



**Practices and Challenges of occupational health
and safety standard implementation in building
construction projects in Addis Ababa**

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**A project work submitted to Addis Ababa University, School of School
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of the Requirements for the Degree of Master of Arts in
Project Management**

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Approval page

**Practices and Challenges of occupational health and
safety standard implementation in building construction
projects in Addis Ababa**

By Solomon Woubshet

Approved by Board of Examiners

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Declaration

I, the undersigned declare that this project work is my original work, and has not been presented for degree in this or any other university and all sources of material used for thesis have been fully acknowledged.

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Addis Ababa, Ethiopia

Place

June, 2020

Date of submission

Statement of Certification

This is to certify that **Solomon Woubshet Argaw** has carried out his project work entitled “Practices and Challenges of occupational health and safety standard implementation in building construction projects in Addis Ababa”. This work is original in nature and is suitable for submission for the award of Master of Arts Degree in Project Management.

Abraraw Chane (PhD)

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Signature

Date

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Abstract

Occupational health and safety practices are designed to handle accidents and illnesses that occurred during work and due to the effects of work. To manage the issue International, regional and national organizations have developed standards, directives and guidelines. Construction is one of the highest occupational illnesses causing sector that result in several fatal and nonfatal accidents. The objective of this paper is to assess practices and challenges of the implementation level of occupational health and safety standard intended for construction sector in selected building construction firms found in Addis Ababa. In presentation of results descriptive approach is followed based on quantitative and qualitative analysis of data collected from twenty one randomly selected grade one construction firms. From the willing firms' persons having direct involvement in the area including safety and health officers, project managers and other staffs are identified and administered with the questionnaire. The data is collected through questionnaire inquiring the awareness, practices and challenges of occupational health and safety standard implementation. The collected data is analyzed using SPSS statistics tool. The study showed that only nearly half of the participating firms know about the availability of the standard and many of them are not using it. In the other hand the requirements stated in the standard and in other literatures are not well placed and not practiced properly. Integration of occupational health and safety in business activities, of lack of budget, absence of planning and identification of hazards and participation of workers in this activities are major findings of the study. It is also observed that nearly half of the participating firms do not have a function that handles occupational health and safety issues. The major challenge raised from the participating firms is lack of management commitment in implementing the requirements and practices in construction sites. As a recommendation the firms should use the standard and apply the requirements and other practices to save the life of their workers and the resource wasted in relation to accidents. Finally this paper provides a highlight on occupational status of participating firms which will be used as an input for further detail study on the overall status of the firms with this respect.

Keywords: occupational health and safety, construction, standards, accidents, challenges, practices

Chapter One: Introduction

1.1 Background

1.1.1 Introduction

Occupational safety and health (OSH) is generally defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the work place that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment (Alli, 2008).

The domain of occupational health and safety is necessarily vast, encompassing a large number of disciplines and numerous work place and environmental hazards. A wide range of structures, skills, knowledge and analytical capacities are needed to coordinate and implement all of the “building blocks” that make up national OHS systems so that protection is extended to both workers and the environment (Alli, 2008).

In response to the global challenges to develop occupational health services, the WHO/ILO/ICOH launched a joint effort on the Development of Basic Occupational Health Services (BOHS) with the objective of providing occupational health services for all working people in the world, regardless of the sector of the economy, mode of employment, size of the workplace, or geographic location. (Rantanen, 2005)

1.1.2 Occupational health and safety practices in Ethiopia

Occupational health services are available only to 10–15% of the workers in the world. In industrialized countries, the coverage varies between 15% and 90%, and in developing countries, it ranges between a few percents and 20%. Even where such services are available, their quality and relevance may be low (Rantanen, 2005).

In Ethiopia governing safety and health at work on legal basis dates back to 1940s when the first legal instrument Proclamation No. 58/1945, which is replaced by Proclamation 232/1964 in 1964, was publicized (Seblework, 2006). Due to the pre maturity of the development of Labor administration system many parts of the proclamation was copied from Britain.

Since then the issue was addressed in different ways and supported by different policies strategies and standards at different times. At this time Ministry of Labor and Social Affairs is given a responsibility to administer occupational health and safety issues in Ethiopia. In the other hand Construction Works Regulatory Authority is mandated to inspect the occupational safety of construction projects.

The Ministry of Labor & Social Affairs' (MOLSA) is established with a mission of promoting effective, healthy and peaceful industrial relations through social dialogue and good labor administration with quality occupational safety and health services at both national and regional levels (Wheeler & Goddard, 2013). The ministry has a team in Directorate of Harmonious industry relations that work on the occupational health and safety practices of the country with bureaus found in regional states and city administrations.

The Ministry assigns inspectors to assess the situation in the work places towards health and safety practices. In addition handle disputes that occur in relation to the issue. Due to the shortage of workers in the team and regional offices they fail to address each case.

The ministry developed occupational health and safety policy and strategy in 2014 aiming to ensure a tripartite cooperation to ensure a healthy and safe work environment. In general the policy has provisions preventive actions and gaps in the existing actions towards the implementation of occupational health and safety practices (MoLSA, National Occupational Safety and Health Policy, 2014). The strategy focuses on establishment of proactive accessible, effective and efficient inspection system. It also designed to develop, endorse and implement laws, standards and conventions based on the context of the country (MoLSA, National Occupational Safety and Health Policy, 2014).

1.1.3 Construction sector

Construction industry is the largest and most complex fragmented industry that involves owners from different orientations, consultants to design and monitor contractors, project managers, supervisors, regulators, and craftsmen. Furthermore, the product is usually "custom made," with almost every project having a separate and unique entity, conceived, financed, designed, constructed, and operated separately. Each of the groups that

contribute directly or indirectly to construction is represented by individuals, organizations, or associations with diverse and often fragmented interests.

All the other contributors, to the overall construction effort, including government representatives, planners, engineers, architects, bankers, bonding companies, material suppliers, lawyers, accountants, and others are equally diverse in their talents, interests, and ways of operating.

The construction sector, which is the second most important sector in the Ethiopian economy in terms of workforce and 9.5 percent of the GDP in 2016, is crucial in ensuring the successful transformation of the economy (ENA, 2018). The sector contributed 3.5 percent to the overall GDP growth of 10.9 in 2017 (WBG, 2018).

The sector has large number of workers with different educational, cultural, physical, social and economic backgrounds. In the future it is assumed to continue hiring many more workers due to the focus given by both government and private sector to build new infrastructures.

To this end the ministry rate contractors in different grades based on various requirements basically based on working capital, professional human resource, number and type of machineries, annual financial transaction, and structure and so on. It classifies the industry from grade one contractor with highest class having many of financial, human, material and structural requirements to grade seven only a graduate in construction sector having a license.

1.1.4 Construction hazards

The diverging interests of entire participants make the sector more prone to occupational health and safety issues. There are a number of hazards that occur and most of them happen due to the absence of proper preventive practices. There are several accidents that resulted in fatal damage and loss of life to the workers in the sector.

In this instance Construction Works regulatory Authority which is established recently is mandated to inspect occupational health and safety practices in addition to building inspection works. The authority maintains records of construction related accidents.

1.1.5 Occupational health and safety laws

There are different laws that cover the occupational health and safety starting from the Constitution of Ethiopia to directives enacted by Ministry of labor and social affairs.

Ethiopian constitution has provisions of Occupational health and safety issues. Some of the major provisions are stated here

Article 9 states about the supremacy of the constitution in the hierarchy of the laws of the land and all international agreements ratified by Ethiopia are an integral part of the law of the land.

Article 44 (1) states about environmental rights and declares that all persons have the right to clean and healthy environment.

Article 89 (8) in relation to economic objectives, it states that, government shall endeavor to protect and promote the health, welfare and living standards of the working population of the country.

Labor Proclamation (Proc. 1156/2019) in Article 92 declares that every employee has the right to enjoy suitable measures of protection, safety and hygiene at work as the employer is required to take all necessary measures to safeguard the health & safety of workers. It is considered unlawful for an employer to require a worker to execute work, which is hazardous to his life.

The proclamation also enforces the employer to comply with the occupational safety and health requirements provided for and to take all the necessary occupational safety and health measures and to abide by the standards and directives to be given by the appropriate authorities in respect of these measures. The owner is also obliged to assign safety officer; to establish an occupational, safety and health committee; to provide workers with protective equipment, clothing and other materials and to instruct them of its use.

Public Health Proclamation No 200/2000 also has provisions regarding to occupational health and safety issues in order to protect the health of the public. It enforces the employer to ensure the availability of occupational health services to his employees.

There is a directive enacted by the Ministry of Labor and Social Affairs in relation to occupational Health and Safety describing the practices and precautions to be considered during work activities. The directive provides a specific provision on the construction sector in part five due to its prevalence of occupational health and safety-related hazards.

1.2 Statement of the problem

Construction sector make significant contributions to the socio-economic development of Ethiopia. It contributed 3.5 percent to the overall GDP growth of 10.9 in 2017 which is next to agriculture (WBG, 2018). It is also most important sector in job opportunities that allow a range of employment from the daily laborers to experienced professionals.

For the last two decades the number of occupational accidents and related injuries is increasing in most of the developing nations such as sub-Saharan countries and Ethiopia from year to year (MoLSA, National Occupational Safety and Health Policy, 2014). According to ILO report (2014) worldwide 2.34 million people die annually in relation with their occupation which means 6,400 workers die every day. Among these 322,000 workers die due to occupational accidents.

In reality, out of the total 3 billion workers in the world, over 85% of them work and live in a condition with no access to proper and effective occupational safety and health services and facilities (Rantanen, 2005). Construction work involves a serious of occupational risks, such as work at heights (use of scaffolding, gangways, and ladders), excavation work (use of explosives, earth moving machines), lifting of materials (use of cranes, hoists), and so on, which are specific to the sector. Construction is often classified as a high-risk industry as it has historically been plagued with much higher and unacceptable injury rates compared to other industries. (Adane, Gelaye, Sharma, & Beyera, 2013; Hoonakker & Loushine, 2005)

Addis Ababa is one of the major construction sites that many complex infrastructures and buildings are under progress for various purposes. The buildings range from small residential buildings to high rise commercial buildings constructed by local, public and foreign contractors. In this projects many thousands of workers with varying educational, professional and practical backgrounds.

According to a report of the Ethiopian ministry of labor and social affairs (MOLSA) from 334 companies total of 4535 work-related accidents were reported 100(2.21%) were fatal whereas 4435(97.79%) were non-fatal in 20015/16 fiscal year. Due to these safety and health-related problems, a cost of 3,787,430.76 ETB is incurred for medical care and loss of 11,466 workdays by absent injured employees (Assegid, 2018). In the other hand in 2016/17 reported 655 accidents from 522 companies that caused injuries on 1551 workers from which 25 lost their life (MoLSA, six month performance report of Ministry of Labor and Social Affairs, 2017). This shows an increase in number of firms facing accidents.

Measures and strategies designed to prevent, control, reduce or eliminate occupational hazards and risks have been developed and applied continuously over the years to keep pace with technological and economic changes (Alli, 2008). Regardless of the directive, policy, strategy (MoLSA, National Occupational Safety and Health Policy, 2014) and standard (ESA, 2015) on Occupational health and safety enacted in Ethiopia, there are a number of injuries and deaths reported annually in the construction projects that are mainly caused by the absence of occupational health and safety practices.

Having all this the accident rates in the construction sector especially in Addis Ababa doesn't show a positive change instead it is increasing from year to year. As the report from Addis Ababa Labor and Social Affairs Bureau shows 39 peoples die due to accidents in relation to construction within the first six months of 2019/2020 fiscal year (AddisTv, 2019). The practices of implementing the requirements stated in the directive and standard are not well studied and organized. Inadequate awareness of occupational hazard, limited use of PPE at the work place, and poor personal hygiene were noted to be contributing factors to excess exposures such as unsafe work environment, dust and noise in Ethiopian construction sector (Kumie, et al., 2016)

There are different researches conducted on the status of occupational health and safety practices in different sectors including construction. After compulsory enforcement of occupational health and safety standard for construction in 2015, the practices of the requirements and challenges facing during its implementation is not assessed.

This research attempts to identify the health and safety practices and challenges of construction firms in implementing occupational health and safety standard in Addis Ababa level that is developed to produce best guiding practice for health and safety of constructions. Specifically, the purpose of this study is to assess the current standard implementation related practices and challenges in Addis Ababa construction firms and forward the necessary recommendation based on the result of the study.

1.3 Research questions

The following questions are raised during the study

- At what level do the contractors are aware of the existence and requirements of the occupational health and safety standard?
- What are the practices of contractors in implementing Occupational health and safety standard in the construction firms?
- What are the challenges that affect the implementation of occupational health and safety standards?

1.4 Objective of the study

1.4.1 General objectives

The main objective of this paper is to assess the practices and challenges of implementing occupational health and safety standards in building construction projects in Addis Ababa.

1.4.2 Specific objectives

The paper has the following specific objectives

- Assessing the awareness level of contractors on the Occupational health and safety standard participating in the building construction
- Analyzing the level of practices of implementation of Occupational health and safety standard in building construction projects

- Identifying the major challenges in implementing Occupational health and safety standard in building construction projects of Addis Ababa conducted by grade I contractors

1.5 Scope of the study

This paper focuses on the assessment of the practice and challenges of implementing occupational health and safety standards in building construction projects done by grade one contractors in Addis Ababa. The paper tries to address in assessing awareness of the project managers on occupational health and safety and standards related to it. In addition, it assesses the challenges that the project managers facing in applying safety and health-related tasks. On the other hand, the practices conducted to address occupational health and safety issues in each of the sample projects will be assessed with respect to the standard requirements.

1.6 Significance of the study

The study will provide the existing reality in the area of occupational health and safety related awareness, challenges and practices. The findings can be used by regulators, standard developers, and policy makers in considering the suitability of requirements and enforcement mechanisms of the standard in the sector. In addition to this, it helps to attract the attention of the project managers and contractors towards the standard requirements by providing those experiences of construction projects that implemented the standard. In addition to this, it can be used as an input for further research in the area.

The paper tries to analyze the awareness of contractors on occupational health and safety standards available in Ethiopia by asking their information on it. In addition to this through questionnaire and observation of some documents the level of practice in implementing occupational health and safety will be evaluated among construction firms.

The challenges that the companies face to implement the practice will be assessed through questionnaires and interview to clearly identify the root cause of the problem. Based on literature the results will be compared and tried to categorize the participant firms into groups of different maturity levels. It also provides conclusions and recommendations based on what is observed from the analysis and the literature.

1.7 Limitations of the study

In doing this paper there are some limitations that may affect the output of the results. The current situation of the country due to COVID 19 pandemic makes free movement of people and accessing responsible and willing respondents to gather the appropriate data. The other limitation will be availability of documented evidences showing the real practice and some respondents may not give true information. In the other hand the respondent's level of understanding on the issue may be different due to experience and exposure to the sector within the firm.

To handle this issues the researcher will try to take care in collecting data by using official emails and other communication means to provide the information. Discussion through telephone will be made with the responsible person in the issue to fill the questionnaire and provide relevant information. To ensure the reliability of information given in the questionnaire cross checking questions will be included. In addition to this for appropriate situation interview and document review will be made.

Chapter two: Literature review

2.1 Introduction

To protect workers and other valuable assets it is advisable to establish a safety and health program at the job site. Exposure of workers to injury or illness, even for a short time, can cause significant disruption and cost to the firm as well as the workers and their families. It can also damage workplace morale, productivity, turnover, and reputation.

Working to develop a proactive approach in occupational health and safety programs fosters a proactive approach to find and fix hazards before occurring. This requires the engagement of owners, contractors, project managers, regulators, and all workers in the site. Establishing coordinated and effective programs to handle the problems seems a headache to all stakeholders due to the varying reasons they raise on the issue regardless of their negligence (Rantanen, 2005).

2.2 Occupational health and safety

Both health and safety programs deal with the prevention of ill health arising from working conditions. They consist of two elements that are occupational medicine, which is a specialized branch of prevention of health hazards at work and dealing with any ill health or stress which has occurred despite preventive actions, and occupational hygiene, which is the province of the professionals engaged in the measurement and control of environmental hazards (Gaceri, 2015).

The World Health Organization (WHO) considers occupational health to be among the most important indicators of health status in both developed and developing countries (WHO, 2015). The first ILO/WHO Joint Committee on Occupational Health in 1950 defined occupational health services and called for actions to develop them for workers. Since then, the Joint Committee has dealt with issues of occupational health services in several meetings. The 13th Joint Committee in 2003 discussed the needs, structures, and content of basic occupational health services as a strategy to expand substantially the global coverage of services, particularly to underserved sectors (Rantanen, 2005).

The initiative launched by WHO/ILO/ BOHS, has the ultimate objective of providing occupational health services for all working people in the world, regardless of the sector of the economy, mode of employment, size of the workplace, or geographic location (Rantanen, 2005). Gaceri (2015) proposes safety programs be designed in two primary ways to accomplish their purposes. The first approach is to create a psychological environment and attitudes that promote safety. This must be accompanied by strong company policy emphasizing safety and health. The second approach to safety program design is developing and maintaining a safe physical working environment (Gaceri, 2015).

With this respect, Rajaprasad & Chalapathi(2015) recommend a sustainable construction during various stages of construction to be practiced through six principles: monitoring quality, safe work environment, protection of the natural environment, utilizing recyclable resources, reducing resources, and enhancing reuse (Rajaprasad & Chalapathi, 2015). Many of them have a direct relationship with occupational health and safety. To promote health and safety meaningfully and to ensure the health and safety of workers any practice should focus on both individual behavior and work organization and design.

2.3 Factors determining occupational health and safety

There are different arguments on the causes of accidents in workplaces and different researchers tried to identify the factors that play a major role in occupational health and safety issues. Some of the common factors discussed in different works of literature are presented

2.3.1 Company size

The effect of the company varies based on the sizes of the companies. In most cases, the factors that affect smaller firms vary from factors that affect larger firms. Many of these factors tend to inversely correspond to the size of companies, in that smaller companies struggle more than larger ones (Nordlöfa, Wiitavaaraa, Högberga, & Westerling, 2017). In different studies, it is observed that work-related injuries and deaths occur disproportionately in small -to- medium-sized enterprises (Kaassis & Badri, 2018)

2.3.2 Top management

Managers are key persons in an enterprise to design and improve the working conditions and thus influence the health of subordinates. They are responsible for deciding on changes in the workplace and work environment. All these facets are instrumental in determining the intensity of Health and Safety at work. It is assumed that strong, effective, and visible leadership is vital to good workplace safety and health. A committed and responsible management legally and ethically protect employees from accidents and ill health — it's a sign of a business that is likely to grow and thrive.

2.3.3 Worker factors

Occupational Health and Safety management will be more likely to succeed if it encourages the active participation of workers and sets up a dialogue between employees and management (EU-OSHA, 2016). ILO convention for construction (ILO, technical convention, 1988) also requires worker representatives to involve in occupational health and safety practices.

The level of awareness and commitment of workers towards occupational health and safety determines the effectiveness of the practice within a firm. Employee involvement can, until now, be expressed in terms of compliance by employees to regulations, standards, and for following all employer safety and health rules and regulations, and for reporting hazardous conditions to the supervisor (Dessler, 2014).

2.3.4 Safety culture

The concept of safety culture is often used to illustrate that there are social processes in organizations that help or hinder certain behaviors or outcomes regarding occupational health and safety. There are shared values and norms (culture) among humans that are learned through socialization in the workplace (Nordlöfa, Wiitavaaraa, Högberga, & Westerling, 2017).

The key aim of safety training is not to meet regulatory training standards. Rather, it is to impart the knowledge and skills required to reduce accidents; just to improve the perception of safety and health hazards, to enhance knowledge of the causes of

occupational illness and injury, and promoting the implementation of effective preventive measures (Dessler, 2014).

2.3.5 Financial performance

Financial performance of companies is often assumed to be associated with occupational health and safety adjustments in the workplace in general and sometimes to occupational health and safety management practices in particular (Larsson et al., 2007). The assumption is that if humans operate in a good work environment that is safe, healthy, ergonomically sound, creative, and so on, these beneficial factors will be reflected in the financial performance of the company.

In addition to this site condition, equipment and tools are also other factors that determine the effectiveness of occupational health and safety practices. Positive action on all the listed and other factors makes the practice fruitful and plays a vital role in reducing accidents related to work-related hazards. This may require some amount of money to place them on the worksite. On the other hand, less attention given to any of these factors increases the vulnerability of worksite to occupational hazards that may have an interrelated consequence leading to bad situations to the overall progress of a firm.

2.4 Occupational health and safety theories

An accident is an unplanned and uncontrolled event that has led to or could have caused injury to persons, damage to a plant, or other loss. Different theories have attempted to explain the causes of accidents and safety. Understanding the causes of accidents helps to devise mechanisms to manage them. Management of accidents generally is supported by safety and health practices, rules, and procedures.

Due to the nature of accidents and the assumptions made on their cause and the safety and health practices conducted to manage them, different scholars develop theories that can be used as a basis for its management. Some of the accident theories are discussed as follows (Shahab, Hosseinian, & Torghabah, 2012)

2.4.1 Domino Theory

Herbert W. Heinrich, an early pioneer of accident prevention and industrial safety developed a safety theory suggesting that unsafe acts of people are the cause of a high

percentage of accidents – he assumes more of accidents are caused by humans rather than conditions. HR practices such as training, rules and regulation, awareness, rewards, employee participation, programs, and inspections play a key role in controlling accidents in the workplace.

2.4.2 Ferrell's Human Factor Model

Ferrell's model incorporates multiple causes and is the result of an error by an individual. He recognized general causes of accidents as below:

- i. The emotional state of the individual such as unmotivated and agitated.
- ii. The physical and educational background, training, and even genetics play a part in accident causation. Situational factors such as exposure to drugs, pollutants, and job-related stressors are also responsible for accidents.
- iii. The load on the individual which includes the difficulty of the task, the negative or positive effects of the environment (noise, lighting, ventilation, etc.), and even the danger level of the task.

2.4.3 Peterson's accident/incident model

Peterson believed that there are two major causes of accidents namely unsafe acts and unsafe working conditions. Human error is due to overload, traps, and the decision to error. Human error may directly cause an accident or may cause system failure which may cause an accident resulting in injury or loss. System failure is due to an error in policy, responsibility, authority, accountability, measurement, inspection, correction, investigation, orientation, training, selection, safe operating procedure, standards, hazard recognition, records, medical, and others (Ranjan, <https://www.rlshumancare.com>, 2020).

2.4.4 Multiple causation theory

Each of the causes has its branch back to reach the root cause of the accident. It is also known as 'Fault -Tree-Analysis'. As per this Multiple Causation theory, many contributing factors combine in random fashion, causing accidents. Such factors should be identified as mostly man, machine, and media interact with each other to generate causes for accidents, and management has to identify them and provide necessary safety measures (Ranjan, <https://www.rlshumancare.com>, 2018).

2.4.5 Bird's updated theory

Bird's Accident Ratio is most widely applied in the industry. He gave the accident proportion as below:

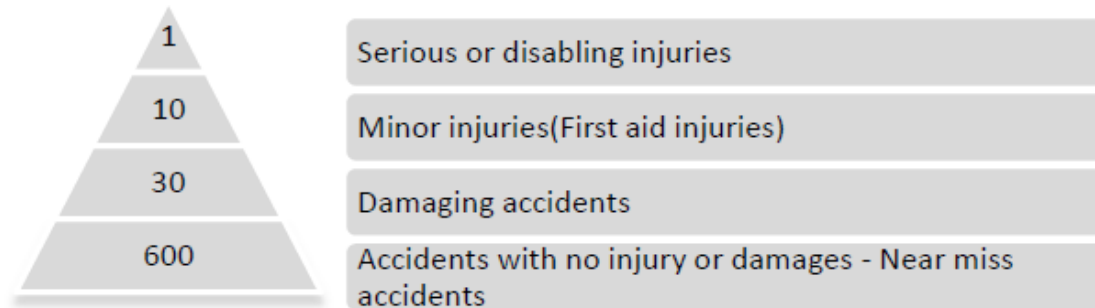


Figure 1: Bird's Accident Ratio (Source Shahab, Hosseinian, & Torghabab, 2012)

This theory emphasizes the higher concentration should be given to near-miss accidents.

2.4.6 The 'Swiss cheese' Model

It is developed by James Reason (1970-77). He mentioned that, "with a higher level of protection company will not be commercially profitable and if the protection level is less then accidents are susceptible and lose business opportunities. There must be equilibrium for commercial survival of the business".

All the theories tried to discuss the relationship between accidents, work, work environment, and people in one way or another. Besides, they recommend measures to be taken to manage them properly. These management recommendations may vary from place to place due to the personality of workers, site conditions, and awareness on the issue, legal framework, and type of work done.

2.5 Occupational health and safety Practices

ILO enforces all appropriate precautions to be taken to ensure that all workplaces are safe and workers work without risk of injury (ILO, technical convention, 1988). Health and safety practices cover all guidelines, programs as well as actions collaboratively and intentionally developed to maintain a safe and healthy workplace. Due to the severity of the issue, different organizations developed guidelines, procedures, and programs indicating recommended practices on occupational health and safety. It is suggested that

to effectively address worker well-being and productivity, the traditional focus of occupational safety and health must be expanded to include an understanding and assessment of those factors that lead to healthy, happy, and productive working lives (Senso, 2017).

Occupational Safety and Health Administration of the USA(OSHA) published Recommended Practices for safety and health programs in construction in 2016 (OSHA, 2016). These recommended practices provide responsible employers, workers, and worker representatives' with a sound, flexible framework for addressing safety and health issues on diverse construction job sites. The recommended practices emphasize a proactive approach to managing occupational safety and health. (OSHA, 2016)

Based on this concern OSHA (2016) proposed seven practices to be followed to keep construction worksites safe. These are

Management leadership

The top management is responsible to demonstrate its commitment to eliminating hazards and to continuously improve workplace safety and health, and to communicate that commitment to workers, and to set program expectations and responsibilities. Managers at all levels shall make safety and health a core organizational value, establish safety and health goals and objectives, provide adequate resources and support for the program, and set a good example. This is one of the major practices that determine all other issues in the worksite.

The ILO convention gives responsibility to each employer for the application of the prescribed measures in respect of the workers placed under his authority (ILO, technical convention, 1988).

Worker participation

The involvement of workers and their representatives in all aspects of the health and safety program is another recommended practice: including setting goals, identifying and reporting hazards, investigating incidents, and tracking progress. All workers including contractors and temporary workers should understand their roles and responsibilities under the program and what they need to do to effectively carry them out.

Workers are encouraged and provided with a means to communicate openly with management and to report safety and health concerns or suggest improvements, without fear of retaliation. Any potential barriers or obstacles to worker participation in the program (for example, language, lack of information, or disincentives) should be removed or addressed. Their participation makes them responsible for themselves and the environment they are working in.

ILO describes the right and duty of workers at any workplace to participate in ensuring safe working conditions to the extent of their control over the equipment and methods of work. They shall be allowed to express views on the working procedures adopted as they may affect safety and health and comply with the prescribed safety and health measures (ILO, technical convention, 1988).

Also, workers have a responsibility to do the following to keep themselves and their co-workers (ILO, technical convention, 1988):

- a) co-operate as closely as possible with their employer in the application of the prescribed safety and health measures;
- b) take reasonable care for their safety and health and that of other persons who may be affected by their acts or omissions at work;
- c) use facilities placed at their disposal and not misuse anything provided for their protection or the protection of others;
- d) report forthwith to their immediate supervisor, and to the workers' safety representative where one exists, any situation which they believe could present a risk, and which they cannot properly deal with themselves;
- e) Comply with the prescribed safety and health measures.

Hazard identification and assessment

For this purpose, procedures are put in place to continually identify workplace hazards and evaluate risks. It enforces safety and health hazards from routine, non-routine, and emergencies to be identified and assessed. An initial assessment of existing hazards, exposures, and control measures are followed by periodic inspections and reassessments,

to identify new hazards. Any incidents are investigated to identify the root causes. Identified hazards are prioritized for control.

Hazard prevention and control

This practice encourages employers and workers to cooperate in identification and selection methods for eliminating, preventing, or controlling workplace hazards. Controls are selected according to a hierarchy that uses engineering solutions first, followed by safe work practices, administrative controls, and finally personal protective equipment (PPE). Development of a plan to ensure controls are implemented, interim protection is provided, progress is tracked, and the effectiveness of controls is verified.

In managing hazards in the worksite, the ILO convention provides a responsibility to those concerned with the design and planning of a construction project to take into account the safety and health of the construction workers under national laws, regulations, and practice (ILO, technical convention, 1988).

Education and training

In this case, all workers are trained to understand how the program works and how to carry out the responsibilities assigned to them under the program. Employers, managers, and supervisors receive training on safety concepts and their responsibility for protecting workers' rights and responding to workers' reports and concerns. All workers are trained to recognize workplace hazards and to understand the control measures that have been implemented.

Besides WHO encourages strongly the education of workers, employers, primary health care practitioners, and professionals for occupational health services. Workers' health should be integrated into basic training for healthcare (Smits, Dijk, Bubas, & B., 2015). It is the right of workers in all countries to be well informed, educated, and trained in safety and health at work.

Some authors believe that working conditions will improve over the long term when the educated and trained worker becomes an integral part of workplace safety programs (Brown, 2009). Others have strong concerns over the influence of education and training

in real-life situations (Smits, Dijk, Bubas, & B., 2015). Having all this it is clear that education and training alone cannot solve all problems in health and safety.

Program evaluation and improvement

At this level control measures are periodically evaluated for effectiveness. Processes are established to monitor program performance, verify program implementation, and identify program shortcomings and opportunities for improvement. Necessary actions are taken to improve the program and overall safety and health performance.

Communication and coordination for employers on multiemployer worksites

To provide effective communication among stakeholders, contractors, and staffing agencies commit to providing the same level of safety and health protection to all employees. Contractors, subcontractors, and staffing agencies communicate the hazards present at the worksite and the hazards that work of contract workers may create on site. Contractors establish specifications and qualifications for subcontractors and staffing agencies. Before beginning work contractors and staffing agencies coordinate on work planning and scheduling to identify and resolve any conflicts that could impact safety or health.

On the other hand, Mazitova et.al (2015) researched the status of occupational health in the Russian Federation and suggested nine priorities to be focused to improve occupational health. Some of the raised issues include (Mazitova & Simonova, 2015):

- a) Improvement of occupational health and safety legislation because of international experience to establish legislative and regulatory acts governing the compliance with the requirements of occupational health and safety as well as preserving and strengthening worker health.
- b) Promotion of the responsibility of social partners and specifying their targets regarding preserving and strengthening worker health.
- c) Overhauling of the social insurance system by rearrangement of Social Insurance Fund financial priorities toward individuals with high rehabilitation potential, specifically employees at risk for development of occupational diseases or with early stages of occupational diseases.

- d) Establishment of the system of occupational health services at the federal level following ILO 161 Convention and corresponding managing social institutions. In general, it means the rebirth of guild medical service based on a new economic framework.
- e) Increasing the number and expanding the activity of enterprise medical offices, involving general practitioners skilled in occupational pathology in the field of industrial medicine.
- f) Creation of a specialized network of medical centers providing medical, psychological, and social rehabilitation for at-risk workers and patients with occupational diseases, thereby enabling a return to work and occupational longevity.
- g) Education and training of occupational medicine specialists (eg, ergonomists, occupational psychologists, rehabilitation specialists).
- h) Wide informing of workers about occupational hazards, providing the training of health-saving behavior and healthy lifestyles.

Some of the priorities indicated are good practices that can be implemented by the contractors and some others by the government. All together support the safety and health of workers in construction sites.

To evaluate the proper implementation of safety performance criteria necessary for carrying out comparisons, estimating forecasts, conducting trend analysis, evaluating safety improvement programs, identifying problem areas, and optimal allocation of resources for improving safety performance.

The criteria must possess two characteristics i.e. reliability and validity. There are two measures of safety performance. The first is based on 'outcome indicators' i.e. Incident Rate, Frequency Rate, and Severity Rate which are blamed to be 'negative' or passive measures. Positive or Service or Active Performance Indicators include several safety audits conducted, training, corrections, and inspections (HSE, 2012).

2.6 Challenges of Occupational health and safety

Liberalization of world trade, rapid technological progress, significant developments in transport and communication, shifting patterns of employment, changes in work organization practices, the different employment patterns of men and women, and the

size, structure and life cycles of enterprises and new technologies can all generate new types and patterns of hazards, exposures, and risks (Alli, 2008).

In 2014 the number of cases of occupational disease per 100,000 in Germany, France, Spain, and Belgium was 78.1, 63.9, 57.1, and 29.3, respectively but it is found 5.5 in Russia (Mazitova & Simonova, 2015). This indicates the severity of the case in the world when compared to other types of diseases. In sub-Saharan Africa, the fatality rate per 100,000 workers is 21, and the accident rate 16,000. This means that each year 54,000 workers die and 42 million work-related accidents take place that causes at least three days' absence from work (Benjamin, 2011).

There are at least 60,000 fatal accidents in a construction site annually around the world and the fatality rate for the construction industry is almost higher than the national average among industries worldwide (Promsorn & Soponsakulrat, 2015). Most of the accidents are caused by human error. Human error is considered as an undesirable human decision or action that reduces the effectiveness of safety or system performance; other causes include inappropriate ergonomic design, quality of material, equipment technology, and personal protective equipment (PPE).

Globally, 4 percent of annual Gross Domestic Product (GDP) or \$1.25 trillion cost incurred due to work-related ill health and accidents resulted from poor health and safety practices, unsafe and unhealthy workplaces (ILO I. L., 2013).

Promsorn et.al (2015) conducted an assessment of the root causes of accidents from non-human errors and found light linked to visibility related accident in the workplace, working environment and variety of natural phenomenon, working under direct sunlight for a long period, working in an enclosed space with no ventilation, dust that builds up when cutting, drilling or grinding material, frequent exposure to a high level of noises, inadequate space or difficult entry to perform a certain task, equipment design, inappropriate PPE design, poor quality of material, absence of safety training program, inadequate provision of safety equipment as the common causes of accidents in workplaces. The author categorized all these causes into Ergonomic Design, Environment, and Supporting Policy related problems.

Diviya et.al (2017) after reviewing different works of literature developed a hierarchy of factors affecting safety management as shown in figure 2.



Figure 2: factors affecting safety management (source Diviya et.al 2017)

Different researchers tried to discuss the challenges that can face during the implementation of occupational health safety and health practices. Some of the challenges are discussed below:

Resource Challenges

The resource includes financial resources, human capital, and any other technical enhancement required to realize a safe work environment (Kaguathi, 2013). Purchasing personal protective equipment (PPE) and employing safety staff incur additional project costs. In addition to this, the emphasis of businesses on safety is proportional to the size of the company or the scale of the project (Gray & Sadiqi, 2015)

The inability to assign adequate resources due to different reasons has its impact on implementing the practices that require an additional initial cost. But investing in the safety and health of a worksite has a long time return through the reduction of accidents and ill health that improve productivity.

Organization culture

Culture is a set of important assumptions (often unstated) that members of an organization share in common. These shared assumptions (beliefs and values) among members of an organization set a pattern for activities, opinions, and actions within that firm; and they are central to the life of an organization. It is difficult to change the already established culture within a short period. For existing firms, it may be difficult to introduce occupational health and safety issues to be practiced in place of old culture developed with safety negligent tradition.

Company Structure

The positioning of safety and health in the company's structure affects the efforts made by the company to push for the implementation of safety in operations (Kaguathi, 2013). In many instances, operation managers focus on productivity than any other issue that seems to hinder their objectives. If the safety manager does not have the same power as of operations manager it may be difficult to address all procedures enacted in terms of health and safety.

Resistance in the Company

In many situations bringing new ideas work procedures and changes face resistance from different directions due to fear of losing the already established system, relationship, and work experience.

2.7 Managing Occupational health and safety issues

A positive wellbeing society can be a powerful apparatus for enhancing security in an association and making a great climate in the workplace (Divya & Bhavsar, Critical Review on Safety Management in Construction Projects, 2017). Safety management must build up and implement security policies and security frameworks. This has to include checking of security execution at the site and administer intermittent and irregular wellbeing examinations to guarantee the usage of safety and health guidelines (Divya & Bhavsar, Critical Review on Safety Management in Construction Projects, 2017). Besides, the productivity of site safety and health reviews by utilizing more qualified safety officers with full specialist ought to be expanded.

The severity and intensity of safety and health issue forced different international, regional, and national institutions to develop several laws, policies, strategies, standards, and guidelines to manage it. Many of them focus on proactive preventive issues by making the working environment safe, increasing awareness to the workers, and as a final option use of personal protective equipment.

ILO developed a convention in 1983 and it is ratified in Ethiopia in 1991 to manage occupational health and safety practices and this Convention takes into account the following main spheres of action in so far as they affect occupational safety and health and the working environment (ILO, www.ilo.org, 1983):

- design, testing, choice, substitution, installation, arrangement, use, and maintenance of the material elements of work (workplaces, working environment, tools, machinery and equipment, chemical, physical and biological substances and agents, work processes);
- relationships between the material elements of work and the persons who carry out or supervise the work, and adaptation of machinery, equipment, working time, organization of work and work processes to the physical and mental capacities of the workers;
- training, including necessary further training, qualifications, and motivations of persons involved, in one capacity or another, in the achievement of adequate levels of safety and health;
- communication and co-operation at the levels of the working group and the undertaking and all other appropriate levels up to and including the national level;
- The protection of workers and their representatives from disciplinary measures as a result of actions properly taken by them in conformity with the policy referred to in Article 4 of this Convention.

In addition to this ILO developed a convention on Safety and Health in Construction in 1991. This Convention applies to all construction activities including building, civil engineering, and erection and dismantling work, including any process, operation, or

transport on a construction site, from the preparation of the site to the completion of the project (ILO, technical convention, 1988).

Safety management is related to the arrangements, targets, techniques, strategies, parts, and capacities that go for controlling threat and hazard in socio-specialized systems. The mindfulness and impression of workers toward safety, wellbeing, and their workplace are the essential perspectives to upgrade the building construction to a better condition to the workers (Divya & Bhavsar, Critical Review on Safety Management in Construction Projects, 2017).

OSHA, the American occupational health and safety administration developed standards, guidelines, and practices to be implemented in different sectors to control the accidents. The administrator developed a hierarchy of control as shown in figure 3.

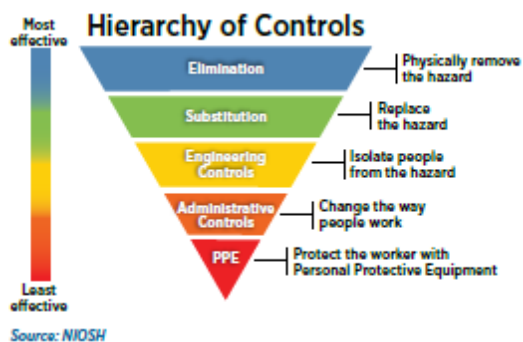


Figure 3: Hierarchy of controls of OHS (source OSHA, 2016)

Promsorn et.al (2015) recommended managing the occupational and health-related accidents especially in construction sectors to either focus on the ergonomics design or on supporting policy as the environment is an uncontrollable factor. Construction companies should look to improve their policy or the ergonomics design to cope with environmental factors (Promsorn & Soponsakulrat, 2015).

Researches show that there are three basic categories of construction accidents which are ergonomic design, environment, and policy. To manage all these focus shall be given to either focus on the ergonomics design or on supporting policy as the environment is an uncontrollable factor (Promsorn & Soponsakulrat, 2015).

Charehzehi Ahankoob et al. (2012) identified some imperative elements that make a critical bit of accidents include: safety management error, poor training programs, the human element, demonstration of god, obsolete method, and no reasonable monitoring approach. Based on these identified issues they developed persistent safety advancement that includes 6 stages. These include making safety direction, distinguish risk, survey, and assess chance, choose safeguard, record discoveries, and refreshing our finding in connection to the work condition (Aref & Alireza, 2012).

In managing safety in construction projects experts shall be equipped with concepts of visioning, perusing and integration. This can be achieved by considering various project aspects which may impact the improvement of project schedule and budget; learning various contractual agreements and their impacts on the projects; understanding the stages, procedures, and activities in construction projects from initiation to completion; and improving based on a project system perspective (Yosia & W., 2013).

2.8 Occupational health and safety maturity level

Through time the culture of occupational health and safety practices passes different phases. These phases may show the level of awareness and culture developed in the firm. Different researchers tried to develop a model that is used to describe the maturity level of occupational health and safety practice at a firm level.

Maturity is a means of reaching a certain level of effectiveness and performance concerning the management of occupational health and safety related risks. To evaluate occupational health and safety risk management maturity, many firms use benchmarking (Kaassis & Badri, 2018). This approach makes it easier for companies to identify good practices, discover innovative improvements, learn who their competitors are and what advantages they have and find the best measurement tools and methods.

Robert K. Wysocki (Wysocki, 2014) developed a project management maturity model which is applicable to all activities and practices that take place in projects. The maturity model has five levels that show how project management practices integrated into day to day activities of a firm. This maturity model is customized into the maturity model of occupational health and safety practices and discussed below:

Level 1: Initial, each members of the firm follows what they are interested in. There may be some procedures and mechanisms for occupational health and safety management, which some people may be using on an informal basis. Occupational health and safety management training is nonexistent, the management and others provide help available on an informal basis at best.

Level 2: Repeatable at this level the firm is distinguished in that a documented occupational health and safety management process is available. It is used at the discretion of the occupational health and safety officer, and some training is available for those who are interested. At the head office level support person who will help a project team on an as-requested basis will be available.

Level 3: Defined, The occupational health and safety management processes are fully documented and occupational health and safety practices have been recognized as critical to business success by senior management. A formal function at head office is established, staffed, and given the responsibility of ensuring enterprise-wide usage of the practices, standards and other procedures. Enforcement is taken seriously, and a solid training curriculum is available. There is some sign that occupational health and safety practices are being integrated into other business processes.

Level 4: Managed, at this level, successful occupational health and safety management is viewed as a critical success factor by the organization. There is a complete training program and professional development program for occupational health and safety officers and other staff. The function at head office is looking for all activities at project site. The occupational health and safety issues are an integral part of all business planning activities.

Level 5: Optimized, at this level, the function at head office is the critical component of a continuous quality-improvement program for occupational health and safety management. Progress in the successful use of occupational health and safety management is visible, measured, and acted upon.

On the other hand, Fleming (2001) developed a model for the maturity of safety culture to help organizations to evaluate their level of maturity in safety culture. His model was

based on the capability maturity models used in software engineering organizations and has five levels of maturity: emerging, managing, involving, cooperating and continually. There are ten elements namely management commitment and visibility; communication; productivity versus safety; learning organization; safety resources; participation; shared perceptions about safety; trust; industrial relations job satisfaction and training.

Hudson (2003) also proposed a safety culture maturity model. The descriptions of each stage of development of safety culture according to Hudson (2003) are as follows:

Pathological: safety is a problem caused by workers. The main drivers are the business and a desire not to get caught by the regulator.

Reactive: organizations start to take safety seriously but there is the only action after incidents.

Calculative: safety is driven by management systems, with many collections of data. Safety is still primarily driven by management and imposed rather than looked for by the workforce.

Proactive: with improved performance, the unexpected is a challenge. Workforce involvement starts to move the initiative away from a purely top-down approach.

Generative: there is active participation at all levels. Safety is perceived to be an inherent part of the business. Organizations are characterized by chronic unease as a counter to complacency.

Based on organizational learning theory Kaassis and Badri(2018) developed levels of occupational health and safety maturity. According to this theory, learning is deemed to have occurred when an organization detects and corrects an error in its management of occupational health and safety risks. The first step is devoted to error discovery, while the other steps take place when the error is corrected. The maturity levels given by Kaassis and Badri(2018) is summarized below:

Type	Level of maturity	Definition
Single-loop learning	1 Naïve	The company learns little from its errors and is not conscientious about OHS
	2 Reactive	The company learns from its errors but lacks formalized and standardized methods for managing situations at risk
	3 Standard	The company learns from its errors and has a formalized and standardized risk management processes intended to avoid repetition of problems
	4 Proactive	The company carries out continued analysis and evaluation of OHS performance and responds to reduce or eliminate risks
Double-loop learning	5 Ameliorative	The company is continually improving its management of OHS risks. It has well-rooted OHS values, strategy, standards and methodologies in place.

Table 1: levels of OHS maturity (source Kaassis and Badri, 2018)

All the maturity models discussed above have somehow similarities in describing the level of development of safety culture in organizations. Any safety culture begins at a lower level aiming to comply with legal requirements and giving less concern to apply it. At this level, the organization can be described as safety reluctant and there is high exposure to accidents and there may not be preventive mechanisms installed before work.

On the other hand when the firm reached the final stage, the firms practice safety as a culture. This means the safety practices are integrated with the day to day activities of the firm. All members of the firm inherit safety based thinking. The firm works in all its efforts to continually improve the performance of safety practices.

2.9 Role of standards in occupational health and safety

Several mechanisms are designed to manage health and safety issues. ILO convention (ILO, technical convention, 1988) recommends countries that ratified the convention for occupational health and safety for construction to provide their practical application

through technical standards or codes of practice, or by other appropriate methods consistent with national conditions and practice. In addition, it enforces them to due regard the relevant standards adopted by recognized international organizations in the field of standardization.

Standards are an important element in prevention activity for safe and healthy workplaces. Elaborated at regional and increasingly also at the international level, they set out technical requirements for products and define measurement methods for emissions such as noise, vibration, radiation and harmful substances. At the same time, standards increasingly impact upon non-technical areas such as the harmonization of occupational health and safety management systems or on social responsibility (Janowitz, 2019).

When a business is standardized the logical systems are put into place in order to streamline every process in the workday rather than taking each situation as it arises, the business reacts according to a set list of instructions and protocols. The goal is to make sure every action, from dealing with the public to manufacturing goods, is done the same way every time.

All employees should be trained in the same way to do their work safely. Whether they're cooking food, using machinery or operating vehicles, the only way to keep workers safe is by training all of them on the same standardized protocols. Each employee will have the information he needs to correctly and safely perform his job, and the firm won't run the risk of one trainer accidentally forgetting to cover a crucial part of the safety course (Bailey, 2018).

2.10 Occupational health and safety standards

The risks for occupational accidents and diseases at work have to be managed by the employers and workers who are facing them. In order to ensure effective action, it is essential to establish occupational safety and health (OSH) management systems at all workplaces for continual improvement of the working environment and preventive measures (ILO, <https://www.ilo.org/safework/areasofwork/>, 2001).

The Code of Practice guides safety and health at work in certain economic sectors (e.g. construction, opencast mines, coal mines, iron and steel industries, non-ferrous metals industries, agriculture, shipbuilding and ship repairing, forestry), on protecting workers against certain hazards (e.g. radiation, lasers, visual display units, chemicals, asbestos, airborne substances), and on certain safety and health measures (e.g. occupational safety and health management systems; ethical guidelines for workers' health surveillance; recording and notification of occupational accidents and diseases; protection of workers' personal data; safety, health and working conditions in the transfer of technology to developing countries) (ILO, <https://www.ilo.org/safework/areasofwork/>, 2001).

International Organization for Standardization (ISO) developed occupational health and safety management system standard (ISO 45001:2018) that is applicable to any work conditions. It is developed based on the high-level structure of management system standards. It provides room to firms to implement the requirements and get a certificate from a recognized certification body. Ethiopia also adopted this standard to be used voluntarily by the firms interested in it.

Different regional and national standard bodies also developed standards focusing on occupational health and safety for all types of sectors. The commonly known are ILO (2001), OSHA(2016) and BSI(2007). All developed standards starting a long time ago and their publications are popular and used by other countries as a reference source.

2.11 Ethiopian standard for Occupational Safety and health

2.11.1 Occupational health and safety management systems — Requirements with guidance for use ES ISO 45001:2018)

This standard is originally developed by ISO and adopted as an Ethiopian standard. The standard is a type of generic management system standard for occupational health and safety. It encourages employers to view occupational health and safety as an investment rather than a regulatory burden and is designed to be integrated into an organization's existing management systems.

The purpose of an OH&S management system is to provide a framework for managing OH&S risks and opportunities. The aim and intended outcomes of the OH&S

management system are to prevent work-related injury and ill health to workers and to provide safe and healthy workplaces; consequently, it is critically important for the organization to eliminate hazards and minimize OH&S risks by taking effective preventive and protective measures (ISO, 2018). It suggests that workers, especially those closest to a particular health and safety risk, should be involved in the decision-making process to help create a healthier, safer and engaged workforce.

2.11.1.1 Scope of the standard

The standard specifies requirements for an occupational health and safety (OH&S) management system, and gives guidance for its use, to enable organizations to provide safe and healthy workplaces by preventing work-related injury and ill health, as well as by proactively improving its OH&S performance. This standard is applicable to any organization that wishes to establish, implement and maintain an OH&S management system to improve occupational health and safety, eliminate hazards and minimize OH&S risks (including system deficiencies), take advantage of OH&S opportunities, and address OH&S management system nonconformities associated with its activities (ISO, 2018).

2.11.1.2 Context of the organization

The organization is required to determine external and internal issues that are relevant to its purpose and that affect its ability to achieve the intended outcome(s) of its OH&S management system. In addition to this, the organization has to determine interested parties and their needs and interests. Based on the determination of all these the organization has to determine the boundaries and the applicability of the standard within the firm.

2.11.1.3 Leadership and worker participation

The top management of the firm shall show its commitment to implement and maintain the system by providing necessary resources, attention and integration of the management system requirements into the organization's business processes. The management shall play a leading role in supporting other members of the firm to demonstrate their commitment and interest in the implementation of the standard.

The standard requires the top management to develop occupational health and safety policy, roles, responsibilities and authorities within the organization and to be assigned and communicated at all levels.

Consultation and participation of workers at all applicable levels and functions, and, where they exist, workers' representatives, in the development, planning, implementation, performance evaluation and actions for improvement of the OH&S management system shall be established, implemented and maintained.

The standard recommends the top management to emphasize the participation of non-managerial workers in the following:

- i. determining the mechanisms for their consultation and participation;
- ii. identifying hazards and assessing risks and opportunities
- iii. determining actions to eliminate hazards and reduce OH&S risks
- iv. determining competence requirements, training needs, training and evaluating training
- v. determining what needs to be communicated and how this will be done
- vi. determining control measures and their effective implementation and use
- vii. Investigating incidents and nonconformities and determining corrective actions

2.11.1.4 Planning

This clause of the standard set requirements on issues that shall be considered during planning of occupational health and safety. When planning for the OH&S management system, the organization shall consider the context of the organization, the requirements of interested parties and the scope of its OH&S management system. Determining the risks and opportunities that need to be addressed to a) give assurance that the OH&S management system can achieve its intended outcome(s);b) prevent, or reduce, undesired effects; c) achieve continual improvement shall also be done.

The organization shall establish, implement and maintain a process (es) for hazard, risk and opportunities identification and assessment that is ongoing and proactive to ensure a uniform and sustainable implementation of the system. The organization's methodology(ies) and criteria for the assessment of OH&S risks, hazards and

opportunities shall be defined concerning their scope, nature and timing to ensure they are proactive rather than reactive and are used systematically. Documented information shall be maintained and retained on the methodology(ies) and criteria.

2.11.1.5 Support

The organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the OH&S management system. The competence of the workers to implement the system shall be ensured in order to attain the expected results. This includes identification of availability of qualified workers; providing relevant training to the workers or hiring new experts to manage the issue.

There shall be a continuous awareness of the objectives, aims and requirements of the occupational health and safety system to all members of the organization in a scheduled time. There should be an established system of communication on the information relevant to the OH&S management system among the various levels and functions of the organization, including changes to the OH&S management system.

2.11.1.6 Operation

The organization shall plan, implement, control and maintain the processes needed to meet requirements of the OH&S management system, and to implement the actions determined in the planning phase. This can be achieved by

- a. Establishing criteria for the processes;
- b. Implementing control of the processes following the criteria;
- c. Maintaining and retaining documented information to the extent necessary to have confidence that the processes have been carried out as planned;
- d. Adapting work to workers.

The organization shall establish, implement and maintain a process(es) needed to prepare for and respond to potential emergency situations including:

- a. Establishing a planned response to emergency situations, including the provision of first aid;

- b. Providing training for the planned response;
- c. Periodically testing and exercising the planned response capability;
- d. Evaluating performance and, as necessary, revising the planned response, including after testing and, in particular, after the occurrence of emergency situations;
- e. Communicating and providing relevant information to all workers on their duties and responsibilities;
- f. Communicating relevant information to contractors, visitors, emergency response services, government authorities and, as appropriate, the local community;
- g. Taking into account the needs and capabilities of all relevant interested parties and ensuring their involvement, as appropriate, in the development of the planned response.

2.11.1.7 Performance evaluation

The standard requires the organization shall establish, implement and maintain a process(es) for monitoring, measurement, analysis and performance evaluation. The organization shall determine: what needs to be monitored and measured; the methods for monitoring, measurement, analysis and performance evaluation, as applicable, to ensure valid results; the criteria against which the organization will evaluate its OH&S performance; when the monitoring and measuring shall be performed; when the results from monitoring and measurement shall be analyzed, evaluated and communicated.

The findings during the evaluation shall be subjected to management review with a time specified in the planning phase. All activities included in the processes, procedures and documents are evaluated and corrective actions shall be taken for future improvements. Top management shall communicate the relevant outputs of management reviews to workers, and, where they exist, workers' representatives. The organization shall retain documented information as evidence of the results of management reviews.

2.11.1.8 Improvement

The organization shall determine opportunities for improvement and implement necessary actions to achieve the intended outcomes of its OH&S management system. To

keep the improvement of the system in case of incidents and non conformities the organization shall

- a) react promptly to the incident or nonconformity and, as applicable
- b) evaluate, with the participation of workers and the involvement of other relevant interested parties, the need for corrective action to eliminate the root cause(s) of the incident or nonconformity, so that it does not recur or occur elsewhere
- c) review existing assessments of OH&S risks and other risks, as appropriate
- d) determine and implement any action needed, including corrective action, following the hierarchy of controls and the management of
- e) assess OH&S risks that relate to new or changed hazards, before taking action
- f) review the effectiveness of any action taken, including corrective action;
- g) make changes to the OH&S management system, if necessary

2.11.2 Occupational health and safety standard (CES 166:2015)

This standard is developed by the Ethiopian standards agency and was in use for a longer time. It becomes mandatory (enforced by law) standard in 2015 after passing some revision work with collaboration of Addis Ababa University, Ministry of Construction and Urban Development and Ethiopian standards Agency. The standard is developed specifically to be implemented in construction projects to protect the safety and health of the working environment.

2.11.2.1 Scope of the standard

Ethiopia developed occupational health and safety standard (code of practice) specifically for construction which has requirements and code of practices to be followed during the construction cycle (from design to demolition) (ESA, 2015). The standard states requirements to be considered during the planning and design of a construction site to the use of materials during installation and finishing work.

The Code applies to Building Construction, Maintenance, Renovation, Demolishing and other associated activities to all Classes of Buildings stated in the Ethiopian Building Proclamation. This Code covers the Health and Safety precautions for the most common construction activities. The occupational health and safety requirements specified in this

document are only the minimum requirements. Other equivalent or better approaches are also acceptable if proven (ESA, 2015).

The standard has requirements that resemble in structure and content with ILO convention for occupational health and safety in construction work. The convention has articles that deal on scaffolds and ladders(article 14); lifting appliance and gear(article 15); transport, earthmoving and material handling equipment(article 16); plant, machinery, equipment and hand tools(article 17); working at height and roof work(article 18); excavations, shafts, earthworks, underground works and tunnel(article 19); structural frames and formwork(article 22); demolition(article 24);lighting(article 5); electricity (article 26); personal protective equipments and protective clothing(article 30).

2.11.2.2 Planning

The standard states requirements to be considered during planning of a project including safety plan, site planning and layout. The contractor is obliged to assign a safety officer and establish safety and health committees at each project site who are responsible for any safety and health issues of the project site. They are also responsible for training and providing information on safety and health issues to the site workers.

The contractor is also responsible to retain information on the following (ESA, 2015)

- a) List of construction work to be performed on a construction site involving particular risks, the approximate time of performance of the work, the contact details of a person responsible for the work and measures for ensuring the safety of workers;
- b) instructions for action in the event of a risk, the names and contact details of persons responsible;
- c) The names and contact details of persons giving first aid, the contact address of the nearest place of providing emergency medical assistance and the means of access.

The site layout shall indicate all components of the site with a proper and clear indication of access to and regress from ways, location of danger zones, storage of flammable materials, one-way traffic routes and storage areas. The external border shall be

delineated from the worksite with clear marking. The signs indicating the locations of all these facilities shall be illuminated with a visible reflective material.

2.11.2.3 Preventive and protective measures

This section of the standard discusses on the requirements for safety and quality of supporting materials including ladders and scaffoldings. It provides detailed information on the materials used, their size, stability, spacing, duration of use, the inspection to be done, connectors used, design and other safety related requirements are specified.

2.11.2.4 Lifting appliances

In this section, the requirements and precautions to be taken in using hoists of persons and materials and tower cranes are discussed. It consists of the materials, types, assembling, inspection, and care to be taken during using them is stated. The standard also requests a crane safety report to be done every day.

2.11.2.5 Work at height and roof work

While working at heights the standard requires the workers to use safety devices like a cradle, safety belts or other anchoring safety methods to protect falls. In addition to this, the project site shall be protected and warning signs placed in a visible location to the surroundings. All the openings that can expose to falling shall be protected by a guardrail. Construction sheds and toolboxes are expected to be located on the exposed side of falling. Elevated workplaces should be provided with safe means of access and egress such as stairs, ramps, or ladders that are strong enough to withstand the load they carry.

Roof work is required to be done with a person that has physical, psychological and practical experience. To make the working condition safe to the worker various safety situations are considered including avoiding work in windy and rainy times; providing intermediate rail at the edge, the fitting slope of roof brackets with roof slope, using sufficient and suitable crawling boards or roof ladders.

The standard states requirements to be considered for guardrail System, fall Arrest System and protection from Falling Objects while working in heights to protect falls.

The standard has compatible requirements with the ILO convention for occupational health and safety for construction work to be applied on scaffolds and ladders (Article 14) and lifting and gears (article 15). The convention states a safe and suitable scaffold shall be provided and maintained or other equally safe and suitable provision shall be made in the case of elevated works. It also states the scaffolds to be inspected by a competent person in such cases and at such times as shall be prescribed by national laws or regulations (ILO, technical convention, 1988).

2.11.2.6 Excavation

One of the major dangerous works in construction is excavation work due to the unpredicted nature of the underground work that makes precautions less reliable. The standard states the necessary care to be taken, the requirements to be fulfilled to conduct the work and the procedures to be followed.

Before commencing the excavation work proper assessment of the availability of utility lines shall be made. Trees, boulders or other matters located in the area should be removed. The nature of the ground should be studied and as much as possible a more suitable safety plan shall be done and approved to keep the surrounding structures keep safe.

Any worker is allowed to enter the excavation site after confirmation of the safety and firmness of the ground from any collapse or failure.

2.11.2.7 Structural frames, formworks and concrete work

During lifting or moving of structural steels or prefabricated parts great care shall be given to avoid spinning. The workplaces should be protected to avoid the fall of persons working with. To erect steel structures an extended area should be kept and assembling should be made on the ground as much as possible.

In the case of the form works shoring should be locked in position and should be left in place until the concrete has acquired sufficient strength to carry the load and authorized by a competent person.

2.11.2.8 Demolishing works

Demolishing old building or existing structures became a common practice due to the demand for high rise buildings increases. To conduct this demolishing activity the standard states requirements and procedures to conduct the activity safely.

The standard requires an engineering survey and plan of the structure to determine the condition of the framing, floors, and walls, and the possibility of unplanned collapse of any portion of the structure before starting the demolishing work. Any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances shall be checked and appropriate measures shall be taken if they are found. In addition, the standard provides requirements to be fulfilled before, during and after conducting demolishing work to keep the work, workers and the surrounding environment safe.

2.11.2.9 Tools, equipment, plant and machinery

The standard states care to be used for tools and equipments while operating with them, transporting and after work. The equipment should be shielded to protect workers from being caught by them.

2.11.2.10 Electrical equipment and installations

Electrical installations shall be done, protected and insulated to prevent the danger of electric shock, fire and external explosions. The electrical appliances and outlets should be clearly marked to indicate their purpose.

2.11.2.11 Emergency routes and exits

During the construction work emergency routes and exits, that are free from any obstruction and which lead as directly as possible to a safe area, shall be provided. The routes shall allow safe, quick and secure evacuation of workers during an emergency situation.

2.11.2.12 Use of personal protective clothing and protective equipment

In most construction works the precautions made to prevent the occurrence of accidents are not perfect that can make the working site free of incidents. This unpredictable nature of the construction site enforces the use of personal protective equipment to reduce the damage that can occur on workers.

For different working situations, different types of protective clothing and protective equipments are proposed by the standard to suit the potential of the incident in the site. They are intended to protect the workers from hazards that arise due to the nature of work including lighting, sound, dust and corrosives.

If adequate protection against the risk of accident or injury to health, including exposure to adverse conditions, cannot be ensured by other means, The ILO convention (1988) urges suitable personal protective equipment and protective clothing, having regard to the type of work and risks, to be provided and maintained by the employer, without cost to the workers, as may be prescribed by national laws or regulations (ILO, technical convention, 1988).

Both standards are intended to manage occupational health and safety and applicable to the construction sector. They mainly focus on proactive measures to be taken in handling hazards and ensuring safe work conditions. The main focus is on awareness of people working in the site, engineering solutions that should be done by identifying possible hazards and taking preventive actions. In addition to this to make the environment more conducive providing personal protective equipment is the last option.

The requirements and recommendations stated in the standards have coherence with theories, practices and conventions available in the area. They can be taken as one tool to manage occupational health and safety related issues in the construction sector. This becomes more important due to the nature of standards that provide minimum requirements, ensure uniformity and adaptability to the working condition and allowing traceability of past events and forecasting of future trends.

2.12 Research gap

From the literature, we can observe that occupational health and safety issue is a serious case all over the world. Different countries, continents and international organizations are working to manage the issue. Especially in the construction sector due to high vulnerability of the area high rate of accidents occur compared to other sectors. This makes attention to be given to the sector to handle the cases.

Ethiopia is also working on it by ratifying conventions, adopting and adapting standards and enacting directives. There are articles done on the status of occupational health and safety practices in Ethiopia focusing on different sectors and specifically the construction sector. There also studies focusing on construction firms found in Addis Ababa in assessing their status in the area.

After the mandatory enforcement of Occupational Health and safety standard for construction sector by the Ministry of Urban Development and Construction in 2015, the status of the standard and the changes and challenged arise from this standard is not studied well.

Chapter 3: Research Methodology

3.1 Introduction

This part of the research deals with how the research work is conducted. It discusses on the research approach, research design, data collection methods and instruments. In general, the study analyzed the practices and challenges of occupational safety and Health standard implementation in selected building construction firms found in Addis Ababa.

3.2 Research approach

This research followed both quantitative approach using data collected from 30 questionnaires distributed to safety officers, project managers and other relevant staff who have involvement in occupational health and safety from 30 different construction firms participating in building construction. Based on open ended questions in the questionnaire qualitative description of results is also included.

The questionnaire is limited to one person from each firm because the study focuses on assessing the practices in implementation of the standard which is a common practice in the firm and well discussed by the responsible person of the firm.

3.3 Research design

In this paper, a descriptive survey method was followed to present results, because this method helps to show the existing reality of occupational health and safety practices and challenges in construction firms working in building constructions. The data that was collected from the participants is discussed in detail based on the objective of the study. In doing so, both quantitative and qualitative data is used to identify the status of the standard implementation and its practices and to search for a solution. It started with a thorough review of existing studies that revealed a lot of issues on occupational health and safety. In addition to this, it discussed the standards on the issue. Finally, it presented the results obtained from the analysis of data collected from questionnaire.

3.4 Sampling design

The population this research is grade one contractors participating in building construction. The building contractors are selected, because the standard is specifically designed to address health and safety of building constructions. There are about 100 contractors that have a status of grade one which are licensed to engage in building construction. In Ethiopian contractors classification grade one is the highest level having considerable amount of resources and facilities. Assessing the status of occupational health and safety practices of these grade one contractors may show its status in other lower grade construction firms.

The study focused on construction firms that have building projects in Addis Ababa. The targeted respondents are staffs working in occupational health and safety issues in their firms or that have a direct involvement in the issue. Random sampling technique was used to select construction firms from a list of grade one building and general contractors that have building projects in Addis Ababa.

3.5 Sources of data

After selection of the construction firms a responsible person for occupational health and safety considered as a primary data source on the status of occupational health and safety standard implementation in the respective firms. Focusing on the people having a direct involvement in the occupational health safety helps to have a relevant and genuine data on the issue. It includes occupational health and safety officers, project managers and other responsible staff. This is due to the unique character of the method that the company uses to implement occupational health and safety rules throughout the company.

Other secondary source of data is taken from articles, reports, books, internet sources. In additions legislations, conventions and standards in the area are reviewed and included in the study.

3.6 Method of data collection

The survey method was utilized with the help of self-administered questionnaires to collect the necessary data from the respondents. The main reason for selecting the

survey method of primary data collection via questionnaires is due to a trend of lack of well-organized secondary data from the various stakeholders participating in the construction. The second reason is, the method is low cost to collect data and provides consistent information from the respondents.

3.6.1 Primary data source

Questionnaire

Questionnaire is taken as a data collection method considering its effectiveness in allowing the respondent confidence to provide the real information and its manageability within a short period of time. The current situation of COVID 19 makes it the only primary source of data due to the restrictions of physical contact to conduct interview and physical observation.

The items of the questionnaire are composed of a close ended questions to make coding and analysis of the results easier towards the objectives of the study. The Likert scale is included in this part ranging from ‘strongly agree’ to ‘I don’t know’ to extract information from respondents on the independent variables. There were also open-ended questions to give additional information on the company and details on the awareness, challenges, and practices of occupational health and safety issues. The questionnaire is prepared in English with the assumption that the participants are professionals that have the capacity to understand English language.

3.6.2 Secondary data source

An extensive literature review was done on previous studies on the issue. Besides, the requirements stated in the standards of occupational health and safety were assessed. The data obtained from the literature was used to compare with the results collected from the firms.

3.7 Data collection procedure

The study mainly focused on the primary data collected through questionnaire. The questionnaire is administered after discussion with responsible persons of the firm through telephone on the objectives of the study. The questionnaire is sent to willing participants through email and telegram to be filled and resent through same medium.

3.8 Data Analysis Methods

The collected data were analyzed qualitatively and quantitatively by using descriptions, tables, and graphs. The responses that are obtained from the respondents were discussed towards the achievement of the objectives set in this paper. It tried to summarize the results obtained from the collected data for the objectives of this paper. A statistical tool of SPSS statistics 25 was used to organize and analyze the data.

To analyze the collected data from the respondents the percentage, frequency, mean and standard deviation methods of descriptive statistics was applied. To come up with a summarized conclusions attention was given to most common responses to questions, identifying data or patterns that can answer research questions, and finding areas that can be explored further.

3.9 Instrument validation

To ensure the validity of the questionnaire in gathering the necessary data on the issues that can be inferred to attain the set objectives some measures were taken. One was identifying the relevant respondents in the firm and giving time to go through the questions and give answers. Redundant questions were included in the questionnaire on some of the critical issues to cross-check the consistency of the responses. The results obtained from the analysis were compared with the previous results of the literature. The main reason for cross-checking was to minimize errors from data and to have considerable confidence over data. This helped in concluding the result to be more meaningful and reliable.

3.10 Validity and Reliability

3.10.1 Validity

To ensure the validity of the research design in sampling, data collection and analysis an extensive literature review is done. Based on the findings of the literature common practices and challenges of occupational health and safety implementation are included in the questionnaire to get the responses of participants. The researcher also referred requirements of the standard to design the questionnaire.

3.10.2 Reliability

There are a number of different aspects to reliability. One of the main issues concerns the scale's internal consistency. This refers to the degree to which the items that make up the scale 'hang together' (Pallant, 2005). The data is analyzed using SPSS-statistics and different tests are conducted to check the reliability of the data collected. One of the common methods that are used to test reliability is Cronbach's alpha value on this scale the value of 0.7 or greater is considered as adequate to analyze results. The statistics tool calculated reliability of the measurement scales using Cronbach's alpha coefficient as shown in figure 10 below.

	Variables	N	Cronbach's alpha coefficient
	Level of awareness on OSH standard	4	0.932
	Practices of occupational safety and health in the company	14	0.972
	Challenges of implementing occupational safety and health practices	6	0.751
	Over all	24	0.964

Figure 4: Cronbach's reliability value (source: own survey result, 2020)

The scale used in this study showed α value greater than 0.7 indicating that they all were internally consistent. This indicates the selected measurement method accurately measures the selected variables in the study.

3.11 Ethical consideration

In this research work, ethical considerations of confidentiality and privacy of all participants were addressed. The firms were selected randomly from a list of firms and the responsible persons from each firm were requested to participate voluntarily. The assigned respondents by the firm were well informed as to the purpose of the study and consented verbally. The respondents were made free to respond to the questionnaire to ensure the respect, dignity and freedom of each individual participating and to assure confidentiality in the study. Moreover, participants were aware that the information about their firm they provide would be kept confidential and would not be disclosed to anyone else including anyone in the company. The

data gathered from each firm was interpreted as it is without prefabrication, falsification or modification. The research work was carefully and critically examined to avoid negligence and errors. Patents, copyrights, and other forms of intellectual property were as much as possible trying to be cited and honored. Unpublished data, methods, or results were not taken without permission and given proper acknowledgment or credit for all contributions to research.

Chapter four: Results and Analysis

4.1 Introduction

To meet the objectives of this paper the data obtained from the respondents is compiled, discussed and analyzed in this chapter. The chapter presents the response rate, their composition and the rate of responses to each question. Finally, it summarizes the overall responses of the respondents participated in assessment of the practices and challenges of occupational health and safety standard implementation in building construction firms found in Addis Ababa . The whole analysis is made using IBM SPSS- statistics 25 software.

4.2 Response rate

To gather information on the practices and challenges of occupational health and safety implementation a total of 40 grade one contractors found in Addis Ababa are shortlisted randomly based on their list from the website. They are requested to respond to the questionnaire to collect information about the issue. A total of 28 questionnaires were distributed to 28 willing firms to assign a responsible staff to participate in this study. To avoid contacts due to the risk of COVID-19 after discussion through phone questionnaires are sent via email and telegram and collected accordingly.

Based on this from all questionnaires distributed to firms 21 of them are responded which indicates 75% of targeted respondents are participated in due time. The response rate is given as shown in the table below.

Type of contractors	Responded	%	Incomplete	Not responded	Total
Local private	15	71.4	-	5	20
Government	3	14.3	-	-	3
Foreign origin	3	14.3	-	2	5
Total	21	100	-	7	28

Table 2: response distribution of respondents

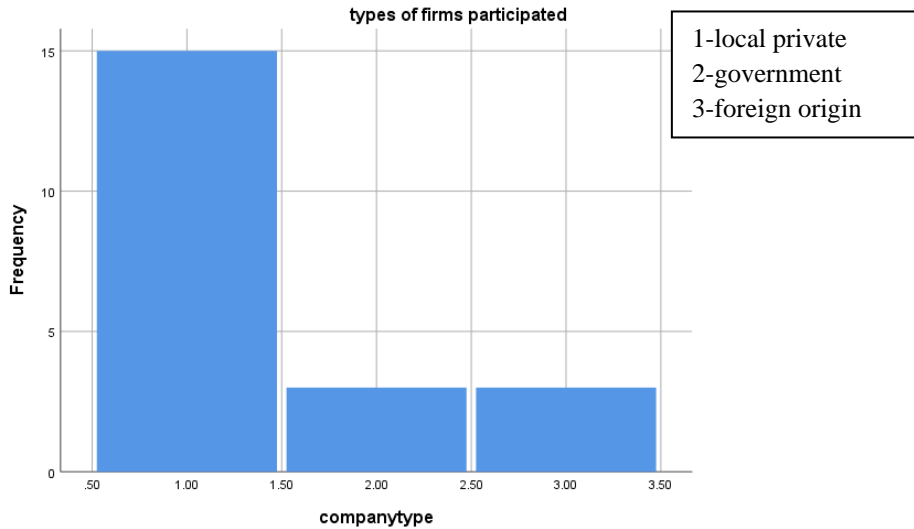


Figure 5: distribution participated in firms

4.3 Background of participants

4.3.1 Experience of participating firms in building construction

The participants have different experience and background that has its own effect on the information they provide to the researcher. The results are summarized below.

From the participated firms 5(23.8%) of them have an age of below 5 years; 8(38.1%) of them are between 6 and 10 years and 8(38.1) of them are above 10 years after their establishment. The distribution of experience has its own effect in placing occupational health and safety practices. So their variation helps to have data in different time horizon and to assess the effect of age of the firm on its practices.

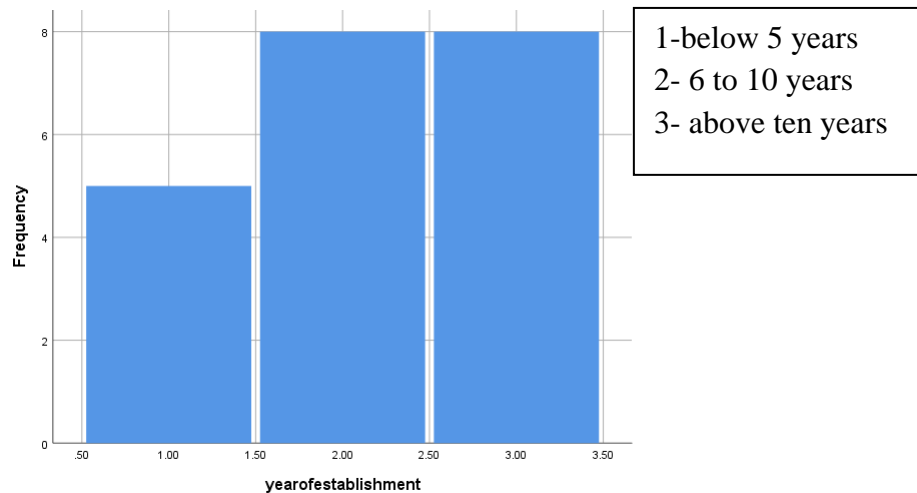


Figure 6: experience of firms in the building construction sector

Similarly, 7(33.3%) of the firms have participated in less than three building projects; 6 (28.6%) of the firms have participated in 3-5 building projects; 3 (14.3%) of them have participated in 6 to 10 building projects and 5(23.8%) of them have participated in above 10 building projects in Addis Ababa since their establishment. At this time, all of the firms have projects in Addis Ababa ranging from 3 to ten. This helps them to provide recent and relevant data on the issue in Addis Ababa and for building projects.

4.3.2 Experience of participating workers

As indicated in the below table, among the respondents that are assigned by the firm 8(38.1%) of them are project managers; 9(42.9%) of them are working on occupational health and safety issue and others 4(19%) are other firm members that have a relation with the issue. The respondents have work experience ranging from three years up to more than ten in the investigated firm. These members of the firm are relevant to provide information on occupational health and safety practices of the firm, because they have a direct involvement in the issue.

Table 3: respondents' position in the firm

Position	Count	Percent
OHS officer	9	42.9%
Project manager	8	38.1%
Other	4	19%

The age of firms, the number of projects they have in Addis Ababa and the experience and position of the participants in the firm helps the researcher to have reliable and true information on the issue.

4.3.3 Back ground information on occupational health and safety status of firms

Among the participating firms, 10(47.6%) of them have a specified occupational safety and health handling mechanism, but 11(52.4%) of them do not have. On the other hand, 8(38.1%) of respondents know their firm has occupational safety and health plan, but 11(52.4%) replied not at all. This indicates that applying and planning occupational health and safety is not properly practiced in many of the participating construction firms found in Addis Ababa.

All of the firms face occupational safety and health-related problems at different levels ranging from less frequently to every time. There are different reasons stated for the possible causes of accidents including absence of precautions indicating hazardous conditions; unavailability of occupational safety management system; lack of awareness and follow up of both the workers and top management; absence of budget to treat affected employees.

In regard to collection and follow up mechanisms of the firm to occupational health and safety the common methods used by few firms is using periodic reports. Many of the firms do not have organized formal mechanism applied to collect and evaluate the status of the firm in handling occupational safety and health issues. In this instance, all of the firms do not have different occupational health and safety methods for building projects. This indicates that the monitoring of occupational health and safety issues is at the infant stage in many of the firms.

4.4 Analysis of collected data

The data collected from the assigned participants on the issues related to awareness level on the existence of the standard and challenges and practices of occupational safety and health implementation is summarized in the table below.

4.4.1 On the level of awareness on the standard

Regarding awareness about occupational health and safety standards in the construction firms, the following results are obtained.

From the respondents 11(52.3) of them agree that their firm has information on the availability of occupational health and safety standards while 3(14.3%) of them disagree with the availability of information. In addition to this 8(38.1%) of the firms have the copy of the standard at the head office and project sites, but 9(42.9%) of the firms do not have the copy of the standard in project sites.

In the other hand only 6(28.5%) of the firms follow the requirements of this occupational health and safety standard. For the question raised to identify the references their firm use in occupational health and safety standards five firms indicated Ethiopian standard two documents from ministry of health and safety and 8 respondents indicated use of other standards as a reference in case of compliance.

For the Likert scale questions provided to assess the awareness of firms on the availability of the standard and requirements it was found a grand mean of 3.05 and standard deviation of 0.42 which indicates a moderate rate for the scale ranging from strongly agree value of one to I do not know value of five. Mean scores 1.00- 1.5 excellent or very good, 1.51-2.50 good, 2.51-3.50 average or moderate, 3.51-4.50 fair and 4.51-5.00 is poor for scales rate 1=strongly agree and 5=strongly disagree (Asefa, 2018)

The standard is mandatory since 2015 to be implemented by all building constructions regardless of size and status. But the reality is different that it is not known by considerable number of participating firms and even more firms are not following the requirements stated in the standard. This standard is aimed to be regulated by ministry of Construction and Urban Development now transferred its authority to Construction Works Regulatory Authority. Less attention is given to issue regardless of the severity of accidents taking place in the area. The results on the awareness of firms on the standard are presented in table 5 below. The firms that apply the requirements of the standard are summarized in figure 7 below.

Table 4: awareness level of firms about OHS

Sr. no	options	Strongly agree		Agree		Less probably		Disagree		I don't know		Mean
		No.	%	No.	%	No.	%	No.	%	No.	%	
Level of awareness on OSH standard												
1	Your company has information on occupational health and safety standard for construction(CES 166)	4	19	7	33.3	4	19	3	14.3	3	14.3	2.73
2	Your company has the copy of occupational safety and health standard at head office level	3	14.3	5	23.8	7	33.3	3	14.3	3	14.3	2.9
3	Your company applies the requirements of occupational safety and health standard at all levels	2	9.5	4	19	9	42.6	9	28.6	-	-	2.9
4	The copy of occupational safety and health standard is available at each project site	-	-	3	14.3	5	23.9	8	42.4	9	19	3.67
Grand mean 3.05 standard deviation												

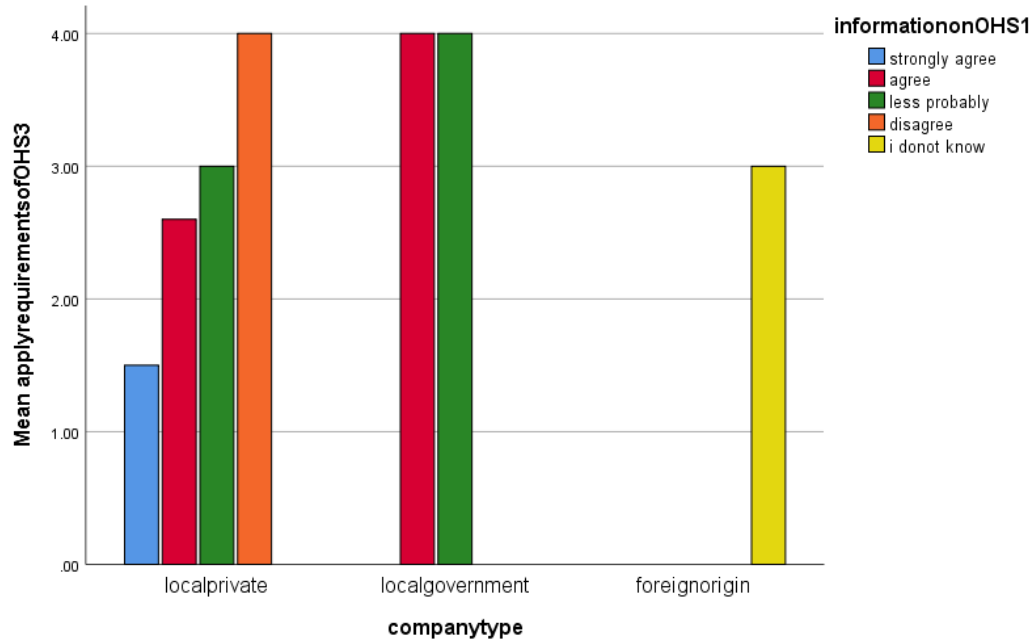


Figure 7: firms that apply requirements of OHS standard

4.4.2 Practices of occupational safety and health in the company

Occupational health and safety practices are critical issues in building construction projects due to higher exposure to accidents. In evaluating the status of common practices of occupational health and safety refined from literature and the standard are inquired to the respondents. Their responses are as summarized in table 6 below.

Table 5: summery of responses on practices of occupational health and safety

Sr. no	options	Strongly agree		Agree		Less probably		Disagree		I don't know		Mean
		No.	%	No.	%	No.	%	No.	%	No.	%	
Practices of occupational safety and health in the company												3.15
1	All activities in the construction site have an integration with occupational safety and health issues	1	4.8	2	9.5	6	28.7	7	33.5	5	23.8	3.62
2	The company has a function/office that manage occupational safety and health issues	9	42.9	2	9.5	1	4.8	9	42.9	-	-	2.47
3	The company has professionals working on occupational safety and health	8	38.1	3	14.3	3	14.6	6	28.1	1	4.8	2.47
4	The company considers occupational safety and health during planning and execution of projects	-	-	4	19	7	33.6	3	28.4	6	19	3.47
5	The company follows requirements stated in	-	-	3	14.3	8	38.8	8	38.2	2	9.5	3.43

	occupational safety and health standard for construction						1		1			
6	There are manuals and guidelines developed to support implementation of occupational safety and health	6	28.6	5	23.8	5	23.3	8	14.2	3	9.5	2.52
7	During commencement of any project the site plan is developed and implemented to ensure health and safety of workers	-	-	4	19	7	33.3	8	38.2	1	9.5	3.38
8	There is continues training and follow up on occupational safety and health related issues	-	-	4	19	7	33.3	8	38.2	1	9.5	3.38
9	There is a formal reporting procedure on occupational safety and health situations	3	14.3	5	23.8	4	19.7	7	33.2	3	9.5	3.00
10	The company assigns budget to manage occupational safety and health issues	-	-	2	9.5	10	47.8	6	38.1	1	4.8	3.38
11	The frequency of accidents in the project sites is very low	2	9.5	3	14.3	8	38.6	1	28.2	6	9.5	3.14
12	The workers in the project site are aware of occupational safety and health practices	1	4.8	5	23.8	8	38.7	1	33.-	3	-	3.00
13	Workers are willing to follow guidelines and procedures in the work site	-	-	4	19	7	33.3	10	47.-	6	-	3.29
14	Workers participate in planning and hazard identification of processes for occupational safety and health	-	-	1	4.8	8	38.1	10	47.2	6	9.5	3.62
Grand mean is 3.15 and standard deviation of 0.408												

As shown in the table from the total respondents, 3(14.3%) of them agree that their firm conducts all of its activities by integrating with occupational safety and health issues, but 6(28.6%) of the firms integrate rarely while 7(33.3%) of them disagree the integration of occupational safety and health issues with their work activities. This shows that in many of the participating firms' occupational health and safety issue is considered as a separate task that it's impact on project performance is neglected. Kaassis and Badri(2018 categorizes the integration of occupational health and safety as an indication of high maturity and it is considered as one business success factor in the firm.

Among the participating firms 11(52.4%) of the firms have function/office and OHS professionals that manage occupational safety and health issues while 9(42.9%) and 6(28.6%) of them do not have function and professionals responsible for the issue respectively. The directive for occupational health and safety enforces firms to establish occupational health safety office and professionals that work on the issue.

Occupational health and safety practices require extensive follow up, training, inspection and recording as indicated in the standard. All these require organized office and professionals that have exposure to the issue, but the reality is different in almost half of the firms that are working without function and professionals.

The responses for the availability of professionals and the integration of occupational health and safety with tasks of the firm by company type are shown in figure 8.

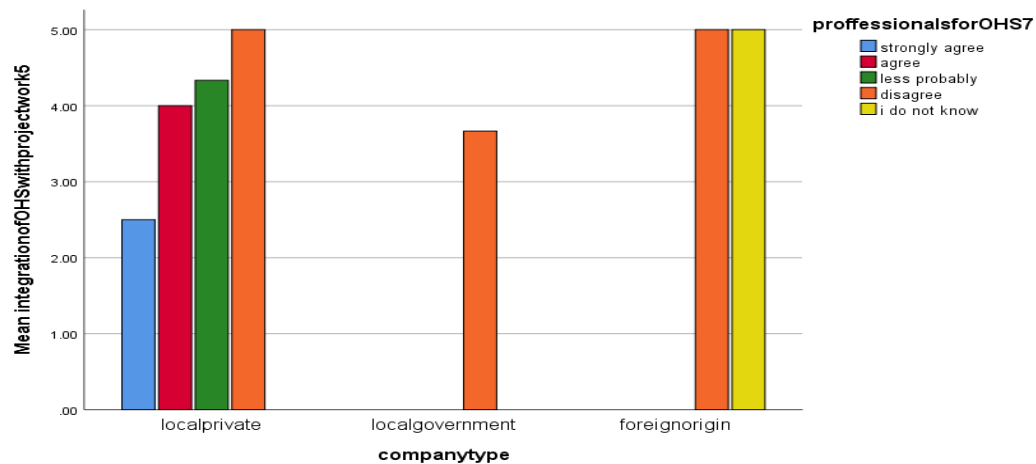


Figure 8: firms that integrated OHS with their work activity by company type and availability of professionals

In relation to planning 4(19%) of them agree that their firm consider occupational health and safety during planning and execution. On the other hand, 8(38.1%) of the firms less probably consider during planning and execution. On the other hand, 6(28.6%) of the firms do not consider the issue during planning and execution. This shows that many of the firms are not ready and willing to implement or follow the requirements of the standard in their firms.

As indicated by participants nearly half 11(52.4%) of the firms have manuals or guidelines to support the implementation of occupational health and safety and 3(14.3%) of them do have it. The remaining (33.3%) gave the other responses. This result shows that only half of the participating firms established a formal process to manage occupational health and safety regardless of its implementation in every project site.

During commencement 4(9%) of construction project firms develop and implement site plan to ensure the safety of the site, 8(38.1%) of them do not develop, 7(33.3%) of them do it rarely. As described in the standard (ESA, 2015) doing site plan

showing the overall layout of the project site taking to account occupational health and safety is mandatory. It helps to organize and segregate the site in to level of hazards and precautions required for proactive control of hazards. But it is not done by majority of the participating firms in this research.

In improving the awareness of firms towards occupational health and safety 4(19.0%) of the respondents agree that their firm gives continuous training on occupational health and safety while 8(38.1) of them disagree 7(33.3%) of the firms provide rarely. Training is one of key tools recommended by both the directive and standard to increase the awareness of workers in preventing and handling occupational accidents. Here the reality is different for the participant firms in this area.

A continues follow up and evaluation is deemed from the head office on the status of occupational health and safety to device a control mechanism and report to the regulator periodically. For this instance, 5(23.8%) of firms have a formal reporting procedure on occupational safety and health issues, but 10(47.6%) of them disagree on the existence of the system. On the other hand, and the remaining participants of the firms are not sure about the reporting system. This is also in contrary to the legal and standard requirements stated.

Among the participating firms 2(9.5%) of them assign budget to manage occupational safety and health issues while 8(38.1%) of them do not assign, 10(47%) of them less probably assign a budget. This is another indication of the lower attention given to occupational health and safety in the firms. It is difficult to think of occupational health and safety management without budget in support of workers with psychological and physical protection methods.

Among the respondents, 6(28.6%) of them agree that the workers in the site are aware of occupational safety and health practices and 4(19.0%) of them confirmed that the workers are willing to follow the guidelines. On the other hand, 7(33.3%) of the respondents disagree with the awareness of the workers and 10(47.6%) of them the willingness of the workers to follow the guidelines. This indicates the awareness and willingness of the workers in participant firms towards occupational health and safety practices is not well confirmed. Without having knowledge and willingness of the

issue and practices it is difficult to save the damages that may happen in human life and resources.

In managing the safety of the project sites 1(4.8%) of the firms allow participation of employees in planning and hazard identification of processes for occupational safety and health, but 10(47.6%) of them do not do it. 8(38.1%) of the firms do it rarely but 2(9.5%) of the respondents do not have the information on the participation of workers in planning and hazard identification processes for occupational safety and health. Primarily accidents and hazards affect the workers found in the construction site and they have the experience and knowledge on the potential risks of accidents. Excluding them from hazard identification and planning means making it to fail beforehand.

For the practices of implementing occupational health and safety in construction sites the result shows a grand mean value of 3.15 with a standard deviation of 0.408. This also indicates average/ moderate values with the same trend of 1=strongly agree to 5= I do not know. The practices are implemented rarely in the participating firms.

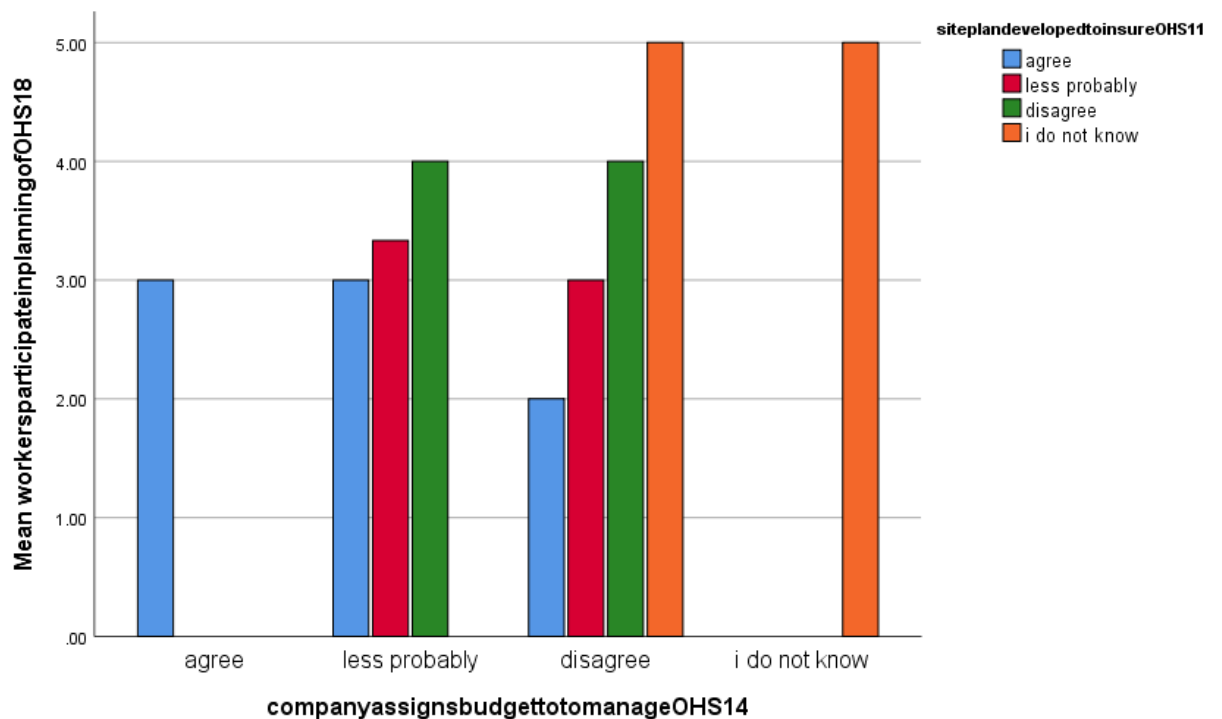


Figure 9: relationship of the budget assigned, worker participation and site plan development

4.4.3 Challenges of implementing occupational safety and health practices

There are a number of challenges in different firms towards the implementation of occupational health and safety practices. In the same manner construction firms may have challenges that hinder them from its implementation. To assess the challenges of the participating firms on the issue commonly discussed challenges in the literature are condensed and presented to the participants to rate their respective firm. Implementation of occupational health and safety practices is considered as expensive by 10(47.6%) and as not expensive by 8(38.1%) of the respondents. Nearly half of the participants perceive that its implementation is expensive which is one challenge stated in literatures to implement occupational health and safety in firms. Considerable number of the participants thinks it is not expensive. Many of them disregard its long time investment that will be compensated by increased productivity and reduced compensation cost.

In relation to productivity 4(18.1%) of respondents assume that implementation of occupational safety and health practices reduce productivity, but 10(47.6%) of them disagree with this idea. while 7(33.3%) of them believe it is less probable reduce productivity. This indicates that the participants have increased positive understanding on the relationship between occupational health and safety with cost and productivity.

Management is directly responsible for preventing injuries and illness, with each level accountable to the one above and responsible for the level below. In contrary to this assumption only 3(14.3%) of the respondents believe that the top management has a higher concern about the issue, but 12(57.1%) of the respondents disagree with this concern. On the other hand, 4(19%) of the top management less probably concerned. This is in contrary to the responsibility given to the employer represented by its top management in managing occupational health and safety of work places by the proclamation ([proc, 1000/2019](#)), directive (2008) and the standard(2015).

Among the respondents, 4(19%) of them agree that accidents are difficult to manage, but 11(52.4%) of them disagree with its difficulty of management. 6(28.6%) of the respondents agree that most of the workers are not willing to wear protective clothing, but 5(23.8%) of the respondents disagree with this while 8(38.1%) of them less

probably not willing to wear. This indicates workers of the participating firms there is no considerable resistance to wear protective clothing.

Among the firms assessed 9(42.9%) of the firms do not inspect occupational health and safety practices while 5(23.8%) of them do. In this case, 7(33.3%) of the firms less probably did it. The standard require firms to undergo a continues periodic inspection of occupational health and safety practices including safety of scaffolds, cranes, stairs, cranes, tools and other heavy machineries and the implementation status of the standard.

In assessing the challenges of occupational health and safety implementation the grand mean value is 3.19 and standard deviation 0.30. This indicates the challenges discussed in the questionnaire have a moderate rate with the same trend of the previous analysis. In this part conversion of negative questions to positive equivalent is made. From the challenges stated in the questionnaire based on common challenges of literature absence of management commitment to improve occupational health and safety is the major challenge that firms facing.

Table 6: summary of challenges of OHS practices

Sr. no	options	Strongly agree		Agree		Less probably		Disagree		I don't know		Mean
		No.	%	No.	%	No.	%	No.	%	No.	%	
Challenges of implementing occupational safety and health practices												3.19
1	Implementing occupational safety and health practices is expensive	2	9.5	8	38.1	3	14.8	8	38.1	-	-	2.80
2	Following occupational safety and health procedures reduces productivity	1	4.8	3	14.3	7	33.3	10	47.6	-	-	3.23
3	The top management is highly concerned with occupational safety and health issues	-	-	3	14.3	4	19.0	12	57.1	2	9.5	3.62
4	Occupational safety and health related accidents are difficult to manage	-	-	4	19.0	6	28.6	11	52.4	-	-	3.33
5	Workers are not willing to wear protective clothing	1	4.8	5	23.8	8	38.5	5	23.2	2	9.5	2.90
6	There is no inspection of occupational health and safety practices	1	4.8	8	38.1	7	33.3	5	23.8	-	-	3.24
Grand mean of 3.19 and standard deviation of 0.30												

4.4.4 Additional back ground information for further classification

In assessing the real situation about occupational health and safety practices additional information is collected to clarify the responses in the Likert scale with more guiding responses and the result is discussed as follows.

Among the firms 5(23.8%) of them use Ethiopian standard, 2(9.5%) use Ministry of Labor and Social affairs directive, 3(14.3%) use European standard, 6(28.6%) do not have a known reference and 5(23.8%) use other requirements as a reference document in implementing occupational health and safety. This response shows somehow different results compared to the previous analysis in that only 9 of them responded having occupational health and safety handling procedures, but at this part about 13 of them use either Ethiopian standard, European standard and other requirements. This indicates that from the participating firms some of them use these documents as reference when requested by the client without developing a defined and dedicated system that responds to the issue.

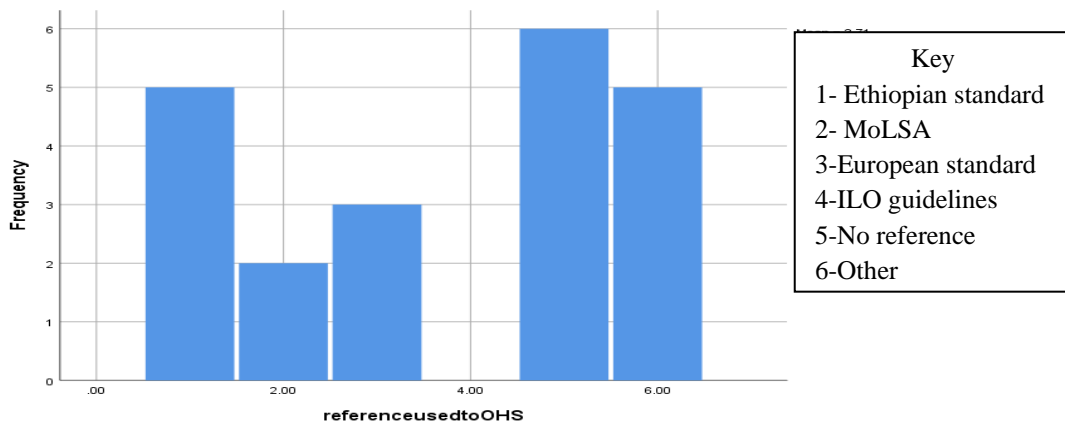


Figure 10: reference standards used by firms for OHS

There are different recommendations and practices proposed in the standard and literature to handle occupational health and safety in firms. To assess the recommendation of participations to their firm in handling occupational health and safety they are given options to choose the item they give top priority. In instance 7(33.3%) of the respondents give priority to education and training, 5(23.8%) to keeping project site safe through proper planning, 5(23.8%) to assigning occupational safety and health officer to look for, 2(9.5%) enforcing workers to use personal protective equipment and 2(9.5%) for other methods. This also is an indication of diverging perceptions of participants in handling the case.

It is a common practice to assign a responsible person to situations that happen in the construction project site. In the case of occupational health and safety from the respondents, it is observed that 7(33.3%) of them assign the responsibility to occupational safety and health officer, 7(33.3%) to project manager, 3(14.3%) to the worker itself 3(14.3%) of them to the company and 1(4.8%) of them to no one.

The respondents are asked to categorize their firm to the maturity level in occupational health and safety. Based on the categorization given by the respondents the firms are categorized 9(42.9%) as the initial (every one work what he/she likes to manage), 8(38.1) % as repeatable (a documented Occupational safety and health process is available), 4(19%) as defined (processes are fully documented, and Occupational safety and health have been recognized as critical to business by senior management). This categorization scale is taken from the Project Management Maturity Model (PMMM) (Wysocki, 2014). But none of the respondents categorized their firms in the other higher levels. The category summarized as shown below

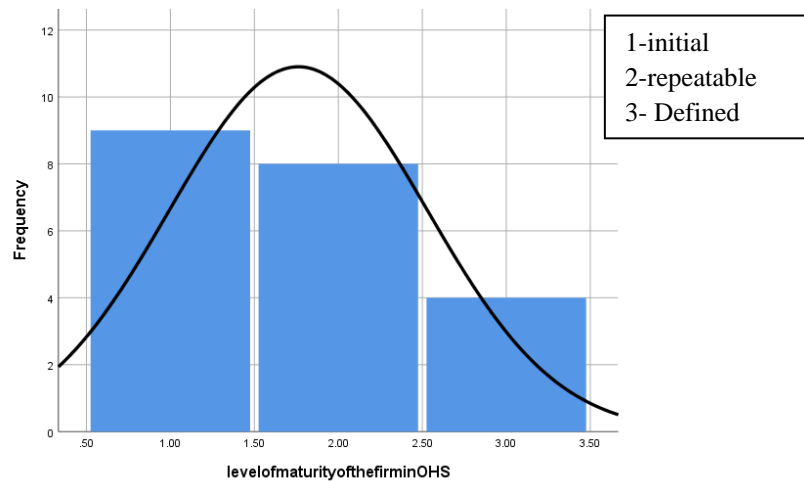


Figure 11: level of maturity of firms in OHS with a distribution curve

Chapter five: Conclusions and Recommendations

5.1 Conclusions

To meet the objectives of this study their awareness on the standard, their practices and challenges of occupational health and safety implementation is assessed from 21 grade one building contractors found in Addis Ababa using questionnaire. The data is collected from staff members that have close relation with this issue. Based on the analysis of collected data, the researcher made the following conclusions.

The construction sector is one of the fast growing sectors in the previous consecutive years both in number of projects and job opportunities. This change has its own role in increasing the exposure to occupational accidents. From the findings nearly half of the participating firms have awareness on the availability of the standards for occupational health and safety especially that is developed to the construction sector. In addition some smaller participants have the copy at their office, but five of them are using it as a reference. Even though the implementation of occupational health and safety requirements is at a lower level, a considerable number of participating firms use other countries' standards as a reference to occupational health and safety.

The findings show that the participating firms are at lower level of implementing occupational health and safety practices in building projects. The major limitations of the firms include lack of integrating occupational health and safety issues in the planning and execution of their work; lower commitment of top management; absence of participation of workers in accident identification and planning; timely evaluation, and reporting of occupational health and safety status; absence of training and awareness to workers; absence of inspection of occupational health and safety status of project sites. These are major requirements stated in the standard to be practiced during construction but are not followed properly. On the other hand, almost all of the firms face occupational accidents at a different level of frequency.

Concerning challenges of implementing occupational health and safety the participating firms considered absence of top management commitment as a major challenge that affect implementation of occupational health and safety practices. There is a considerable perception that implementing occupational health and safety practices is

expensive in the participating firms and other considerable numbers of participants do not consider the cost of implementation as expensive. The willingness and awareness of workers is not stated as a major challenge in the participating firms which may indicate the improvement of perception of workers towards protecting themselves.

As a whole the firms can be categorized into a level of maturity in occupational health and safety implementation based on the one recommended by Kaassis and Badri(2018) many of them fall under the category of naïve, some others in reactive and very few of them can be categorized as standard.

5.2 Recommendations

Based on the results of the research the following recommendations are proposed by the researcher to support the effective and integrated implementation of occupational health and safety practices in the construction sites:

- ❖ The construction firms should take the responsibility of protecting their employers and work places. One of the tools for safe work environment is standards, so the construction firms should use the standards and follow the requirements stated in this standard which is specifically developed and enforced to building construction sector.
- ❖ The contractors should work hard in making their occupational health and safety functions active. The existing functions should work focusing on integration of occupational health and safety-related issues and requirements in firm business plan. Working to change a mind setting of workers and top management towards occupational health and safety issues should be given a top priority by the professionals working in these construction firms. Assigning budget to the practice should be taken as a long time investment that will be paid by saving human life and wasted time in addition to increased productivity.
- ❖ Employees should push the construction firms to provide them with necessary safety devices and to allow them participate in hazard identification, planning and reporting activities. It is also recommended to establish a safety committee that works in the issues.
- ❖ Further detail study should be done in specific firms to have a clear image of the standard implementation.

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Appendix

Addis Ababa University School of Commerce

Project management Department

Questionnaire to be filled by construction companies

This questionnaire is designed to collect data for preparation of research paper on challenges and practices of occupational health and safety standard in construction projects in Addis Ababa that is aimed to assess the level of implementation of the standard and the challenges and practices of its implementation. It is intended for fulfillment of requirements of Masters of Arts in Project Management. I believe that your accurate and truthful response will greatly contribute to the success of the research paper. The information that you provide will be confidential and not bring any problem on you. You are kindly requested to give accurate and relevant information honestly.

Thank you

Solomon Woubshet

Direction

Please provide your response based on the instruction given for each group of questions

I. Company information

- 1. Type of company Local Private Local Government Foreign origin
- 2. No. of years the company established
 Below 5 years 5-10 years Above 10 years
- 3. Number of building projects the company had participated in Addis Ababa
 Below 3 3-5 6-10 over 10
- 4. How many projects do you have now on hand in Addis Ababa? _____

II. Personal Information

- 1. Position in organization _____
- 2. Year of service in the company
 Below 2 years 2-5 years 5-10 years above 10 years

III. Occupational Safety and Health related questions

- 1. Does your company have a specified occupational safety and health handling mechanism?
 Yes No
- 2. Do you have a occupational safety and health plan?
 Yes No
- 3. Have you ever faced an occupational safety and health problem?
 Yes rarely Yes less frequently Yes every time Not at all
- 4. If your answer to question no. 3 is ‘yes_’ what do you think of the reason for that?

- 5. If your answer for question number 3 is ‘not at all’ what helped your organization to succeed?

- 6. What mechanisms does your organization use to collect information that helps to evaluate the status of occupational health and safety practices?

- 7. Do you use a different method to manage occupational health and safety on building projects than other types?
 Yes No
- 8. If your answer to question no. 7 is ‘yes’ please can you specify the reason?

IV. Sign 'x' mark on the option that you agree on the space provided

SN	Options	Strongly agree	Agree	Less probably	Disagree	I don't know
Level of awareness on OSH standard						
1	Your company has information on occupational health and safety standard for construction(CES 166)					
2	Your company has the copy of occupational safety and health standard at head office level					
3	Your company applies the requirements of occupational safety and health standard at all levels					
4	The copy of occupational safety and health standard is available at each project site					
Practices of occupational safety and health in the company						
5	All activities in the construction site have an integration with occupational safety and health issues					
6	The company has a function/office that manage occupational safety and health issues					
7	The company has professionals working on occupational safety and health					
8	The company considers occupational safety and health during planning and execution of projects					
9	The company follows requirements stated in occupational safety and health standard for construction					
10	There are manuals and guidelines developed to support implementation of occupational safety and health					
11	During commencement of any project the site plan is developed and implemented to ensure health and safety of workers					
12	There is continues training and follow up on occupational safety and health related issues					
13	There is a formal reporting procedure on occupational safety and health situations					
14	The company assigns budget to manage occupational safety and health issues					
15	The frequency of accidents in the project sites is very low					
16	The workers in the project site are aware of occupational safety and health practices					
17	Workers are willing to follow guidelines and procedures in the work site					

18	Workers participate in planning and hazard identification of processes for occupational safety and health					
Challenges of implementing occupational safety and health practices						
18	Implementing occupational safety and health practices is expensive					
19	Following occupational safety and health procedures reduces productivity					
20	The top management is highly concerned with occupational safety and health issues					
21	Occupational safety and health related accidents are difficult to manage					
22	Workers are not willing to wear protective clothing					
23	There is no inspection of occupational health and safety practices					

V. Select the possible response among the alternatives(possible to choose more than one alternative)

1. What reference does your company use for occupational safety and health management?
 - a) Ethiopian standard
 - b) Ministry of labor and social affairs directive
 - c) European standard
 - d) ILO guidelines
 - e) No reference
 - f) Other (please specify)_____
2. Which one has highest priority in managing occupational safety and health in your company?
 - a) Education and training
 - b) Keeping project site safe through proper planning
 - c) Assigning occupational safety and health officer to look for
 - d) Developing guidelines and procedures and documenting at work site
 - e) Enforcing workers to use personal protective equipment
 - f) Any other (please specify)_____
3. Who will be responsible for occupational safety and health related accidents on site?
 - a) occupational safety and health officer
 - b) project manager
 - c) the worker it self
 - d) the company
 - e) no one
4. At what level do you place your firm in relation to occupational safety and health implementation practice?
 - a) Initial(every one work what he/she likes to manage)
 - b) Repeatable (a documented Occupational safety and health process is available)

- c) Defined (processes are fully documented, and Occupational safety and health has been recognized as critical to business by senior management)
- d) Managed (manages the Occupational safety and health process as an integral part of all business processes and more extensive training.)
- e) Optimized(Continuous improvement of all Occupational safety and health services and processes)

5. Any other information on the issue

Thank you for your time