St. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MASTER OF PROJECR MANAGEMENT PROGRAM

Assessment of Construction Safety and Health Management Practice in Building Construction Projects in Addis Ababa: In case of Bamacon Engineering P.L.C

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Acronyms

CIDB	Construction Industry Development Board
CREATE	Construction Research Education Training Enterprises
FDRE	Federal Democratic Republic of Ethiopia
HS	Health and safety
HSE	Health and Safety Executives
ILO	International Labor
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Administration
PM	Project Manager
PMBOK	Project Management Body of Knowledge
PPE	Personal Protective Equipment
WHO	World Health Organization

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Abstract

The nature of the construction work is risky and needs attention in integrating health and safety management in to the entire process. The safety and health of workers should not be taken as a luxury but rather a necessity. Health and safety at construction sites deals with both physical and psychological well being of workers on construction sites and other persons whose health is likely to be adversely affected by construction activities. The major objective of this research is to present findings of health and safety management practices in building construction recently constructed in Addis Ababa, Ethiopia under Bamacon Engineering PLC. 50 of employees were selected for the study for which a questionnaire was distributed and additionally documented sources were looked for more accurate date including site observation. Consequently, the study result revealed that relatively through time the company is developing. Better health and safety (HS) practice but there are also limitations such as lack of management motivation and very low level of implementation of occupational safety and health standards, rule and policies in the construction companies and Little training and orientation on safety and health standards. Based on the responses obtained from engineers, poor working conditions and environment, and lack of personal protective equipment are the main causes of accidents in the construction company.

KEY-WORDS: *health and safety management, employee/worker, accident, injury, occupational safety and health*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Construction industry is one of the vital economic sectors and mainly considered as the backbone of development of all nations. Construction site is a very important place, where a considerable number of workers with various professional back ground (Vithartant, 2015) are involved in construction activities. Occupational accidents with the resulting injuries and ill health problems in workplaces insisted organizations to put much effort and develop effective strategy on occupational health and safety and sustain best practices (Ramazan, 2016). As people spend more than one-third of each day at work (Roberto, 2006), it has been an important field of interest for industries especially in developing countries to improve occupational health and safety (OHS) and productivity of employee (Ramazan, 2016). The construction sector is characterized by countless incidences of injury, absenteeism, death and huge compensation and replacement cost resulted from accidents the hazardous conditions in construction sites (Mulinge, 2014). Occupational injuries pose a major public health and development problem which could be prevented implementing appropriate occupational health and safety practices. Out of the total 3 billion workers in the world over 85% of them work and live in condition which no access to proper and effective occupational health and safety services and facilities (Rantanen, 2012).

According to (Seifedin 2014) the safety of a construction is one of an essential components in the processes of construction when it can be preferred as a mitigation measurement before an incidence occurring. However, in all over Ethiopia, millions of daily laborers work in big constructions through unsafe working environment and without supportive and protective equipment. They do not have protective caps, hand gloves, eye glasses, working clothes, shoes and others. They work on high rise buildings standing on old and inclined wooden scaffolds and ladders; they even transport heavy construction materials on them. Moreover, the

constructions do not have safety nets, restraint and fall arrest systems. As a result, a dozen of daily laborers get different serious injuries. Many, in fact, lose their lives.

However, construction project pose enormous challenges to not only finish within an owners' schedule and budget, but to also eliminate and minimize harmful impacts to the environment. Construction has significant impacts on the natural environment (Hendrickson and Horvath 2000). Even a minor impact, such as a small release or spill of hazardous substance can cause a health or environmental threat and lead to costly cleanup activities.

In Ethiopia, during the last few years several accidents have occurred on various sites of construction projects all over the country where some of them were cause for fatal injuries. Due to this, construction sector become one of three most hazardous and dangerous industries with frequent and high rate occurrence of accidents which entails both fatal and non-fatal injuries and ill-health problems to workers, practitioners as well as great loss of economy to the company and country at large (Hannan, 2017). Although many prevention efforts and intervention programs have been undertaken throughout the world, it is recognized that construction workers continue suffering from low to extremely high risk fatal and non-fatal injuries. Only 19% of global work related deaths are thought to account due to accidents and the remainder being due to ill-health problems and diseases (Karen, 2009). An estimate of studies conducted by ILO indicated that more than 100,000 construction workers die every year at world level i.e. death of around one worker every five minutes (ILO, 2010). In most countries the construction industry continues to account for a disturbingly high proportion of both fatal and non-fatal accidents and injuries of workers (Thewodros, 2016).

Safety can be defined as the state of being "safe", the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequences of failure, damage, error, accidents, harm or any other event which could be considered non-desirable. Safety can be defined to be the control of recognized hazards to achieve an acceptable level of risk. This can take the form of being protected from the event or from exposure to something that causes health or economic losses. It can include protection of people or of possessions. Similarly construction site safety can be defined as the efficient and effective implementation of the policies and tasks necessary to satisfy the safety of a construction firm's employees and management. Construction safety

focuses on the careful management of the processes involved in the production and distribution of products and services within construction sites (Bernold et al. 1993). The subject of health 0and safety is very wide and can be approached from different perspectives such as management, medicine, psychology, sociology and economics to investigate the determinants and implications of health and safety for individual workers, economies and societies (pouliakas and Theodossiou, 2010).

Safety management is essential knowledge in a project management area which recognized in *the guide to the project management body of knowledge* (PMBOK Guide, cited by Crete al. 2011). Safety management is expected to take account of all risk and accidents that may possibly be expected that put project employee at risk. The Health and Safety (H & S) of any workplace is very important to diminish such risks, legally and ethically, but in mainly dangerous contexts such as the construction industry H & S takes on perilous importance as daily activities of the industry are highly unsafe. It is thus important to identify suitable safety activities and strategy, accommodating potential serious H&S problems.

1.2 statement of the problem

The construction industry is a sector of the economy that transforms varies resources into construction physical economic and social infrastructure necessary for socioeconomic development. But it has been seen as one of the hazardous industries. This is because the industry has a poor health and safety performance record compared to other industries all over the world.

With the above statement in mind projects at Bamacone Engineering PLS are safety and health progress is evaluated on daily basis**.** Accident and Injured person are the major parameters which are assessed continuously. However, fatalities occur at construction sites and Near-miss is mostly occurred injuries (Banacone engineering PLC monthly report, 2019)

Construction industries particularly, the construction site poses many hazards that can cause injury to workers, from transport in the workplace, exposure to excessive noise and harmful substances, dangerous large equipment and plant, risk of slips from a wet working

environment, manual handling and working unsafe machinery, risks of fire and explosions (ILO, 2006). Most of the accidents in workplaces happened due to combination of various complex hazard factors. The leading causes of work related hazards in construction industries include physical hazards, biological hazards, mechanical hazards and chemical hazards. These hazards are mostly prevalent in project sites of construction industries (Abera, 2016).

A variety of studies, for example (Glendon and Litherland, 2001, Kheni, 2008, Zeru Tariku, July 2014) have investigated the construction health and safety within developed countries. In the majority of these studies, researchers have either developed a new framework model or replicated an already tested one with a view to improving its adequacy. However, there is a lack of research in this area in the context of developing countries with specific requirements. Although much research has been directed at health and safety, very little is concerned with the Ethiopia and the particular characteristics of health and safety management practice in their environment. (Alhajeri, 2011). Some prior studies, Evaluation of Health and Safety practice in building construction a case study in Addis Ababa by (Fekele et.al, 2016), Occupational safety and health profile for Ethiopia by (Dawit Seblework, ILO Consultant, Oct.2016), Study of Health and Safety performance indicators on Ethiopia public (road & Building) construction project in case of Addis Ababa city by (Zeru Tariku, July 2014) and others few studies has been done in relating to safety and health management in Ethiopia. But from practice and experience in the construction industry injuries and fatalities resulted from accidents in the construction industry still are an obstacle in the building constructions and to identify which phase of building construction need more focus or emphasis of health and safety management practice.

According to the Addis Ababa construction office report during 2016/17 as examined public construction project more than 10 workers were died due to unsafe practice of construction consequently, Addis Ababa fire protection agency has been mentioned the construction disaster that more than 42 construction professionals were disabled an passed away because of involving unsafe practice during the year of 2015-2016/17.

1.3Research Question of the study

What is the current level of safety and health management practice in Addis Ababa building project of Bamacon Engineering P.L.C?

What is the cause of accident accord in constructing building projects at Bamacon Engineering P.L.C?

What are the factor that affects safety and health management in construction building projects of Bamacon Engineering P.L.C?

1.4 Objectives of the study

1.4.1 Main Objective

This study will focuses on the practice of health and safety management at construction site of Bamacon Engineering P.L.C.

1.4.2Specific Objective

The research will be conducted:

To examine the major safety and health measures used in building construction today?

To identify the weaknesses and strengths of safety and health management practice in building construction projects?

To identify the reinforcement techniques on safety regulation at building construction sites?

1.5Significance of the study

The significance of the research stems from the need to develop good health and safety management system in construction company (Bamacon) and thus the findings of the study will contribute to the improvement of the practices of health and safety management system of the company. In addition, this finding of study intends to provide some information to government about the status of health and safety management practice in the construction sector so that it will allow the government to introduce rules and regulations in construction safety in Ethiopia.

1.6Scope and limitation of the study

The scope of this research is limited to assess safety and health management practice in building construction projects which are constructed by Bamacon Engineering P.L.C and projects located in Addis Ababa, Ethiopia.

Because of the time shortage and corona virus the research addresses only building construction project that constructed in Addis Ababa. It was difficult to collect sufficient data and give more empirical results and the finding of the result may not represent as a general representation in the construction industry.

1.7Organization of the study

The study is organized into five chapters. Chapter one presents introduction of the study. Chapter two presents the literature review. Chapter three presents the research methodology. Chapter four presents the results and discussion. Chapter five presents the conclusions and recommendations. Finally, the references used in the study are listed at the end. Questionnaire use is also included in the Appendix part.

CHAPTER TWO

LITERATURE REVIEW

2.1 Construction Industry and Construction Projects

The Construction Industry can be described as the sum of all economic activities related to civil and building works: their conception, planning, Execution, and maintenance. Such works normally comprise capital investment in the form of roads, railways, airports, ports and maritime structures, dams, power generating stations, irrigation schemes, health centers and hospitals, educational institution, warehouses, factories offices and residential premises. Construction is widely acknowledged as the most important single constituent in a developing country's investment program. Because of such a high contribution, the construction industry has a major influence on the economic growth of a country. (Tackle and Mahelet, 2009)

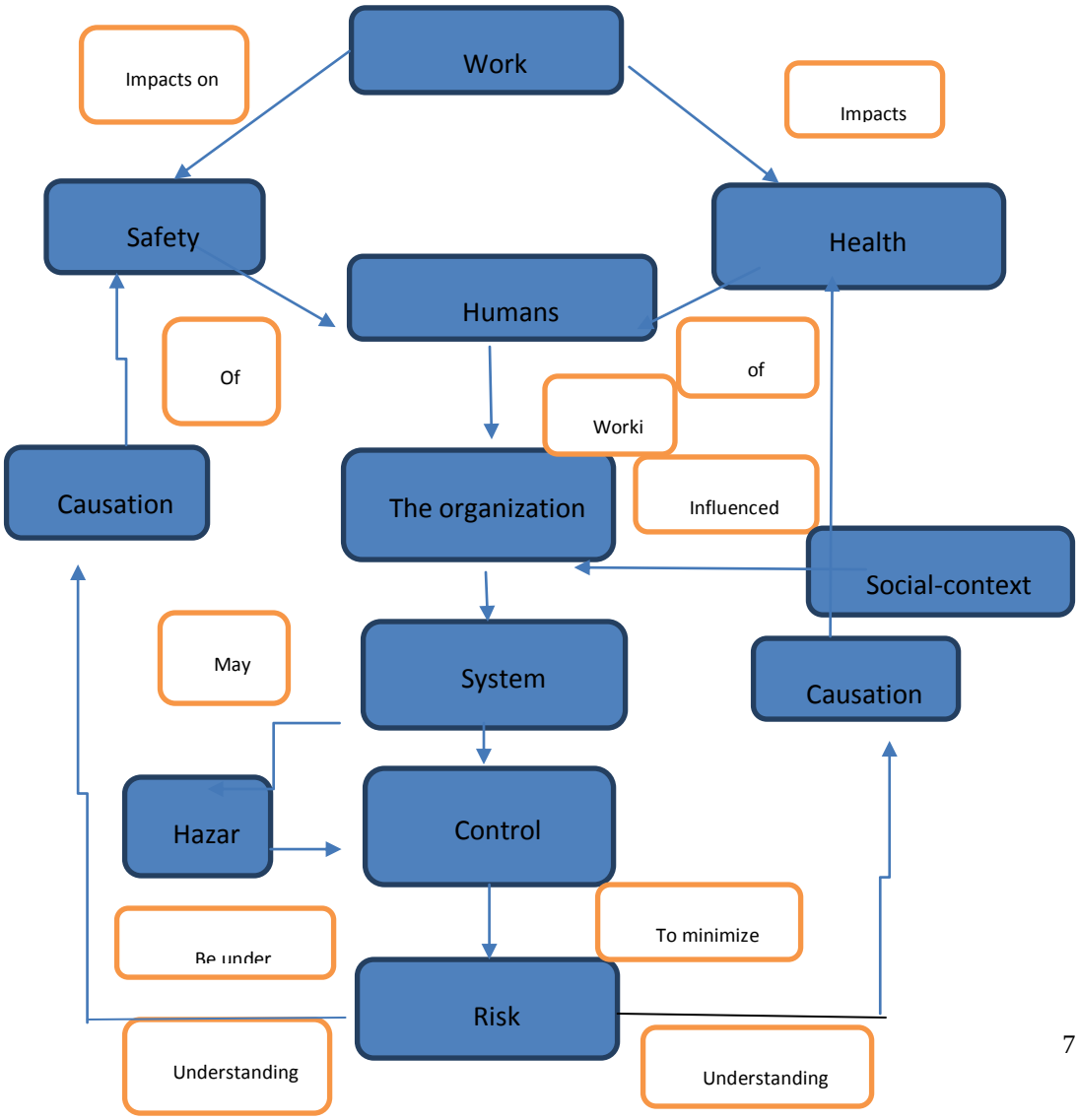

Figure 2.1 overview of a health and safety framework (coony, Nov 2016)

Construction is a vast and an active economic sector, which is also considered as backbone of the world's economy in general (Panassaya, 2015). Particularly in Ethiopia, this sector mobilizes an enormous amount of various resources and budgets that embraces huge manpower of different professions by creating a large job opportunity (Lucy, 2016). Many professionals involve and work together on a construction site: client, project supervisor, coordinator for safety and health matters, and contractors and contractors deliver many construction materials and inputs, often heavy and bulky to the site. The ill-defined conditions of construction site with numerous material-handling, transportation and storing operations which involve various equipment is considered as responsible factor for frequent occupational accidents and occupational diseases (Jean Caude, 2004).

However, in the construction sector, no significant activity is observed other than the limited research activities on construction Materials, Generally, the major scientific and technological problem of this sector are low capability, low capacity in designing and supervising large construction projects, less attention to improve and develop indigenous construction technology and the application of labor intensive construction technique, inadequate local production of hand tools with acceptable quality, lack of well-developed design standard codes and non-conducive system of collection and use and dissemination of information therefore, at present, engineering and consultancy, and technology transfer and development capabilities that enable the reduction of dependence and promote self-reference through time are not well established in the industrial sector (Tackle and mahelet,2009)

In both developed and developing countries, the construction industry is considered to be one of the most significant industries in terms of its impact on health and safety of the working population. Construction industry is both economically and socially important. However, the construction industry is also recognized to be the most hazardous, The results show that there was still a lack of commitment from the government, the insurance company, the labor ministry, the owners, consultants, and also the contractors to improving safety performance on the construction sites. The suggestion is to improve the safety performance on the construction sites. The government should follow up the safety performance by visiting the construction sites. The insurance company should be more active in visiting the

construction sites the owners should be more active towards the safety by controlling visiting the process in the construction sites. The contractors have to train the workers and promote the safety culture and follow up the safety performance. The consultants should control all the tools in the construction sites to insure that those tools are safe (Foad, 2011).

The term building construction worker refers to a person engaged in the physical construction of a building these individuals could be either skilled or unskilled, depending on the nature of work they are expected to perform on the building site. Building construction workers perform a wide range of tasks, although virtually all these tasks require some form of training and experience, some can be performed with little or no skills (Daniel, 2015).

2.1.1Safety in construction project

The construction industry in developing countries faces many challenges, one of which is safety, globally, it is estimated that 55,000 fatal accidents occur at construction sites per year or state otherwise, that one fatal accident occurs every ten minutes (Lopez, 2001). In Sub-Saharan Africa, the fatality and injury rates in the construction industry are at 21and 16,012 per 100,000 workers, respectively (CIDB, 2010). The fatality rate for the construction industry in the United States of America (USA) during the year 2008 was 9.6 per 100,000 workers compared to the national (all sectors) fatality rate of 3.6 per 100,000 workers (Lopez,2001).In Spain, a country which has some of the highest accident rates in the European Union, the fatality rate in the construction industry during the year 2003 was 20.1 per 100,000 workers compared to the national (all sectors0 fatality rate of 7.5 per 100,000 workers (Lopez,2001) in Asia, the fatality and injury rate are at 21.5 and 16,434 per 100,000 workers, respectively (CIDB,2010) Due to lack of proper recording and notification systems, construction accidents statistics in developing countries could be underestimated. Nonetheless, the above statistics demonstrate that construction safety is a global problem, and that the scale of the problem is bigger in developing countries compared to developed countries (Richard Irumba, 2015).

2.1.2 Definitions and terms of safety

According to (Allan st.john,2015) ‘ safety ‘a state of protection and a condition not involving risk An injury is thus a consequence of an incident but not the only possible one.

Hazard means the inherent property or ability of something to cause harm According to (WHO,2003), occupational safety and health can be defined as a multidisciplinary activity aiming at:

- Protection and promotion of the health of workers by eliminating occupational factors and conditions hazardous to health and safety at work
- Enhancement of physical, mental and social well-being of workers and support for the development and maintenance of their working capacity, as well as professional and social development at work.
- Development and promotion of building: - means a permanent or temporary construction used for the purpose of dwelling, office, and factory or for any other purpose (EBP, 624/2009)
- Construction: - means the construction of a new building or any other infrastructure or the modification of an existing building or alteration of its use (EB, 624/2009). Sustainable work environments and work organization.

According to (ILO, 1999) definition of occupational health is’ the promotion and maintenance of the highest degree of physical, mental social well-being of workers in all occupation’ and the WHO considers occupational health service to be responsible for the total of worker and, if possible, his or her family. Occupational Health is a diverse science applied by occupational health professional’s engineers, environmental health practitioners, Chemists toxicologists, doctors, nurses, safety professionals and other who have an interest in the protection of the health of workers in the workplace.

2.1.3Health and safety in the construction Industry

The overall construction industry is still looking at positive way to change to a safer working environment with the influence of everyone's concern not just the workers or individuals

(Hinzer, 1996). Kunju (2000), states that safety should look beyond accidents and more towards human behaviors and culture and he also said that measurement would enable comparison and benchmarking of performance and track progress from time to time. Once the principle and the practice of measurement become the norm, this will facilitate the transformation of motivations attitudes and choices in every construction company.

On the other hand, Anderson (1992) states that proactive safety performance is assured by providing the following ; having plant and equipment which is fit for the purpose of reducing risks from identified hazards as far as is reasonably practicable; system and procedure to operate and maintain equipment in a satisfactory manner and to manage all associated activates; and People Who are competent, through knowledge, skills and attitude operate the plant and equipment and to implement the system and procedure.

Liska (1993) has introduced the concept of zero accident techniques as follows; safety planning including goals, personnel, policies and procedures; fire protection programmers and safety budget; safety training and orientations; safety incentives; alcohol abuse programmers; proper record keeping and follow up; regular safety meetings; personal protective equipment. Other safety measures include; a comprehensive safety policy statement; a review of construct ability; reliable contractor screening pre-construction meeting (Safety review); inspection; good housekeeping.

2.1.4Health, safety and safety managements

Health: - is the general condition of a person in mind, body and spirit, usually meaning to be free from illness, injury or pain. The World Health Organization (WHO) defined health in its broader sense in 1946 as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2006).

Safety: - is related to external threats, and the perception of being sheltered from threats. According to the business Dictionary Safety is defined as a relative freedom from danger ,risk or threat of harm, injury, or loss of personnel and/or property, whether caused deliberately or by accident.

According to Davis safety is defined as freedom from any dangers of risk (Davis, 1999) Safety also can be defined as absence of danger, a state of protection and condition not

involving risk (Lingard, 2005) Construction site safety is a self-explanatory that the environment or condition of construction which is safe enough for the construction participants to perform their particular duties and tasks safely (Jannadi, & Bu-Khamsin, ,2002).

Hazard: - in general means anything that can cause harm but, for your purposes, this must be workplace generated(e.g. dangerous chemicals, electricity, working at heights from ladders, poor housekeeping), HSE define hazard as any source of potential damage harm or adverse health effects on something or someone under certain conditions at work (HSE, 2004). Basically, a hazard can cause harm or adverse affects (to individuals as health effects or to Organizations as loss of property or equipment).

The terms accident and injury refer to separate phenomena, mutually interrelated as cause and effect (Exposure and outcome (Anderson, 1999). The terms, "accident" and "injury" are hereby used in accordance with the definition adopted at the first world conference on Accident and Injury prevention (WHO,1989) that is, an accident is an unintentional event which results or could result in an injury, whereas injury is a collective term for health outcomes from traumatic events. (Rejda, 1992) defined an accident as a "sudden, unforeseen and unintentional" event, which may result in physical harm to a person and/or damage to a property. The use of the term ,,accident" in this thesis is based on an event which cause physical harm or damage to the body resulting from an exchange, usually acute, of mechanical chemical , physical, or other environmental energy that exceeds the body's tolerance.

Safety Management can be defined as the management function connected with the carrying on of an industrial undertaking that relate to the safety or personal in the undertaking, including (a) the planning, developing, organizing and implementing of a safety policy; and

(b) The measuring, auditing or reviewing of the performance of those functions Safety management system means a system which provides safety management in an Industrial Undertaking.

2.1.5types of Health Hazards in Construction project

A hazard is the potential for harm. In practical terms a hazard often is associated with a Condition or activity that, if left uncontrolled, can result in an injury or illness (Elaine, 2002).As in other jobs. Hazards in construction are typically of four classes; chemical, physical, biological and social (Weeks and James, 2011)

1. **Chemical hazards**

Chemical hazards are often airborne and can appear as dusts, fumes, mists, vapors or gases; thus, exposure usually occurs by inhalation, although some airborne hazards may settle on and be absorbed through the intact skin (e.g. pesticides and some organic solvents). Chemical hazards also occur in liquid or semi-liquid state (e.g. glues or adhesives, tar) or as powders (e.g.dry cement). Skin contact with chemicals in this state can occur in addition to possible inhalation of the vapors resulting in systemic poisoning or contact dermatitis chemicals might also be ingested with food or water, or might be inhaled by smoking (Weeks and James, 2011).

Several illnesses have been linked to the construction industry, among them:

- Silicosis among sand blasters, tunnel builders and rock drill operators
- Asbestosis (and other diseases caused by asbestos)among asbestos insulation workers, steam pipe fitters, building demolition workers and others
- Bronchitis among welders
- Skin allergies among masons and others who work with cement
- Neurologic disorders among painters and other exposed to organic solvents and lead.

Elevated death rates from cancer of the lung and respiratory tree have been found among asbestos insulation workers, roofers, welders, and some woodworkers. Lead poisoning occurs among bridge rehabilitation workers and painters, and heat stress(from wearing full-body protective suits) among hazardous-waste clean-up workers and roofers white

finger (Reynaud's syndrome) appears among some jackhammer operators and other workers who use Vibrating drills(e.g. Stopper drills among tunnellers).

Alcoholism and other alcohol-related disease is more frequent the expected among construction works. Specific occupational causes have not been identified, but it is possible that it is related to stress resulting from lack of control over employment prospects, heavy work demands or social isolation due to unstable working relationships.

2. Physical hazards

Physical hazards are present in every construction project. These hazards include noise, heat and cold, radiation, Vibration and barometric pressure Construction work often must be done in extreme heat or cold, in Windy, rainy, snowy, or foggy weather or at night. Ionizing and non-ionizing radiation is encountered, as are extremes of barometric pressure (Weeks and James, 2011).

The machines that have transformed construction into an increasingly mechanized activity have also made it increasingly noisy; noise is present on demolition projects by the very activity of demolition. It affects not only the person operating a noise-making machine, but all those close by and not only causes noise-induced hearing loss, but also a mask other sounds that are important for communication and for safety.

Pneumatic hammers, many hand tools and earth-moving and other large mobile machines also subject workers to segmental and whole-body vibration.

Heat and cold hazards arise primarily because a large portion of construction work is conducted while exposed to the weather, the principal source of heat and cold hazards. Roofers are exposed to the sun, often with no protection, and often must heat pots of tar, thus receiving both heavy

Radiant and convective heat loads in addition to metabolic heat from physical labor. Heavy equipment operators may sit beside a hot engine and work in an enclosed cab with window and without ventilation. Those that work in an open cab with no roof have no protection from the sun. Workers in protective gear, such as that needed for removal of hazardous waste,

may generate metabolic heat from hard physical labor and get little relief since they may be in air-tight suit. A shortage of potable water or shade Contributes to heat stress as well. Construction workers also work in especially cold conditions during the winter, with danger of frostbite and hypothermia and risk of slipping on ice.

The principal sources of non-ionizing ultraviolet (UV) radiation are the sun and electric arc Welding Exposure to ionizing radiation is less common, but can occur with x-ray inspection of welds, for example, or it may occur with instruments such as flow meters that use radioactive isotopes. Lasers are becoming more Common and may cause injury, especially to the eyes, if the beam is intercepted.

Those who work under water or in pressurized tunnels, in caissons or as divers are exposed to high barometric pressure. Such workers are at risk of developing a variety of conditions associated with high pressure; decompression sickness, inert gas narcosis, aseptic bone necrosis and other disorders.

Strains and sprains are among the most common injuries among construction workers these and many chronically disabling musculoskeletal disorders (such as tendinitis, carpal tunnel syndrome and low-back pain) occur as a result of traumatic injury, repetitive forceful movements, awkward postures or overexertion. Falls due to unstable footing, unguarded holes and slips of scaffolding and ladders are very common.

3. Biological hazards

Biological hazards are presented by exposure to infectious micro-organisms, to toxic substances of biological origin or animal attacks. Excavation workers, for example, can develop histoplasmosis, an infection of the lung caused by a common soil fungus. Since there is constant change in the composition of the labor force on any one project, individual workers come in contact with other workers and as a consequence may become infected with contagious diseases influenza or tuberculosis, for example. Workers may also be at risk of malaria, yellow fever or Lyme disease if work is conducted in areas where these organisms and their insect vectors are prevalent (Weeks and James, 2011).

Toxic substances of plant origin come from poison ivy, poison oak, poison sumac and nettles, all of which can cause skin eruptions. Some wood dusts are carcinogenic, and some (e.g. western red cedar) are allergenic.

Attacks by animals are rare but may occur whenever a construction project disturbs them or encroaches on their habitat. This could include wasps, hornets, fire ants, snakes and many others. Underwater workers may be at risk from attack by sharks or other fish.

4. **Social hazards**

Social hazards stem from the social organization of the industry. Employment is intermittent and constantly changing and control over many aspects of employment is limited because construction activity is dependent on many factors over which construction workers have no control, such as the state of an economy or the weather. Because of the same factors, there can be intense pressure to become more productive. Since the workforce is constantly changing, and with it the hours and location of work, and many projects require living in work camps away from home and family, construction workers may lack stable and dependable networks of social support. of construction work such as heavy workload, limited control and limited social support are the very factors associated with increased stress in other industries. These hazards are not unique to any trade, but are common to all construction workers in one way or another (Weeks and James, 2011).

2.1.6Accidents in the construction Industry

Accidents can be defined as any avoidable action by personnel or any failure of equipment, tools or other devices that interrupt production and has the potential of injuring people or damaging property (Ogles by et al.1989) Accidents in construction projects in many countries are of important issue to handle. The phenomena makes the construction industry has a big image of risky place of accidents (Sawachaetal., 1999; shi, 2009). The nature of Construction project itself has potential hazards of accidents since its uniqueness, open space, exposure to weather, involving many unskilled labors, tight schedule of short targeted project duration, workers turn over and working at height, confined space and psychologically and physically vulnerably working environment (Imriyas et al.2007)

2.1.7. Hazard Prevention and Control

Continually review the work environment and work practices to control or prevent workplace hazards.

Systems used to prevent and control hazards include (OSHA, 2002):

Engineering Controls

Safe Work Practices

Administrative Controls

Personal Protective Equipment (PPE)

Systems to Track Hazard Correction

Preventive Maintenance Systems

Emergency Preparation

Medical Programs

2.1.8The Role of Design in Occupational safety and health in the Construction Industry

The key role design plays in OHS has been identified in numerous studies. The study carried out by Rechnitzer (2000) identified the priority injury risks related to falls from height, manual handling and contact with power tools and other equipment. A conclusion reached in regard to reducing injury risk, related to the key role of designers and architects: Lack of Designer & Architect OHS consideration (and accountability) for erection and maintenance, and downstream risks. Many risks to which construction workers are exposed to are in part dictated to by the design of the particular project. These risks can be overcome or reduced by rethinking designs to take into account OHS considerations. In other words, there is a lack of accountability for injury risk by system designers. That is, architects and engineers are not required (typically) to consider constructability or operation and maintenance in terms of OHS

risk. A holistic view needs to be developed whereby due consideration is given to downstream consequence of any design :(Exposure to injury risk during construction, Exposure to injury risk during operation, Exposure to injury risk during maintenance and Exposure to injury risk during refurbishment/ demolition)

The tendering process can also lead to separation of the design from the construction process, thereby further removing the scope for construction personnel to reduce injury risk during construction, by design changes.

2.2. Construction Safety and Health in Ethiopian Context

Condition of work of construction workers in Ethiopia is found to be poor. This is mainly due to the poor employment relationships and lack of safety measures. Safety measures are nonexistent in the construction sites; therefore, workers are exposed to different kinds of work related hazards. Most of the injured workers did not receive compensation because of triangular employment arrangements between the building contractors, subcontractors and subcontractors which obscure lines of liability (Limenih, 2010).

Injuries generally are unreported; however, if necessary, a laborer might receive first aid or preliminary medical care. In most cases, specialized medical treatment or compensation is unavailable. Workers themselves consider accidents as due to their own negligence, and accept that construction is a dangerous occupation. Nevertheless, major accidents involving the death of a worker may be reported due to the financial expenses and litigation that could be involved. Some informal assessments identified a few major reasons for safety non-performance which included: lack of development of construction sector in the shape of mechanization and industrialization; lack of professional construction management practices, inadequate safety provisions laid by the existing regulatory environment which has failed to establish safety as a major industry objective, insufficient and incentive-less insurance mechanisms which have failed to establish safety as a business survival issue, and unfavorable business environment which has led to adversarial business relationships among stakeholders resulting in

controversies, conflicts, claims and litigation and hence diverting the focus away from issues like safety (Farooqui , 2007). The researcher was tried to get data from Addis Ababa University, Ministry of labor and Social Affairs and Ministry of Works and Urban Development concerning health and safety in

2.3Empirical Review

There is very little literature relating directly to the safety on construction sites in developing countries like Ethiopia. Existing publications tend to suggest how accidents may be prevented but assume that a strong regulatory body exists to enforce legislation (Sohail and Kolsky, 1999). This result is consistent with the findings of this research as stated in section 2.15 of this paper. Though most of the existing studies were conducted in developed countries, their findings will be applicable in most situations in the developing nations as well.

Helander (1991) analyzed the causes of 739 construction fatality accidents that occurred in the UK. He found that fifty two percent of them occurred due to falls from roofs, scaffolds and ladders. Falling objects and material were involved in 19.4 per cent of the deaths, and transportation equipment, (e.g. excavators and dumpers) were involved in 18.5 percent. Helander also found that 5 percent of construction accidents occur during excavation work. The categories used for classifying fatal accidents were: falls, falling material and objects, electrical hazards, transport and mobile plants, and other. The majority of accidents that involved falls occur during work on roofs, scaffolds and ladders. Collapses of structures and falling materials also account for a large proportion of fatalities. Many of the safety hazards are specific to the different trades, and typically construction workers underestimate the hazards in their own work which affects the motivation for adopting safe work procedures. The establishment and use of procedures and regulations to enhance safety can avoid a large proportion of these accidents (Helander, 1991). Helander (1991) finally suggested that top managers can contribute to reducing the number of accidents if they: Note the safety records of all their field managers and give these figures the same importance as productivity and

overall cost, Communicate safety issues to staff along with cost and timing issues, Develop mechanisms for allocation of safety costs, Ensure through improved planning that equipment and materials required for safe working are available on site, Train newly hired people in safety issues, Make safety awards and Ensure the effective use of safety departments.

Construction processes in Nigeria are characterized by unsafe practices leading to accident that leaves severe consequences on both the project and the workers .Accidents in building construction sites, whether minor or fatal could result to injuries, loss of resources, partial or permanent disability and death in case of fatalities. The paper explores the class of workers that are mainly responsible for construction accidents, the factors that causes accidents and the types of accidents that is been encountered in building construction sites and the frequency of their occurrence. It was achieved through the review of existing (Daniel.N, 2015)

According to Seifedin;(2014) the findings indicate that the overall safety and health condition in the Ethiopian construction industry is very poor. In addition there is very low level of implementation of OSH standards, rule and policies in the construction companies. Little training and orientation on OSH is given to employees, most of the construction companies do not have OSH components like written safety policy, safety officer, health and safety committee, hazard identification and reporting program, and properly placed safety signs. Based on the responses obtained from engineers/foremen, poor working conditions and environment, and lack of personal protective equipment are the main causes of accidents in the construction sector. On the other hand, foot and hand injuries, and falling from heights are the more frequently occurring types of accidents in the industry.

2.3.1 Legal aspect of safety and Health management

Developed country

The industry control environment in developed countries has incorporated OHS as an integral part in the regulatory framework. In the U.S.A. for instance, the workers compensation rates are a function of the loss experience of a contractor, and each labor hour is affected through the

reflection of those losses in the experience modification rating (EMR) (Farooqui, Arif, & Rafeeqi, 2008). On one hand, a safe contractor can create a substantial competitive advantage through superior safe experience while, on the other hand, an unsafe contractor can be liable to pay huge penalties in terms of insurance. Safety, therefore, and the effects of its absence accidents is now a key cost driver for construction firms in such countries. Safe work experience is also becoming a business survival issue for them, as more and more owners are reluc-tant to permit contractors to bid work without acceptable EMRs (Farooqui, Arif, &Rafeeqi, 2008). Thus, the most important step in controlling costs for contractors in these countries is to run safe construction projects. Hence the contractors are compelled to implement safety as their business strategy, which has led to recent improvements in global construction safety records (Farooqui, Arif, & Rafeeqi, 2008).

Developing country

Developing countries have a poor health and safety record compared to the developed world, which may be attributable to a low use of technology, labor intensive methods and low work-force participation in health and safety issues. According to the (Lee, 2003) construction sites in developing countries are ten times more dangerous than in industrialized countries.

Construction processes in developing countries share similar characteristics in terms of the adoption of technology, construction methods, cultural environments and regulations, (Hillebrandt 1999). These aspects of the industry in developing countries make the management of construction projects including health and safety a difficult one (Jaselskis, 1999).

In many developing countries, the legislation governing Occupational Health and Safety (OHS) is significantly limited when compared with that in the UK (Enshassi, 2008). Previously, (Lee, 2003) found that in many countries that have safety legislation, the regulatory authority is weak or non-existent and employers support regulations only superficially.

2.3.2Health and Safety Integrated Management Systems

Research suggests integrating the health and safety management function of a business with other management functions could enhance the overall performance of the business (Kamp and Bansch 1998, Koehn and Datta 2003, Taylor et al. 2004:544). Besides, the benefits to be derived from such an integrated management systems. Gibb and Ayoade (1996) have pointed out client pressure, cost reduction, legislation and total project management as factors promoting their adoption.

Many management systems, especially health and safety, environment and quality have many identical elements. For instance, policy, training of personnel, auditing, responsibility for task and controls are common elements in all three areas of management. This, therefore, makes it possible to integrate them as a single management system. Proponents of integrated systems argue that such an integrated system will lead to management effectiveness, reduced duplication, and elimination of conflicting responsibilities and harmony of objectives (Douglas and Glen 2000, Scipioni. 2001).

Dias (2000) examined the possible integration of the elements of families of standards, ISO 9000, ISO 14000 and a similar standard in health and safety in construction. Many elements of the three standards were found to be candidates for possible integration. (Hamid, 2004) investigated the integration of safety, health, environment and quality in the construction industry. Their findings indicate that safety, health, environment and quality have many common grounds which make integration possible. Based on the similarities in many areas of these management functions, the authors proposed a model of integrated management system for the construction industry. Similarly, Kirbert and Coble (1995) explored the integration of health and safety regulations with environmental regulations in the construction industry. Arguing that environmental issues are safety issues, the authors suggest a single administrative procedure for safety and environment via an environmental safety plan. The benefits of such a procedure include fewer processes involved in regulatory agency reviews and workers benefiting from training in both environmental and safety aspects of their work environment.

2.3.3Integration of Health and Safety with Project Management

Studies in construction accidents suggest many accidents on construction sites could be prevented by taking appropriate steps in all phases of the project life. Thus, participants in a project have a role to play in improving the health and safety performance of construction sites and completed projects. Current thought on health and safety in construction put emphasis on integrating health and safety management into the entire construction process. This view of health and safety management is, at least to some extent, largely driven by developments in health and safety legislation in Europe and USA.

This view of integration of health and safety management into construction processes re-quires responsibility for health and safety to be equitably shared between the key participants in a construction project. This view therefore requires project participants to "think health and safety" throughout the phases of a project. As Hinze (1998) has emphasized, addressing the safety of construction workers in the design phase involves recognizing the potential impact designers‟ decisions can have on the health and safety of construction site workers. Similarly, owners‟ involvement in construction safety could reduce cost of safety to minimum.

In the UK and other countries which are members of the European Union, the European Directive on Temporary and Mobile Construction Sites calls for health and safety to be considered during the early stages of a project. However, maximum benefits can be derived from considering health and safety at the early stages of project if procurement routes are adopted which facilitate coordination and team spirit (Kheni and Gibb 2006).

Integration of health and safety into project planning has been promoted by authors such as Kartam (1997), Cameron and Duff (2002), Murray (2002), Saurin. (2004), Pavitt. (2004), Gibb and Pendlebury (2005) and Hare et al. (2006). The work of these authors have each sought to explore avenues for managing health and safety as integral aspect of projecting planning during one or more of the phases of project execution. For instance, one the most recent studies, Hare et al. (2006) investigated the integration of health and safety with the pre-construction phase of projects. The authors highlighted the importance of effective teams and effective two-way flow of information for successful integration.

CHAPTER THREE

RESEARCH MEHODOLOGY

3.1Research Design and approach

The study used a descriptive survey research design for the study as the study conducted to answer question of how health and safety management practiced in building construction projects in Addis Ababa at Bamacon Engineering P.L.C. it helped to identify the nature of the health and safety measures and used on the construction sites and evaluate their enforcement mechanisms on construction sites. Direct observation also use on visits to construction sites to directly observe and document the identified hazards, tasks, job site organization, work practices, equipment and tools Bing used.

The study used quantitative research approach. For this purpose a questionnaire were developed and quantitative data were obtained through questionnaire.

3.2Target Population and Study Units

The population size of this study comprise 50 employees of the company that engaged in the building construction projects (PM, safety engineer, office engineers, site engineer, quality engineer, electrical engineer, sanitary engineer & other) with engineering educational background.

The study used random sampling techniques this is considered as a technique fairly represent all of the construction projects and the workers in these projects is implemented to select the representative sample size for the study.

3.3. Source of data and Data collection Method

3.3.1. Source of data

Structured Questionnaire is developing by studying several international journals. And also reference material source of data such as books, journals, reports, and related articles collected from the internet. The sources of data were from the main parties in the construction projects

mainly contractor side. Those reference material data were then use to prepare questionnaires in relation to the topic under discussion. Closed ended questionnaires were prepared and distributed for all selected respondents.

3.3.2. Data collection Method

Pilot questionnaire: it is normal practice that the survey tool should be piloted to measure its validity and reliability which test the collected data. The design of the questionnaire were based upon the research objectives and theoretical directions derived from the literature review as well as a preliminary questionnaire which consisted of a few simple questions about their health and safety awareness and practice. A pilot study was conducted with one project managers and four project engineers in the company who are working on building projects, to test whether the questions are understandable, easy to answer, unambiguous, cover most the required questions, etc. valuable comments were obtained to improve the quality of the questionnaires, after a refinement, the questionnaires were developed.

Observation: the goal of obtaining rich data justifies a research combining other methods of collecting primary data such as observation. That involves observing workplace relationship among the workers and work processes/procedures, recording, description, analysis and interpretation of research subjects' behavior. Observations of are to type structured observations and participant observation.

Documentary source: Documentary source data formed part of the data collection methods. These were including written materials such as annual reports, administrative records, statutes, laws, acts, regulations, and minutes of meetings. Analysis of these sources help to triangulate findings based on primarily data.

3.4. Data Analysis Method

In this study, descriptive statics is the major technique of statically analysis through using Microsoft Excel spread sheet and SPSS. The quantitative data collected from sample respondent who are working in the Bamacon Engineering were analyze by use averages, percentages, frequency, mean and important index. Tables and fingers use as data presentation tools to answer safety and health measures use, weakness and health managements, reinforcement technique on safety regulation in currently constriction of building sites.

3.5. Reliability and validity of the instrument

Validity refers to the extent to which a test measures what we actually wish to measure, the concept validity refers to what the test or measurement strategy measures and how well it does so (pallant, 2005). Reliability has to do with accuracy and precision of a measurement procedure (Kothari, 2004). The questionnaire was tested with 5 employees to test the content validity of the instrument and also to check the clarity, length, word ambiguity and structure and their suggestion were incorporated before the final distribution of the questionnaire.

Cronbach's Alpha was used to measure the reliability; Cronbach's alpha is a coefficient of reliability cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. Ideally, the cronbach's alpha coefficient of a scale should be above 0.70. (pallant,2005). To test the internal reliability of the questionnaire, Cronbach's alpha test was used and found to be 0.78 which is higher than 0.7, thus the construct has been believed to have adequate reliability.

3.6. Ethical Issues

The study was conducted in such way that it will consider ethical responsibility. Ethical responsibility include, providing information about the study for respondents (like who's conducting the research, for what and who will benefit), also the study provided anonymity, means the information from the respondents was confidential and was not used for any personal interest.

CHAPTER FOUR

Data Analysis and Presentation

4.1. Introduction

This chapter analyses the results of collected data from of the questionnaire, documented source and observation in four major sub topics on health and safety Management practice in building projects in BAMACON construction P.L.C. the first part, deals about the general information/description of respondents, the second part contains information on the current safety and health practice of the companies/projects, the third part shows the major safety and health areas to be considered during building construction projects, factors that affect safety and health performance of in building construction projects and the last part deals about set observation. 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 percentages, Tables and charts are used because this method of data presentation is much more preferred among others, as it provides easier understanding and clearer picture of information to be delivered.

4.2. Data Presentation

The questionnaire was designed and distributed to investigate health and safety management practice in building construction projects held by BAMACON construction company in the Addis Ababa sites, 50 copies were distributed to PM, safety engineer, office engineers, site engineers, quality engineers, electrical engineer, sanitary engineer & other employees in each project sites. From the50 questionnaires, about 40 questionnaires were filled out and returned representing 80% response rate. Despite several follow ups 20% failed to respond. A response rate of 50% was deemed adequate for analysis and reporting, response rate of 60% was good and a response rate of 70% and over was considered very good (Mugenda & Mugenda,2003). Thus, the study returned a very good response rate at 80% and was considered adequate for analysis and reporting. Figure4.1. below shows the percentage of both distributed and received questionnaires:

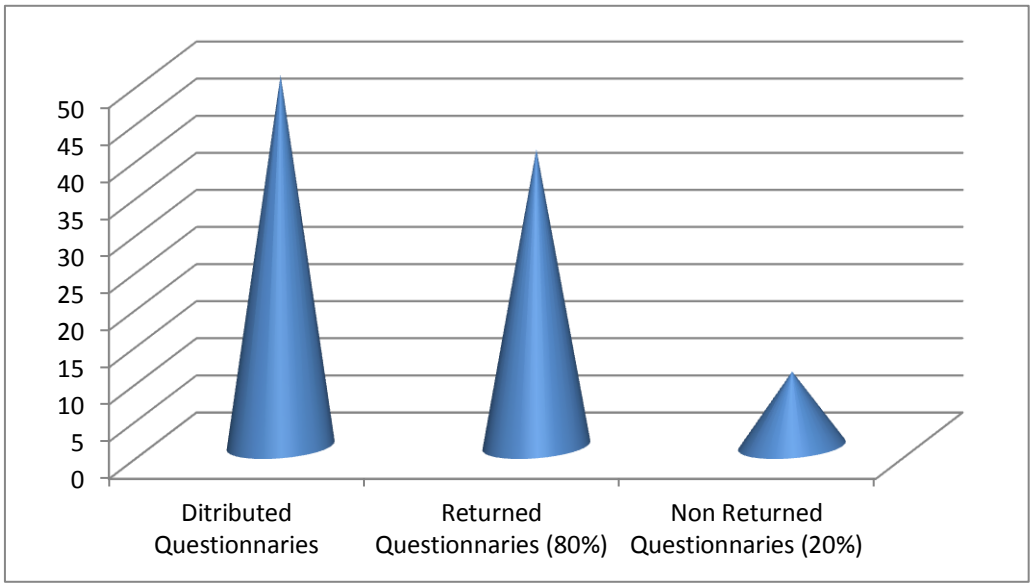

Figure-4.1 Response Rates

4.3. Demographic Characteristics

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

4.3.1. Job title of respondent

In order to ensure that the responses were reliable and valid, it was important to determine the position of the person who answered the questionnaire within the company.

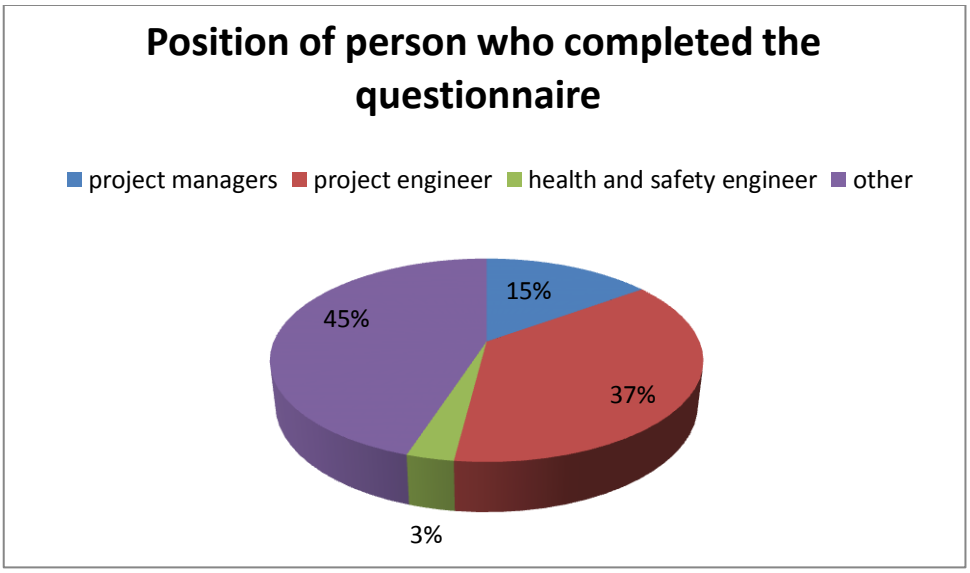

Figure-4.2 Position of person who completed the questionnaire.

From the figure above, 15% of the respondents are project managers, 37% of the respondents are project engineer, 45% of the respondents are resident engineers, construction supervisors and site engineers and 3% are health and safety manager. This shows, almost no health and safety manager were present on the site during the questioners were distributed, this indicates only very few of the project assign a health and safety professional

4.3.2. Educational status of respondents and their work experience

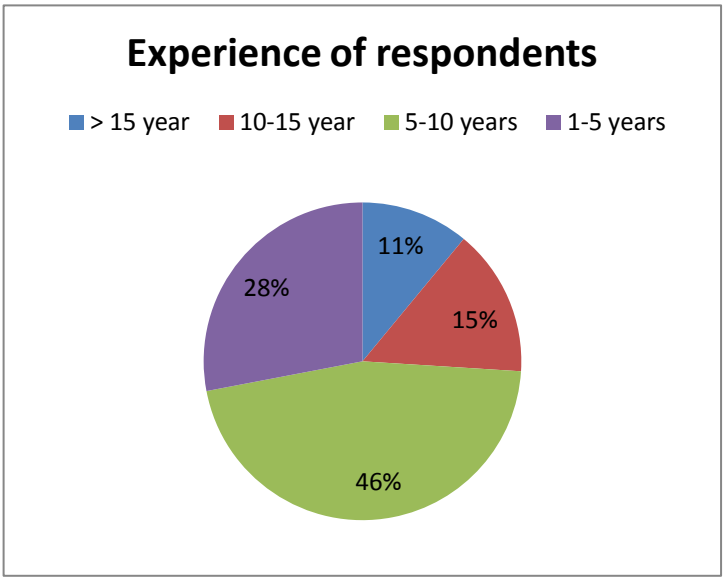

Figure-4.3. Experience of respondents

From the figure above,11% of the respondents have an experience of fifteen and above years in the construction industry,15% have 10up to 15 Years of experience,46 % have 5 up to 10 years of experience and 28% have less than 5years of experience in the construction industry and 27% of the respondents have masters degree,73% have first degree holders and implies that respondents involves in the study have significant work experience in the area, which implies that the information forwarded could be important as required in the study.

4.4. Practice of health and safety system

Descriptive statistics

Numerical Values were assigned to each of the survey responses, so that strongly disagree=1, disagree=2, Neutral =3, agree=4, and strongly agree =5. Lower mean scores indicate stronger disagreement whereas higher mean scores indicate stronger agreement for each of the questions. The descriptive statistics are presented in table 4.1, 4.2 and 4.3.

Table 4.1, 4.2 and 4.3 presents the descriptive statistics of the responses of the questionnaires collected from engineers and foremen with regard to organizational, technical and environmental factor the table shows the frequency and percentage of the results.

Table 4.1 organizational factor

Item No	Description	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
		F	%	F	%	F	%	F	%	F	%
1	The company has written health safety policy	11	27.5	20	50	6	15	3	7.5	-	-
2	The policy is communicated to all concerned parties in the company	13	32.5	23	57.5	4	10	-	-	-	-

3	The company has a health and safety committee	6	15	17	42.5	9	22.5	8	20	-	-
4	The company has a designated health and safety officer	4	10	14	35	10	25	10	25	2	5
5	The company holds craft toolbox safety meetings frequently	12	30	19	47.5	7	17.5	2	5	-	-

It is clear from table 4.1 that 50% of the respondents disagree that their companies have written safety policy and only 7.5% agree that their companies have written safety policy. Almost none of the respondents agree to the statement that the policy is communicated to all concerned parties in the company while 32.5% strongly disagree and 57.5% disagree, regarding the existence of health and safety committee in the company; 15% of the employees strongly disagree that there id health and safety committee in the company.10% of the employee strongly disagree and 35% disagree that the company has a designated health and safety officer were as 25% agree to the statement. Regarding the statement that the company holds craft toolbox safety meetings frequently; 30% strongly disagree and 47.5% disagree while 5% agree.

Table 4.2 technical factor

Item No	Description	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
		F	%	F	%	F	%	F	%	F	%
6	The company provides and enforces the use of safety equipment	11	27.5	20	50	7	17.5	2	5	-	-

7	A program is in place for the reporting and correction of workplace hazards	9	22.5	15	37.5	11	27.5	3	75	2	5
8	Workers are encouraged to intervene when unsafe conditions are observed	11	27.5	20	50	7	17.5	2	5	-	-
9	The company will take disciplinary measures on workers who do not follow safety procedure	12	30	19	47.5	7	17.5	2	5	-	-

From table 4.2 that 27.5% and 50% of the employee strongly disagrees and disagree respectively, that the company provides and enforces the use of Safety equipment. On the other hand, 37.5% of the employee disagree that their company has a program in place for the reporting and correction of workplace hazards. Whereas, 50% of the respondents disagree with the idea that workers are encouraged to intervene when unsafe conditions are observed. Similarly, 30% and 47.5% of the employee strongly disagree and disagree respectively that the company will take disciplinary measures on workers who do not follow safety procedure.

Table 4.3 environmental factor

Item No	Description	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
		F	%	F	%	F	%	F	%	F	%
10	The company has a nurse or a doctor on staff	9	22.5	9	22.2	6	15	10	25	7	17.5
11	First aid materials are available and easily accessible in the company	6	15	7	17.5	10	25	10	25	7	17.5

12	The company provides health and safety training to employees regularly	5	12.5	10	25	12	30	7	17.5	6	16
13	The company provides safety orientation for new employees	4	10	9	22.2	7	17.5	14	35	6	16
14	The company conducts regular site safety inspection	1	2.5	5	12.5	13	32.5	15	10	6	16
15	The safety inspection results are documented and communicated	-	-	7	17.5	18	45	10	25	5	12.5
16	Hazardous jobs are clearly identified and special attention is given by the company	2	5	7	17.5	12	30	10	25	9	22.5
17	Unsafe jobs will be stopped by safety officers when they are found	-	-	5	12.5	10	25	14	35	11	27.5
18	The company gives priority for safety as they give priority for profitability	6	15	8	45	13	32.5	9	22.5	4	10

From the above table 4.3 With regard to the presence of a designated nurse or a doctor on staff and first aid materials, 22.5% strongly disagree and 22.5% agree that the company has a nurse or a doctor on staff; whereas 15% strongly disagree 17.5% disagree that first aid kit is available and easily accessible with sufficient materials in it. Concerning the provision of

safety training and orientation, 12.5% strongly disagree and 17.5% agree with the statement the company provides health and safety training to employees regularly; similarly, 10% strongly disagree, 22.5% disagree and 35% agree that the company provides safety orientation for new employees. When it comes to safety inspection 17.5 % disagree and 25% agree that regular site safety inspection is conducted in the company. 17.5% and 25% of the engineers strongly disagree and agree respectively, with the claim that hazardous jobs are clearly identified and special attention is given by the management 12.5% and 35% of the respondents disagree and agree that unsafe jobs will be stopped by safety officers when that are found. While 45% of them strongly disagree and 22.5% agree with the statement that the company gives priority for safety as they give priority for profitability.

Table 4.4 Policy and Regulation for the Implementation of Safety and Health Procedures

Item No	Description	Strongly disagree		Disagree		Neutral		agree		Strongly agree	
		F	%	F	%	F	%	F	%	F	%
19	There should be a strong policy or regulation for the implementation of safety and health by the government	-	-	-	-	-	-	5	12.5	35	87.5
20	The accidents occurred before are mainly due to employee's mistake	-	-	13	32.5	2	5	18	45	7	17.5
21	The accidents occurred before are mainly due to faulty procedure of work	-	-	8	20	14	35	12	30	6	15
22	Sometimes I have to ignore a safety rule or policy in order to complete an assignment to meet the schedule	1	25	19	47.5	12	30	8	20	-	-

23	Safety signs are properly put in place at the working site	-	-	24	60	-	-	16	40	-	-
24	The company has a medical insurance for all workers	-	-	14	35	18	45	8	20	-	-
25	When workers lose their working ability due to occupational accident they are given compensation	-	-	10	25	19	47.5	11	27.5	-	-
26	I have the safety Knowledge needed for the hazards we face on this job	-	-	2	5	-	-	38	95	-	-
27	The site supervisors always follow site safety rules and procedures very closely	6	15	8	20	14	35	12	30	-	-
28	The company do not force workers to work too many hours per week on their job	-	-	10	25	18	45	12	30	-	-
29	The laws, directive and regulations of the country regarding health and safety are Know and implemented by management of the company	-	-	14	35	22	55	4	10	-	-

It can be observed from table 4.4. Above that 12.5% and 87.5% of the respondents agree and strongly agree that there should be a strong policy or regulation for the implementation of safety and health by the government.32.5% of the respondents disagree and 45% agree that

sometimes they have to ignore a safety rule or policy in order to complete an assignment to meet the schedule. Concerning, safety signs 60% and 40% of the respondents disagree and agree respectively, that safety signs are properly put in place at the working site. and also shows that 35% disagree but 20% agree that the company has a medical insurance for all workers; whereas 25% disagree and 27.5% agree with the statement that when workers lose their working ability due to occupational accident they are given compensation, the table reveals that 5% of the respondents disagree but 95% agree that the respondent has the safety Knowledge needed for the hazards they face on their job. On the other hand, 20% of the respondents disagree and 30% agree that the site supervisors always follow site safety rules and procedures very closely. Similarly, 25% of the respondents disagree that their company do not force workers to work too many hours per week on their job. Finally 78% of the respondents disagree and 10% agree that the laws, directives and regulations of the country regarding health and safety are Known and implemented by management of the company.

4.5. Challenges in the Implementation of Safety and Health Procedures

4.5.1. Injuries in construction sites

Item no	Description	Very high		Medium		Low		Very low	
		F	%	F	%	F	%	F	%
1	Falling (Objects Falling from a height)	20	40	11	27.5	7	17.5	1	2.5
2	Falling stairways and ladders	16	40	15	37.5	7	17.5	2	5
3	Scaffolding (falling from scaffolding during construction0	17	42.5	17	42.5	5	12.5	-	-
4.	Excavations(slides, collapse, not shored protection….etc)	-	-	3	7.5	27	67.5	10	25

5	Electricity (electric power Accidents)	-	-	1	2.5	22	55	17	42.5
6	Construction hoists & elevators and cranes & Derrick (sudden dismantling)	-	-	8	20	12	30	20	50
7	Hazardous Substance(careless/miss use)	1	2.5	18	45	21	52.5	-	-
8	Noise	2	5	22	55	16	40	-	-
9	Tools and Machinery (drilling, Grinding, bending…etc.)	-	-	14	35	23	57.5	3	7.5
10	Fire (from electric, fuel, chemical etc.)	-	-	-	-	12	30	28	70

Table4.5. Frequency of causes of injuries in construction sites

The above table shows that in their construction sites, a high percentage of the respondents believed that objects falling form a height, falling stair way ladder, workers falling from scaffolding during construction work. Electric power accidents cause, careless/miss use of hazardous substance and tools & machinery cause injuries & fatalities in a low rate. Whereas accidents occur due to un-shored protection of excavation, sudden dismantling of construction hoists & elevators and cranes & derrick and fire is exceptional. According to the surveying data the respondent agreed that noise has a medium frequency in causing injury.

4.5.2.. Factors that affect safety and health performance in the construction industry

Table4.6. Factors that affect safety and health performance in the construction

Item No	Description	Mean	Relative Importance Index (RII)

1	Complexity of the Design	3.1	0.62
2	Type of owner/attitude of owner	3.85	0.77
3	Weather Condition	3.85	0.755
4	Project cost	4.35	0.87
5	Project Duration	3.05	0.61
6	Contractual Specification of safety health	3.55	0.71
7	Safety and Health Policy	3.6	0.72
8	Accidents/Incidents/Near Miss Report	3.57	0.715
9	Fire prevention and control	2.75	0.55
10	Risk Assessment	3.23	0.595
11	Safety and Health training	3.88	0.775
12	Personal Protective equipment	2.75	0.645
13	Emergency Planning and procedures	2.77	0.555
14	Safety and health inspection	3.63	0.725
15	Safety and Health Management meeting	3.37	0.675
16	First-Aid Provision	4.05	0.735
17	Safety Signals, signs and barricades	3.65	0.73
18	Work environment	4	0.8
19	Reward and punishment system(incentive)	3.7	0.74
20	Role of government and engineering societies	3.75	075

Priority index is used for analyzing question in which respondents were asked to place a set of attitudes in ranking order, indicating their importance priorities or preferences, Accordingly the factor, Project cost got the highest priority index (0.87) and to the other extreme, the other factor, whenever Fire prevention and control (0.55) priority index as pointed out in the table above.

Item No	Description	Very High		High		Moderate		Low		Very low	
		F	%	F	%	F	%	F	%	F	%
1	Complexity of the Design	2	5	12	30	14	35	12	30	-	-
2	Type of Owner/attitude of owner	10	25	18	45	8	20	4	10	-	-
3	Weather Condition	11	27.5	9	22.5	18	45	2	5	-	-
4	Project cost	18	45	11	27.5	10	25	5	12.5	-	-
5	Project Duration	6	15	11	27.5	7	17.5	11	27.5	5	12.5
6	Contractual specification of safety health	14	35	7	17.5	10	25	5	12.5	4	10
7	Safety and Health Policy	15	37.5	5	12.5	11	27.5	7	17.5	2	5
8	Accidents /incidents/Near Miss report	14	35	7	17.5	11	27.5	4	10	4	10

9	Fire Prevention and control	9	22.5	3	75	7	17.5	11	27.5	10	25
10	Risk Assessment	3	7.5	11	27.5	12	30	10	25	4	10
11	Safety and Health	18	45	7	17.5	9	22.5	4	10	2	5
12	Personal Protective equipment	9	22.5	8	20	11	27.5	7	17.5	5	12.5
13	Emergency planning and procedures	3	7.5	7	17.5	17	42.5	4	10	9	22.5
14	Safety and Health Inspection	13	32.5	10	25	8	20	7	17.5	2	5
15	Safety and Health Management Meeting	10	25	8	20	12	30	7	17.5	3	7.5
16	First –Aid Provision	13	32.5	10	25	9	22.5	7	17.5	1	2.5
17	Work Environment	14	35	10	25	7	17.5	6	15	3	7.5
18	Work Environment	18	45	9	22.5	9	22.5	3	7.5	1	2.5
19.	Reward and Punishment system (incentive)	13	32.5	9	22.5	12	30	5	12.5	1	2.5
20.	Role of Government and Engineering societies	14	35	10	25	10	25	4	10	2	5

Most of Respondent realized, factors such as project cost, safety and health contractual specification of policy training, inspection, signals, signs and barricades personal protective equipment (PPE), first-aid provision work environment, reward and punishment system (incentives) and role of government & engineering societies has a very high degree of impact on safety and health performance in the construction industry. As presented in the above table, safety and health performance in the construction industry is highly affected by project duration and risk assessment. From respondent's perspective, type of owner/ attitude of owner/ weather condition, emergency planning and procedures and H&S management meeting has an average high effect on safety and health performance in the construction industry, but the other factors complexity of the design, accidents/incidents/near miss report and fire prevention and control has low degree of impact on safety and health performance in the construction industry.

4.6. Sites Observation Results

During the questionnaires survey in construction sites the researcher also performed personal observation of site, some of the respondents to substantiate the result obtained using questionnaires, from different data types and sources, the results of site observations showed the following:

Factors responsible for site accidents

The major causes of accidents are related to the company, Haman behavior, difficult worksite conditions, which result in unsafe work methods, equipment, and procedures. The scaffoldings observed on most of the construction sites selected for the study are timber scaffolding that has been used for too long time and they were constructed without a design. In most of the construction sites observed by the researcher, it was difficult to see a worker with the proper PPE.

Health and safety practices

- Workers are sometimes reluctant to use PPE see Picture 4.4 (e.g. safety shoes, Gloves, Harness etc…) Believing that it will reduce their productivity.
- From picture 4.5 the barrier need to be placed well back from the edge from collapse and allow work to be carried out around the edge of the excavation.

- Even though, the work contract strictly requires the application of OSH in the construction sites where OSH was supposed to be applied, the represented safety supervisor tends to be reluctant to properly supervise the implementation of the contract on safety with the proper PPE.
- Regarding the nature of the construction site, it is dirty and contains hazardous particles; construction material, remnant wastes and debris, and so on.

Challenges

Lack of communication, Not all good supervisors are natural communicators; they sometimes lack the skills required to deliver a good toll box talk or provide clear, effective communications on essential safety issues. Failures in communication makes for a more hazardous workplace overall and down the road can lead to employees who are less engaged in safety.

4.7 Discussions of Results

Article 37 of the labor proclamation no. 377/2003 of the FDRE requires that employers should have written safety and health policy and this should be communicated to employees. Similarly, the tables show that attention is not given by the construction company regarding safety officer and safety committee; unlike, the article (60-61) of the labor proclamation no. 377/2003 of the FDRE that states the employer has an obligation to assign safety officer as well as establish an occupational safety and health committee. This implies that the proclamation is not implemented by the construction company. The analysis also reveals that toolbox safety meetings are not conducted frequently and there is also poor provision and use of safety equipments. Even though proper reporting and correction of safety hazards is necessary for better safety, the company has not established a program for such activity. On the other hand, workers are not urged to follow safety procedures while working, based on the analysis of responses.

Fortunately, based on the table 4.3 the company have a nurse or a doctor on staff as well as there is first aid kit with sufficient materials in it (25% agree). Nevertheless, little training and orientation is given to employees regarding health and safety by the company. This contradicts with the provisions of ILO (1995) and the labor proclamation no. 377/2003 of the FDRE,

which seriously requires the provision of regular health and safety training to employees of the construction company. Again with regard to site safety inspections, the company conducts safety inspections regularly. Some of the engineers/foremen do not believe their company gives priority for safety as they give priority for profitability. This is not in agreement with the principle safety comes first.

Because of the fact that there is weak safety and health condition in the construction industry, the engineers suggest strong government regulation for the implementation of safety and health standards (87.5% strongly agree). This result is consistent with the finding of CREATE (2009) in South Africa, noted that enforcement of the construction regulation is inadequate and that the OHS inspectorate is understaffed and lacks the requisite construction expertise. Therefore, more attention should be given for the implementation of safety and health standards by the Ministry Of Labor and Social Affairs and other concerned government bodies in Ethiopia. Based on the responses for survey questions 26,28 and 29 similarly, CREATE (2009) attributes Poor construction H&S performance to a lack of management commitment, inadequate supervision and inadequate or a lack of H&S training. The most frequent type of accident that occurs at construction areas according to this survey is falling form a height, falling stair way ladder, workers falling from scaffolding during construction work. But this result is not in agreement with the finding of Helander (1991) rho found that 52% of fatal accidents occurred in UK are due to falls from roofs, scaffolds and ladders. When it comes to the main cause of accidents in construction sites, poor working conditions/environment is the first one followed by lack of personal protective equipment (PPE). According to Article 41 of the labor proclamation no. 377/2003 of the FDRE that states the employer is obliged to provide workers with the appropriate personal protective equipment besides the employer is responsible for the maintenance of the PPE.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Conclusions

Safety and health in workplace is a vast discipline consists of various aspects in human life which is considers as fundamental for healthier and sustainable life style. Most of the findings are consistent with the obvious literature in other developing countries. It is found that the level of occupational health and safety practices in the Ethiopian construction industry is very poor. Indeed the construction industries are working very hard to improve its health and safety record, this paper based on the analysis concluded that:-

- The construction companies do not have occupational safety and health (OSH) components like written safety policy, health and safety committee, hazard identification and reporting program, and properly placed safety signs.
- In the company there is a shortage of health and safety officer or they are very small in number relatively, there is careless and lack of motivation of management for implementation of health and safety practice, training and also budget constraint. Additionally there is carelessness of worker attitudes and lack of safety Knowledge.
- Poor working conditions/ environment and lack if personal protective equipment (PPE) is the main cause of accidents in construction companies. On the other hand foot and hand injuries as well as falling from height are the more frequently occurring types of accidents in the industry.

5.2. Recommendation

- To improve the level of occupation health and safety practices in the construction industry, the concerted effort of stakeholders of the construction company including owners, management and employees of construction companies, consultants as well as government is necessary.
- It is imperative for the construction company to increase the quality and quantity of safety and health supervisors since port supervision is the main reason which is responsible for the accident occurrence.
- Regular health and safety training and orientation should be given to employees by construction companies; the ministry of labor should also give training to representatives (e.g. safety officers) of construction companies and certify them. The safety officers' intern will train workers in their respective companies and inspect the site regularly.
- Regular work place hazard analysis and construction materials inspection and giving adequate orientation on ways of performing job safely and about the hazards related to their work activity are vital actions in kipping workplace safer.
- To monitor health and safety performance (such as reports, audits and inspections) during bid the contractor should have incorporate safety audit report for their qualification. The contract document prepared for tender should have guidelines for health and safety regulation and enables the enforcement of rules and regulations for health and safety problem minimization.
- Occupational safety and health education should be given by colleges/ universities to student who will be working in the construction section when they graduate.
- An adequate budget for safety and health provision should be stated in all construction contracts which should be approved by all parties. Safety as a pay item in contract document is suggested to be included.
- Finally all parties in construction project must contribute their rightful parts towards making construction sites healthy and safe.

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APPENDIX A: QUESTIONNAIRE

St. Mary's University

School of Graduate Studies

Department of Project Management

Assessment of Construction Safety and Health Management Practice in Building Construction Projects in Addis Ababa: In case of Bamacon Engineering P.L.C

Dear Participant

This questionnaire is designed to assess the practice of health & safety management in building construction projects in Bamacon Engineering P.L.C. The main objective will be to assess the current safety and health management practice in building construction sites at Bamacon Engineering P.L.C.

The information obtained will be used for academic purpose only; All information and feedbacks will be kept strictly confidential. Your experience and educational background in the construction industry will greatly contribute to the success of my study and I believe this kind of study will be an input for the development of Ethiopian construction industry. So, I am kindly requesting you to respond each and every question.

Thank you,

Maheder kedir

+251-913103186

Gmail: mahederkedir3@gmail.com

Part one: About the respondents

Mark "√"on the space provided

1) Job title of respondent

Project Manager ☐ Project Engineer ☐ Health & Safety engineer ☐ Others☐

2) Educational status of respondents

MSc/MA ☐ Degree ☐ Diploma ☐ Others ☐

3**)** Respondents work experience_____ (years)

Part two: Organizational, Technical, procedural and environmental factors

Mark "√ "on the space provided

Item no	Description	Strongly disagree	Disagree	Neutral	agree	Strongly agree
1.	The company has written health and safety policy					

2.	The policy is communicated to all concerned parties in the company					
3.	The company has a health and safety committee					
4.	The company has a designated health and safety officer					
5.	The company holds craft toolbox safety meetings frequently					
6.	The company provides and enforces the use of safety equipment					
7.	A program is in place for the reporting and correction of workplace hazards					
8.	Workers are encouraged to intervene when unsafe conditions are observed					
9.	The company will take disciplinary measures on workers who do not follow safety procedure					
10.	The company has a nurse or a doctor on staff					
11.	First aid materials are available and easily accessible in the company					
12.	The company provides health and safety training to employees regularly					
13.	The company provides safety orientation for new employees					

14.	The company conducts regular site safety inspections					
15.	The safety inspection results are documented and communicated					
16.	Hazardous jobs are clearly identified and special attention is given by the Company					
17.	Unsafe jobs will be stopped by safety officers when they are found					
18.	The company gives priority for safety as they give priority for profitability					
19.	There should be a strong policy or regulation for the implementation of safety and health by the government					
20.	The accidents occurred before are mainly due to employee's mistake					
21.	The accidents occurred before are mainly due to faulty procedure of work					
22.	Sometimes I have to ignore a safety rule or policy in order to complete an assignment to meet the schedule					
23.	Safety signs are properly put in place at the working site					
24.	The company has a medical insurance for all workers					
25.	When workers lose their working ability due to occupational accident the y are given					

	Compensation					
26.	I have the safety knowledge needed for the hazards we face on this job					
27.	The site supervisors always follow site safety rules and procedures very closely					
28.	The company do not force workers to work too many hours per week on their Job					
29.	The laws, directives and regulations of the country regarding health and safety are know and implemented by management of the company					

Part Three: please tick ("√") mark on the appropriate column indicating the frequency of injuries caused by the accidents presented in the Description column in construction sites of Bamacon Engineering PLC

Item no	Description	Very high	Medium	Low	Very low
1.	Falling (Objects falling from a height)				
2.	Falling Stairways and ladders				
3.	Scaffolding (Falling from scaffolding during construction)				

4.	Excavations (Slides, collapse, not shored protection…etc.)				
5.	Electricity (Electric power Accidents)				
6.	Construction Hoists &Elevators and Cranes & Derrick (sudden dismantling)				
7.	Hazardous substances (careless /miss use)				
8.	Noise				
9.	Tools and Machinery (Drilling, Grinding, Bending…etc.)				
10.	Fire（from electric, fuel, chemical etc.）				

Part Four: Factors that affect safety and health performance in the construction industry

Please Mark "√" on the space provided.

Item No	Description	Very high	high	Moderate	low	Very low
1.	Complexity of the Design					
2.	Type of Owner/attitude of owner/					
3.	Weather Condition					
4.	Project Cost					
5.	Project Duration					
6.	Contractual Specification of Safety health					
7.	Safety and Health Policy					
8.	Accidents / Incidents / Near Miss Report					
9.	Fire prevention and control					
10.	Risk Assessment					

11.	Safety and Health Training					
12.	Personal Protective Equipment					
13.	Emergency Planning and Procedures					
14.	Safety and Health Inspection					
15.	Safety and Health Management Meeting					
16.	First-Aid Provision					
17.	Safety Signals, Signs and Barricades					
18.	Work environment					
19.	Reward and Punishment System (Incentives)					
20.	Role of Government and Engineering Societies					

APPENDIX B: BAMACON ENGINEERIG PLC weekly safety report format

BAMACON Your construction partner®	*Company name* ባማኮንኢ.ንጅነሪንግኃ.የ.የግ.ማ **BAMACON ENGINEERING P.L.C**	Form No: OF/ED/23	
Form: Title	**Title:**Weekly Safety report	ISSUE NO 1	**Page No:61 of 3**

Project Name:		
Prepared by (SafetyEngineer/Officer)		Signature
Report Period	25/10/19	

1. SAFETY RECORD:

ITEMS	THIS WEEK	PREVIOUS WEEK	REMARK
Average number of employees	73	70	
Number of Near-miss	1	0	
Number of Minor accidents	2	3	
Number of Moderate accidents	0	0	
Number of Major accidents	0	0	
Number of Fatal case	0	0	
Number of dangerous	0	0	

Occurrences			
Total Man Hours lost	7hr	0	
Total Sick Leave Days(hours)	8hr	0	
Total Cost of Treatment	53 birr	0	
Total cost of sick leave, man-hour lost, and treatment	53		
Total Safe Man-hours	4,088hr		
Number of Risk Assessment	1	0	
INDUCTION PROVIDED			
Number of Tool Box training attendees	43		
Number of inducted employees and sub-contractors	3		
Number ofInducted Visitors			
MONITORING (Use Yes or No)			
Site inspection conducted	yes		
Job hazard Analysis conducted	yes		
Hazard Observation / Improvement Note sent to Project Manager and Head office	no		
Stop Work Notice Sent to Project Manager	no		
PPE worn by all employee	yes		

2. TOOL BOX TALK CONDUCTED RECORDS

Topics	No. of Attendees	Remarks
Proper use of ppe	43	
TOTAL		

3. SUB-CONTRACTOR RECORD

Company Name	Work Scope	Total No. Of Employees	Total Accident Occurred				Remark
			Minor	Moderate	Major	Fatal	
	Bar bender	18	1	0	0	0	
Mesfin	Carpenter	31	1	0	0	0	

No	NAME (INJURED	SEX	POSITION	ACCIDENT	TYPE OF ACCI	CAUSE OF	ACTION	MANH	SICK	PER DAY PAY	COST OF TRE

4. Accident records

				TIME	DATE							
	kassa	M	D/L	2:20 pm	23/10/19	minor	Nail injury	First aid given by the time of injury	0 b/che start his work immediately after taking first aid	0	75	0

5. DETAILS OF ACCIDENTS AND INCIDENTS

Accident /Incident Description	Category Of Incident			Body Part
	Major (Disability, Fatality)	Moderate	Minor	
Nail injury during playwood transportation			yes	On finger

6. Major challenges during the week

Major challenges during the week
The workers are not welling to wear the helmet after giving the orientation
There is no room for workers for changing and store their materials

7. **Lessons learned during the week**

Lessons learned during the week
Punishing the workers who do not wear appropriate ppe on site
Prepare changing room for the workers

APPENDIX C

Figure 4.4 excavating without safety shoe

Figure 4.5 misplaced barrier guard