability to continue the task at hand in a safe manner.

Continuing on, the study shows worker's colleagues' influence and work pressure and intensity with mean of 3.61 and 3.59 respectively. Although, these statements rank least, still more than half (60% and 55%) of respondents still either strongly agree or agreed with the statements. For neutral response of work pressure, it shows that it can affect the safety behaviour of the workers to a certain extent. From studies like (Mosly, 2019) state that; there is an effect of workers on their colleagues. Positive or negative safety actions can be conveyed to workers from their colleagues and also that a lot of work pressure and intensity on the construction project can lead to unsafe decisions to be made by the employees of the organization.

4.6.2 Unsafe behaviour

Unsafe behaviour on the construction site is said (Saeed, 2017); to lead to 90% of accidents on sites, which cause injuries. The common causes are: struck by an object, falling from a height, slipping and tripping, Excavations (Slides, collapse, inadequate shored protection), contact with Electricity, Construction Elevators and Cranes. The respondents were asked to rate them as: High, Medium, Low, and Exceptional.

Table 4.9: Frequency of causes of injures

Falling			
low	medium	high	Exceptional
9.5%	38.1%	47.6%	4.8%
Struck by an object			
low	medium	high	Exceptional
4.8%	54.8%	40.5%	0.0%
Excavation			
low	medium	high	Exceptional
57.1%	31.0%	9.5%	2.4%
Contact with electricity			
low	medium	high	Exceptional
28.6%	50.0%	21.4%	0.0%
Elevators and cranes			
low	medium	high	Exceptional
38.1%	57.1%	4.8%	0.0%
Slipping and tripping			
low	medium	high	Exceptional
0.0%	59.5%	40.5%	0.0%

From the table above, the study shows that falling is the most common cause of injury with a mean of 2.417. The respondents rated it with 47.6% of them stating that there is a high frequency to occur on the site and 4.8% as exceptional. So, according to the respondents, falling is the most frequent cause of injury as compared to the other types. This matches with the study (Saeed, 2017), that the most likely accident to cause injuries to workers in the construction industry is falling from height. In 2nd rank is slipping and tripping with a mean of 2.4. The respondents rated it with 59% of them stating that it can occur with moderate

occurrence. From the respondents, it shows that slipping and tripping on the site can occur with moderate frequency. Being stuck by an object, with a mean of 2.35 is in 3rd place. The respondents rated it with 55% of them stating with medium frequency of occurring on the site.

Contact with Electricity and Construction Elevators and Cranes (dismantling), with a mean of 1.928 and 1.6667 respectively are in 4th and 5th place. The respondents; with 28.6% rating it low and 50.0% of them rating it medium frequency for contact with electricity to occur and 40% rating it low frequency for construction elevators and cranes during dismantling for injury to occur. From the study findings, injury during excavation is rated with 58% of respondents answering low frequency of occurrence as compared to the other causes of injures, placing it last. The study matches with (Saeed, 2017); that falling and slipping & tripping are common occurs on the construction sites.

The findings of the study show that the safety behaviour on the project sites has the most significant influence on the safety practices of the company with total mean of 3.9.

The total mean value and the rank of the 3 attributes, namely: safety climate, enforcement techniques on safety regulations and safety behaviour is shown in table below:

Table 4.10: Ranking of the influences on safety practices:-

Safety practices	Mean	Rank
Safety climate	3.4231	2
Enforcement techniques	3.2341	3
Safety behaviour	3.9014	1

From the table 4.10, the findings of this study reflect that all 3 of the attributes, that is; safety climate, enforcement techniques, and safety behavior are important in assessing the safety practices of the company. From the 3, the safety behavior has the most significant influence on the safety practices. The safety climate and enforcement techniques hold the second and third place respectively in level of influence on the safety practices.

CHAPTER FIVE: - SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the summary of the data findings on assessment of Project Safety Management practices in construction projects: The case of Elmi Olindo construction PLC. It also gives conclusions and recommendations drawn from the findings. The chapter is therefore structured into summary of findings, conclusions, recommendations and area for further research.

5.2 Summary of Findings

The construction industry has been seen as one of the hazardous industries. As literature reviews revealed that the industry has poor safety performance record. This paper was conducted on safety management practices in Elmi Olindo building projects in Addis Ababa.

The overall body of the paper is summarized as follows: The majority of respondents have experiences greater than 5 years and are first degree holders. Out of the total respondents only (9.5%) respondents were from the safety department. This shows that safety officers in the project site have relatively small number compared with the other respondents. With 62% of projects above 250 million, means that the company has a lot invested in these projects.

The findings of the study from safety climate revealed from the respondents that Safety Signals, Signs and Barricades and Safety equipment are the aspects the company makes available for them on the project sites. The other aspects that more than half of respondents agree the company has available are: safety work rules, communication, safety project planning & Safety program documentation procedures.

Although, management commitment to safety performance being monitored and safety training are key aspects; the majority of respondents disagreed or were neutral that the company emphasis it. While for safety value and reward system, the majority of respondents disagreed that the company provides incentives for safety on sites.

From enforcement techniques, the findings of the study revealed from the respondents that the company has adequate first aid in sites with more than 80% agreeing. The other aspects that more than half of respondents agree the company has are; accident reporting and safety officer.

For inspection of PPE (personal protective equipment), almost half the respondents were neutral that the company conducts it or haphazardly done. It also revealed that local safety agencies, according to a majority of respondents, don't visit sites.

For safety behavior, the findings of the study revealed from the respondents, that a majority of them agree that wearing PPE is the most effective on the site for safety. The other aspects that at least 70% of respondents agreed are effective for safety on the sites are: the safety competence and experience of a worker and safety evaluation of the workers by supervisors. The aspects that two-thirds of respondents agreed to that leads to unsafe behaviour in the sites are: tight project schedule and extreme weather conditions.

For the two aspects, namely; that a co-worker has an influence in doing a task in a safe manner and that the work pressure and intensity in the construction site can lead to unsafe work behaviour, the respondents rated them least effective on safety behaviour; although at least half of them still agreed that they have an influence on the project sites.

On unsafe behaviour, the study revealed that almost half of respondents say that there can be a high frequency of falling to occur, which would put it as the most common cause of injury on the site. The other causes with medium frequency to occur are: slipping & tripping, stuck by an object, contact with Electricity, Construction Elevators and Cranes (dismantling). While, for low frequency of occurrence on the site is: during excavation.

5.3 Conclusions

It is essential for employers and employees to be aware of the safety issues that concern them and demand for qualifications in this area especially in developing countries and so, the general aim of the study was to assess project safety management practices in construction in the case of Elmi Olindo. This study concluded that:

- Safety climate has a large influence on the safety practices of the company; due to adequate availability of Signals, Signs and Barricades and Safety equipment in the company, and there is more or less availability of: safety work rules, communication, safety project planning and Safety program documentation procedures. Although, not much emphasis by the management to monitor safety performance and safety training on the site. And there is almost no form of incentive scheme for safety.

- On enforcement techniques have a moderate influence on the safety practices; with adequate first-aid readily available on the site. Although the company has safety officers and accident reporting when an incident occurs, it is not readily available on every site. Inspection of PPE for repair is rarely conducted and local safety agencies rarely visit sites for safety inspection.
- Safety behaviour has a significant influence on the safety practices; with wearing PPE, the safety competence & experience of a worker plus safety evaluation of the workers by supervisors being effective for carrying out the tasks in a safe manner. While, having tight project schedule and being in extreme weather conditions leads to risky behaviour in the sites.
- The most common causes of injury on the site are: falling and slipping & tripping. While, it is considered low risk of injury to occur during excavations (Slides, collapse)

5.4 Recommendations

Based on the study, the following are several recommendations that can help improve safety practice in building construction projects:

- The construction industry should put more effort to conduct more safety training for their personal on the specific tasks that are assigned to them. This will enable them to do those tasks in a safe manner.
- The company should be more proactive in monitoring safety performance on the site, as this can show the workers that the company is committed to their welfare and not only the cost of the project, by doing safety review on the site
- The company should conduct more safety equipment training on machinery, which can reduce the number of accidents that can happen on the site.
- Due to there being no incentive system in place at the company for doing a task in a safe manner, the company should put more priority on it as it can motivate the workers to conduct their tasks safely which can result in fewer accident rates.
- Regular inspection of PPE (personal protective equipment) ought to take place, as this insures that defective equipment can be spotted and repaired.
- Reducing work pressure and tight schedule on workers by distributing work load can reduce risky behaviour on the site

5.5 Suggestion for further study

The study suggests further study or research should be carried out:

- This study was based on the building construction projects, so research on safety practices can be done on other construction projects like: roads, hydroelectric dams, and bridges.
- Research can be conducted to evaluate the current safety practices on construction projects considering all stakeholders in the construction industry like: contractor, client, consultant, in the case of Addis Ababa or if need be all over the country, since this study is based on one contractor.
- Since this research was based on only assessing the safety practices, further research can be conducted on the cause and effect of safety climate and safety regulations on the workers at the project sites.

6. REFERENCES

- Abas, N. H, Yusuf, N. A., Suhaini, N. K., Mohammad, H., & Hasmori M. F. (2020). Factors affecting safety performance of construction projects: literature review, IOP conf. Ser.: Mater. Sci. Eng., 713
- Ahmed, S. M., Farooqui, R. U., & Azhar, S. (2007). Safety Management Practices in the Florida Construction Industry, ASC proceedings of the 43rd annual conference, northern Arizona University
- Alagidede, P., Mensah, J.O. (2016). Construction, institutions and economic growth in sub Saharan Africa
- Alli, B. O. (2001). Fundamental principles of occupational health and safety, ILO, 13(2)
- Andersen, L. P., Nordam, L., Joensson, T., Kines, P., & Nielsen, K. J. (2017). Social identity, safety climate and self-reported accidents among construction workers, Construction Management and Economics, 36(1), 22-31.
- Awolusi, I. G. And Marks, E. D. (2016). Safety Activity Analysis Framework to Evaluate Safety Performance in Construction, journal of construction engineering and management, 143(3)
- Chan, Hon, C., A., and Yam M. (2013). Determining Safety Climate Factors in the Repair, Maintenance, Minor Alteration, and Addition Sector of Hong Kong, Journal of Construction Engineering and Management, 139(5), 519-528
- Chan, A.P., Javed, A.A., Wong, F.K., and Hon, C.K. (2014). Improving Safety Communication of Ethnic Minorities in the Construction Industry of Hong Kong, In ICCREM: Smart Construction and Management in the Context of New Technology, American Society of Civil Engineers: Listeria, VA, USA, 463–474.
- Choudhry, R. M., Fang, D., and Ahmed, S. M. (2008). Safety Management in Construction: Best Practices in Hong Kong, journal of professional issues in engineering education and practice, 134(1), 20-32
- Choudhry, R. M., and Dongping, F. (2008). Why operatives engage in unsafe work behavior: Investigating factors on construction sites, Safety Science, 46, 566–584

- Choudhry, R. M. (2014). Behavior-based safety on construction sites: A case study, *Accident analysis & prevention*, 70, 14-23
- Cigularov, K. P., Lancaster, P. G., Chen, P. Y., Gittleman, J., & Halie, E., (2013). Measurement equivalence of a safety climate measure among Hispanic and White Non-Hispanic construction workers, *Safety Science*, 54, 58-68.
- Dingsdag, D. P., Biggs, H. C. And Sheahan, V. L. (2008). Understanding and defining OH&S competency for construction site positions: worker perceptions, *Safety Science*, 46(4), 619-633
- Dongping, F., yang, C., & Louisa, W. (2006). Safety climate in construction industry: a case study in hong kong, *journal of construction engineering and management*, 132(6), 573-584
- Enshassi, A., and Mayer, P. E. (2004). Analysis of construction site injuries in Palestine, *construction safety management systems*, 73
- Fekete, L., Quezon, T., & Macarubbo, Y. C. (2016). Evaluation of Health and Safety Practice in Building Construction: A Case Study in Addis Ababa, *International Journal of Scientific & Engineering Research*, 122-131.
- Gerhardt, P. L. (2004). Research methodology explained for everyday people. *Methodology*, 1–36. Available from: <http://www.scribd.com/doc/38090941/researchmethodology-Explained-for-Everyday-People>
- Giang, D.T & Pheng, S.L. (2010). Role of construction in economic development; Review of key concepts in the past 40 years, *Habitat International*
- Glendon, A. I., and Litherland, D. K. (2001). Safety climate factors, group differences and safety behaviour in road construction, *Saf. Sci.*, 39(3), 157–188
- HASSAN, C.R., BASHA, W.H., and WAN, H. (2007). PERCEPTION OF BUILDING CONSTRUCTION WORKERS TOWARDS SAFETY, HEALTH AND ENVIRONMENT, *Journal of Engineering Science and Technology*, 2(3), 271 - 279
- Heale, R. And Twycross, A. (2015). Validity and reliability in quantitative studies, article in *Evidence-Based nursing*

Health and Safety Executive. (2002). Strategies to promote safe behavior as part of a health and safety management system, Contract Research Report, 430/2002.HSE, Merseyside, UK.

Hinze, J. (2003). Improving Safety Performance on Large Construction Sites, CIB working commission W 99

ILO (2001) Guidelines on occupational safety and health management systems, ILOOSH 2001. Geneva: ILO.

Jitwasinkul, B., & Hadikusumo, B., HW. (2010). Identification of important organisational factors influencing safety work behaviours in construction projects, Journal of civil engineering and management, 17(4), 520-528

Kapp, E. A. (2011). The influence of supervisor leadership practices and perceived group safety climate on employee safety performance, safety science, 50(4), 1119-1124

Meldrum, A., Hare, B., & Cameron, I. (2009). Road testing a health and safety worker engagement toolkit in the construction industry, Construction and Architectural management, 16(6), 612-632

Mofed. (2014). Estimates of GDP and other Macroeconomic indicators – Ethiopia. [Online]. [Http://www.mofed.gov.et/GDP](http://www.mofed.gov.et/GDP). Ministry of Finance and Economic Development, Addis Ababa

Mosly, I. (2019). Factors Influencing Safety Climate in the Construction Industry: A Review, international journal of construction engineering and management, 8(3), 105-109

Mugenda, O.M. and Mugenda, A.G. (2003). Research Methods, Quantitative and Qualitative Approaches. ACT, Nairobi.

MUIRURI, G., and MULINGE, C. (2014). Health and Safety Management on Construction Projects Sites in Kenya: A Case Study of Construction Projects in Nairobi County, Kenya. FIG Congress, Engaging the Challenges – Enhancing the Relevance Kuala Lumpur, Malaysia

Mullen, J. (2004). Investigating factors that influence individual safety behavior at work, Journal of Safety Research, 35(3), 275–285.

- Neal, A., Grin, M.A., and Hart, P.M. (2000). The impact of organizational climate on safety climate and individual behavior, *Safety Science*, 34, 99-109
- Neal, A.; and Griffin, M.A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels, *J. Appl. Psychol.*, 91, 946–953
- NONGIBA, K., DAINITY, A. & GIBB, A. (2008). Health and safety management in developing countries: a study of construction smes in Ghana. *Construction management & economics*, Vol. 26, 1159-1169
- Razuri, C., Alarcónand, L. F., & Diethelm, S. (2007). EVALUATING THE EFFECTIVENESS OF SAFETY MANAGEMENT PRACTICES AND STRATEGIES IN CONSTRUCTION PROJECTS, *iglc-15*
- SAEED, Y. S. (2017). Safety Management in Construction Projects, *Journal of University of Duhok*, 20(1) (Pure and Eng. Sciences), 546-560
- Sainan, L., Carol, KH., Albert, PC. C., Francis KW. W., and Arshad, A. J. (2018). Relationships among Safety Climate, Safety Behavior, and Safety Outcomes for Ethnic Minority Construction Workers, *international journal of enviromntal research and public health* 15(3), 484
- Schwatka, N. V., Hecker, S. And Goldenhar, L. M. (2016). Defining and Measuring Safety Climate: A Review of the Construction Industry Literature, *Annals of occupational hygiene*, 60(5), 537-550
- Seo, D.C., Torabi, M.R., Blair, E.H. and Ellis, N.T. (2004). A cross-validation of safety climate scale using confirmatory factor analytic approach, *Journal of safety research*, 35(4), 427-45
- Sunindijo, R. Y. And Zou, P. XW. (2013). Conceptualizing Safety Management in Construction Projects, Article in *Journal of Construction Engineering and Management*, 139 (9), 1144-1153
- Svensson, A., & Hyden, C. (2006). Estimating the severity of safety related behavior, *Accidental Analysis Prevention*, 38, 379–385.

Wilson, D. J., Takahashi, K., Smith, D. R., Yoshino, M., Tanaka, C. & Takala, J. (2006). Recent Trends in ILO Conventions Related to Occupational Safety and Health, *International Journal of Occupational Safety and Ergonomics*, 12:3, 255-266

Wu, C., Song, X., Wang, T., and Fang, D. (2015). Core dimensions of the construction safety climate for a standardized safety-climate measurement. *J. Constr. Eng. Manag.*, 141

Wu, C., Wang, F., Zou, P., Fang, D. (2016). How safety leadership works among owners, contractors and subcontractors in construction projects. *International Journal of project management*

APPENDIX
ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE
MASTER PROGRAMS IN PROJECT MANAGEMENT

Dear Sir/Madam

I am a graduate student in the postgraduate program of Project Management at Addis Ababa University, School of Commerce. I am currently undertaking a research project on the topic “Assessment of Project Safety Management Practices in Construction Projects: The case of Elmi Olindo Construction PLC.” to fulfil the partial requirement for the Master’s Degree program. I would be grateful if you kindly take few minutes of your time from your busy schedule to fill out this questionnaire by reflecting on your personal experience with regard to the issues raised. Your willingness and cooperation in giving genuine information is well appreciated and the information you provide will be used for academic purpose only and will be kept in strict confidentiality. If you would like to gain further information about this study or have a problem in completing this questionnaire, please contact me via email a2jsamuel@gmail.com or on my cell phone 0913-78-53-72.

I would like to thank you in advance for your cooperation and taking the time to consider my request.

Yours Sincerely,

Samuel Kenneth

Questionnaire

Part one: General information

Mark “√” on the space provided

1) Which of the following best describes your job:

Project Manager ☐ Project Engineer ☐ Safety engineer ☐ Others ☐

2) Educational status of respondents

MSc/MA ☐ Degree ☐ Diploma ☐ Others ☐

3) How many years of working experience do you have?

Less than 5 years ☐ 5-10 years ☐ 10-15 years ☐ over 15 years ☐

4) What is the cost of the Project/construction Cost (ETB) you are working at:

Less than 250 Million ☐ 250Million-500million ☐ 500 million – 1billion ☐ Greater
than 1 Billion ☐

Rating questions: Please put “√” on the space you feel is appropriate for the following.

Scale rating: 5 =strongly agree, 4 = agree, 3 = neutral, 2= disagree, 1 = strongly disagree

Part 2: Safety Climate

Item no.	Description	Rate				
		5	4	3	2	1
	1) Management commitment to safety					
1	Management sets corporate safety goals for the company					
2	Managers monitor the safety performance of their projects through reports					
	2) Safety work rules					
	The company has safety work rules for the construction projects (ex., handling and storage)					
	3) Safety Project Planning					
1	There is a site-specific safety planning for the construction project					
2	The layout of the site is considered for safety aspects (During constructing site offices, access roads)					
	4) Communication					
	The company provides awareness with written information about safety rules and procedures					
	5) Safety training					
1	The company conducts safety orientation training for employees					

2	Equipment operation/certification training is required for operating machinery for safety					
	6) Safety Signals, Signs and Barricades					
	The company puts up safety signals, signs, and barricades around risky/unsafe sections of the construction site					
	7) Safety equipment (personal protective equipment)					
1	The company has a personal protective equipment (PPE) policy for the construction site					
2	There is adequate personal protective equipment on the site (Safety boots, vests, etc.)					
	8) Safety value and reward system					
	Safety incentives are given to workers on the site for doing tasks in safe manner					
	9) Safety program documentation procedures					
	The company has a written safety program manual					

Part three: - Enforcement Techniques on Safety Regulations

Item	Enforcement techniques	Rate				
		5	4	3	2	1
1	There is a safety officer on the site					

2	The company does a safety audit/review on the site					
3	The company conducts inspection of PPE for maintenance and repair					
4	There is accident reporting when there is an incident/accident on the site					
5	The company provides adequate First-Aid in the construction site					
6	Local authorities and Health & Safety enforcement agencies visit sites for inspection on safety					

Part four: - Safety Behaviour

Item No.	Safety behaviour	Rate				
		5	4	3	2	1
1	That a co-worker has an influence in doing a task in a safe manner					
2	The work pressure and intensity in the construction site can lead to unsafe work behaviour					
3	The safety competence and experience of a worker has an influence on his task					
4	Wearing PPE (protective personal equipment) and personal safety accountability is effective on the work site for safety					
5	Tight project schedule can lead to risky work behaviour by the workers					

6	Extreme weather conditions has an influence on safety, like in hot conditions					
7	Safety evaluation of the workers by supervisors is effective for safety on the site					

Unsafe behaviour on the construction site is said to lead to 90% of accidents on sites, which cause injuries. Please rate the frequency of the causes of injuries on the construction site of the description below:

Item No.	Description	Frequency of Causes of injuries			
		Exceptional	High	Medium	Low
1	Falling from a height (Falling from stairways, ladders and scaffolding)				
2	Being struck by an object				
3	Excavations (Slides, collapse, inadequate shored protection)				
4	Contact with Electricity				
5	Construction Elevators and Cranes (dismantling)				
6	Slip, trip, from some level				

Thank You!!