

# **A Case Study on Safety and Security Assessment of Construction Project in Bangladesh**

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A thesis submitted to the Department of Civil Engineering in partial fulfillment for the degree  
of Bachelor of Science in Civil Engineering



Department of Civil Engineering  
Sonargaon University  
147/I, Green Road, Dhaka-1215, Bangladesh  
Section: (Section: 14A)  
Semester -Year (Fall-2021)

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## DECLARATION

We hereby declare that the undergraduate research work reported in this thesis has been performed by us under the supervision of Md. Redowan Rashid and this work has not been submitted elsewhere for any purpose (except for publication).

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*Dedicated*  
*to*  
*“OUR PARENTS AND TEACHERS”*

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## ABSTRACT

For the past few decades, there have been large infrastructure developments in many countries. construction industry is an important part of the economy and often seen as a driver of economic growth especially in developing countries. as construction industry is less mechanized and more labor intensive, construction workers are backbone of this industry. this rapid growth has attracted international construction organizations and the workforce to the region. at the same time, occupational safety and health remained one of the key issues of the industry in the region. The aim of this research was, therefore, to find the solutions, develop toolkits and guidelines which could help construction organizations in the region to improve their safety performance. this study has considered the key areas of safety that include causes of accidents, costs of accidents, heat stress, occupational safety and health regulations, worker's health factors, and safety climate. the study was conducted in three stages. firstly, the existing rules and regulations of construction safety were studied. secondly physical survey was conducted among the ongoing construction sites. thirdly causes and effects for not practicing safety measures that influence the safety performance in construction sites, benefits for practicing safety. according to the physical survey data, it was obvious that workers were working without PPE and fall protective system. from the data analysis, the main causes for not practicing safety rules and measures are lack of enforcement of safety rules and regulations, lack of safety awareness among the construction stakeholder and lack of safety training respectively.

After visited the construction sites we have seen, in most of the project health & safety are not followed properly. A few amount of safety facilities is available in the sites. Almost all the project we have found pure water supply for workers. Only a minor percent of sites is follow the safety rules.

By doing this research, we realized that the safety condition of construction sites in Bangladesh is not as good as it should have been. Workers don't know much about safety. Most of the workers are illiterates. They are working with risk, to earn money for their family. Overall significant on hazard at sites average 33.33% of high risk, 40% of medium risk and 26.67% of low risk which is not acceptable for any construction sites in any country.

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## LIST OF ACRONYMS

BBS: Bangladesh Bureau of Statistics  
BNBC: Bangladesh National Building Code  
LGED: Local Government Engineering Department  
BUET: Bangladesh University of Engineering and Technology  
NCA: Natural Concrete Aggregate  
F.M: Fineness Modulus  
ACV: Aggregate Crushing Value  
AIV: Aggregate Impact value  
F.I: Flaking Index  
SSD: Saturated Surface Dry  
PSI: Pound Per Square inch  
PWD: Public Works Department  
W/C: Water Cement Ratio  
Mpa: Mega Pascal  
ACI: American Concrete Institute  
ASTM: American Society for Testing and Materials  
SU: Sonargaon University  
X: Percent of replacement of concrete.  
UN: United Nations  
UTM: Universal Testing Machine  
SG: Specific Gravity  
AASHTO: American Association of State Highway and Transportation Officials  
C&D: Construction and Demolition  
FA: Fine Aggregate  
OSHA: Occupational Safety and Health Administration  
DOL: Department of Labor

# CHAPTER 1

## Introduction

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### 1.1 General

This is the primary chapter of the thesis which aims to provide an introduction to the research undertaken. The focus of the thesis is on construction safety and security with a specific reference. Every year a significant portion of the world GDP is spent on the matter arising from the poor occupational safety and security conditions. Construction is among those industries which are classified as most of the hazardous where the risk of accidents is comparatively high particularly in the industries of developing countries. The construction industry is prone to many hazards and accident can happen if safety is ignored. Construction materials, tools, machinery and handling techniques all come with their own dangers. The main types of accidents which cause death or serious injury on construction sites include falls, incidents with site vehicles, collapsing materials and contact with overhead power lines. The situation around the safety and health in Bangladesh is particularly poor due to the lack of knowledge on the causes and costs of accidents, implications of heat stress and worker's health of their safety performance, occupational safety, and security regulations, and non-availability of a safety climate assessment tool. This research, therefore, aims to investigate the solutions which could lead to improved safety performance in construction. This chapter introduces the research rationale, aims, and objectives of the research, research methodology and the thesis structure in separate sections. The next section provides a brief overview of the research rationale followed by a detailed description of the research aims and objectives, research methodology and structure of the thesis.

From the literature review of this study it is clear that more than 800 deaths are occurred in construction sites during the phase of 2008 to 2013. In Bangladesh more than 40% workers die due the falling from height. In the case of accident construction industry could have been in highest position, but the accidents occurred in Rana Plaza during 2013 had resulted in deaths at least 1,134 people and injured more than 2,500. only five months earlier, at least 112 workers had lost their lives in another tragic accident, trapped inside the burning Tazreen fashions factory on the outskirts of Dhaka. As a result, the fatalities rate of workers in garments sector is the highest position. If we skip the fatalities rate in garments sector, construction industry is placed in highest rank. A safe and constructive working environment decreases the risks of heavy accidents at work, sickness and lower costs for the total construction. The government enacted the following Act/Code at the national level to ensure health and safety of workers in construction sector: BLA 2006 (Bangladesh Labor Act 2006). BNBC 2006 (Bangladesh National Building

Code 2006). These regulatory documents have provisions to focus the welfare of construction workers. In order to protect the rights of the workers, the following authorities are entrusted with the duty according to the provision respectively. The Department of Inspection for Factories and Establishment legal authority to enforce BLA 2006. RAJUK=Rajdhani Unnayan Katttripakkha or the Capital Development Authority-legal authority to enforce BNBC 2006 and to take legal actions against the violators of safety laws specifically for construction sector. No health and safety law was applied to the construction sector as there was no existing law before November 2006. In November 2006, the Bangladesh Labor Act 2006 (BLA 2006) and the Bangladesh National Building Code 2006 (BNBC 2006) were first introduced. These rules and regulations contain health and safety provision relevant to the construction sector. The Bangladesh Labor Act 2006 (BLA 2006) includes all types of labor that are involved in any type of work that are related to GDP of the country. On the contrary Bangladesh National Building Code 2006 (BNBC 2006), specifically deals with the labor safety of the building construction sector. So the author wants to find out what are the actual onsite scenario and what are the reasons behind the labor death or injury in construction sites in Bangladesh against BNBC and BLA. The construction industry of Bangladesh is increasing day by day rapidly. Generally, it's a huge thing and the most important sector right now to build up civilization and everyone really interested in this civilization. To be civilized, the industry became more familiar already, always the existence of it was remarkable but in this modern age, the parameters of it became broad. When the term of construction work came, then obviously the term of construction safety should to come just after that. Construction is the most dangerous land based work sector now-a-days worldwide. Fatal rate is one of the most essential parameter to analyze the concern of construction safety. The reason to give it the high importance is that it's a major source of employment in the world. In Bangladesh also this industry is growing very fast. It represents about 10 percent of Bangladesh's gross domestic product (GDP) and employs more than 2.6 million people. This industry in Bangladesh is worth 900 billion Taka or US \$12 billion (BBS 2013). There are more than a thousand companies in Bangladesh who are involved in the construction business. But, the safety management issue in this sector is very poor in Bangladesh characterized by high fatality rates. though there is extensive research in this sector around the world, but in Bangladesh, studies are limited and research cannot go far due to lack of data and lack of knowledge about safety. Therefore, this subject demands further study and research, as its importance is being realized at national level to keep on track with the international standard. There are lots of human tragedies, loss of life, less productivity and delays of projects are occurring because of construction accidents. Selecting this topic was the main reason for improving safety performance in Bangladesh by making a good



analysis worldwide. To provide some ways to reduce accident by make a recommendation over the rules and regulations.

## **1.2 Basic Important Terms**

### **1.2.1 Vulnerability**

Vulnerability describes the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. There are many aspects of vulnerability, arising from various physical, social, economic and environmental factors.

### **1.2.2 Canopy**

A cloth covering suspended over abed. A cover (as of cloth) fixed or carried above a person of high rank or a sacred object: baldachin a canopy huge over the altar. Protective covering: such as the uppermost spreading branchy layer of a forest.

### **1.2.3 Injury**

An injury is damage to your body. It is a general term that refers to harm caused by accidents, falls, hits, weapons and more.

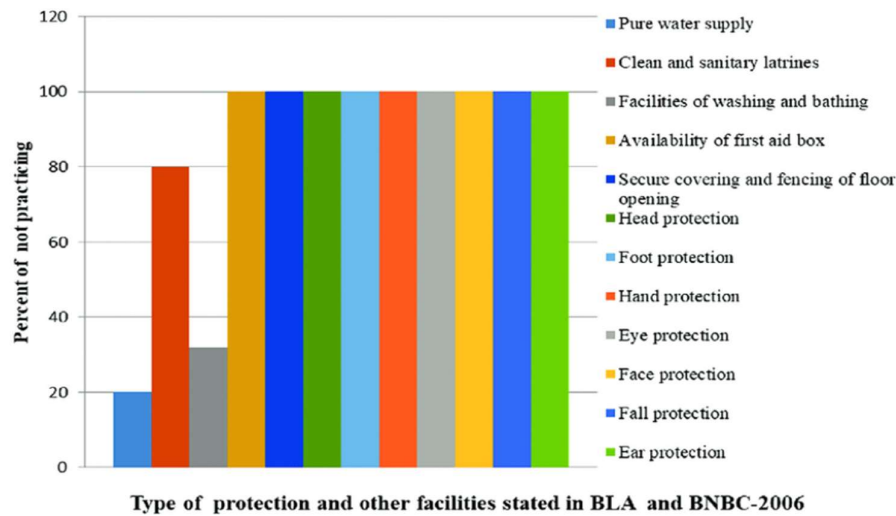
## **1.3 Problem Statement**

The construction regulations of the H&S Act are in place for the protection of all participants involved in the construction process. However, recent statistics depict a 5% increase in the number of fatalities from 2007 to 2008. Furthermore, 2008 statistics show that 68% of incidents were of a non-fatal nature (Smallwood et al., 2009). This is largely due to the negligence of the workforce, contracting parties and site supervisors (Holt, 2001). Dangers are ever present on construction sites therefore it is imperative to find better means of maintaining safety.

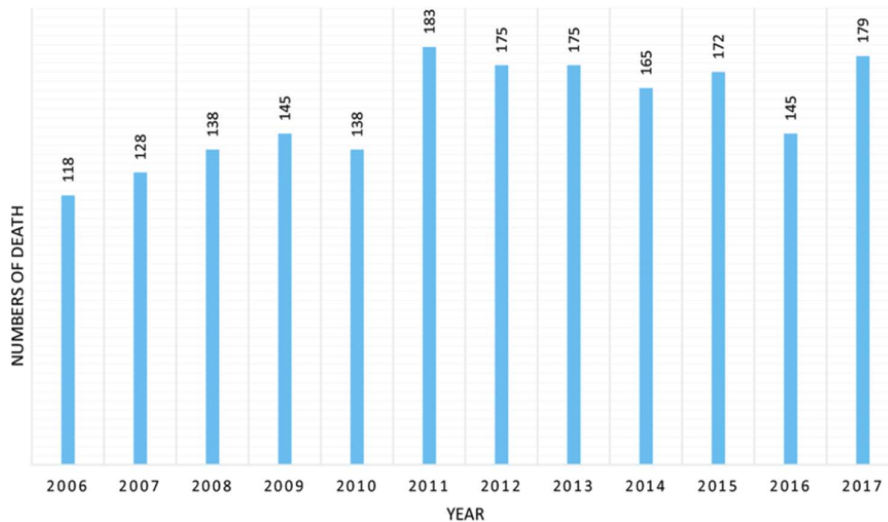
## **1.4 Fatality Rates and Construction Safety Culture in Bangladesh**

The government enacted the following act/code at the national level to ensure health and safety of workers in the construction sector. Bangladesh Labor Act 2006 (BLA 2006). Bangladesh National Building Code 2006 (BNBC 2006) The Bangladesh Labor Act 2006 (BLA 2006) includes all types of laborers who are involved in any type of work that is related to the GDP of the country. BLA is a common safety policy for all industries in Bangladesh. It does not cover all the safety issues of the construction projects (Hossain and Ahmed 2018). On the contrary, BNBC 2006 specifically deals with the labor safety of the building construction sector. However, this code is also not enough for construction safety management and is not compatible

with OSHA regulations (Star 2017). Construction safety practice in Bangladesh is at very poor and concerning level. The existing culture is not favorable to the workers and site staffs for practicing safety rules and measures, and they also do not get any training on construction safety. Islam et al. (2015) stated that construction safety is absent or over-looked in most of the construction contracts in Bangladesh. a large portion of construction workers is not practicing safety regulations. There are many safety measures in BNBC and BLA that are not practiced by all most all workers (100%). However, a small number of workers practice safety regulation with a low scale but not appropriate as stated in regulations (Hossain and Ahmed 2018). This poor safety culture is the primary cause of the high rate of the construction accident. the fatal statistics due to the construction accidents from 2006 to 2017. The highest numbers of death occurred in 2011 with 183 people, followed by 2017 with 179 people and 2012 and 2013 with 175 people. It is clear that the fatal rate is increasing day by day since 2006. This figure states how important is to find out the causes of accidents in Bangladesh.



**Figure 1.1: Current safety status in construction sites at Bangladesh**



**Figure 1.2: Numbers of death due to construction accidents in Bangladesh**

### 1.5 Research Motivation and Rationale

This figure states how important is to find out the causes of accidents in Bangladesh. Research into the causes and effects of non-compliance with the H&S procedures on construction sites by Bangladeshi contractors is justified because of the following reasons: -

- To create awareness to all stakeholders.
- To remove the general public perception that accidents are acceptable.
- To encourage further studies in this domain.
- To improve existing action plans used to curb non-compliance by contractors.
- To shed some light on the significant impact of these incidents on the construction project and the economy at large.

### 1.6 Objectives

**The Prime Objectives of this Study are as Follows**

1. To investigate the current safety status in building construction in Bangladesh.
2. To analyze the safety factors those influence the safety performance in construction sites.
3. To ensure the safety equipment's in constructions work sites.
4. To ensure all kinds of documents paper those are needed for starting work and its stay still finishes the work.

## **1.7 Safety Equipment's List**

1. Safety glasses or goggles
2. Safety helmet
3. Safety helmet with flashlight
4. Ear protection
5. Safety gloves
6. Safety boot
7. Chemical boot
8. Face shield
9. Safety helmet with flashlight
10. Protective clothing
11. Safety harness
12. Apron
13. laboratory coat
14. Road cone
15. Fast aid box.
16. Face mask
17. Fire protection

### **1.7.1 Safety Harness**

A safety harness includes all PPE that is used to ensure the safety of persons working at heights who are in danger of falling during their work. It includes safety belts with lifelines, retaining belts, safety ropes, protective appliances and rope unwinders.

#### **Safety belt with lifeline**

This is the most commonly used safety harness and is suitable for protection against falls from small heights. Safety ropes (hemp or perlon) can be attached and secured to a point above the workplace.

#### **Retaining belts**

These are used to protect persons from falling from great heights as well as ensure that they are not injured by being held.

### **Protective appliances**

These are fastened above the workplace and allow the persons roped to them to alter their distance as they wish from the fastening point to the desired working height, while the rope remains taut so that no loops form.



**Figure 1.3: Safety harness for working at height**

### **1.7.2 Scaffolds**

A general requirement is that scaffold floors 2m above the ground, and openings in them, should be fenced with two-rail railings and toe boards to prevent falls of persons, materials, tools, etc.



**Figure 1.4: Scaffolding at construction site**

### **1.7.3 Roofs**

Workers on roofs should always be equipped with a safety belt and life line that serves to secure him and prevent him from falling off the roof. A man should always be on standby to render aid if necessary, even if the work is for a short duration.

### **1.7.4 Working Platforms**

These are movable working structures, designed to carry one person, having one surface area and usually only one height for all purposes. The floor and edge protection shall be the same as for scaffolds. Precautions for prevention of falls through openings and into trenches can be summarized as follows.

### **1.7.5 Opening and Edges**

Openings in floors are sometimes covered by a piece of ply or metal sheet and this is said to be a common cause of fatalities as people fall into the void when these covers are accidentally moved. All holes shall be properly secured, protected and covered and fastened so that the cover cannot be easily moved. Demarcations and warning signs can be used to clearly indicate the dangers present.

Solid guardrails shall be installed where falls of 2m or more could occur instead of using fall protection. These protect the laborers working near the edges from falling over. Protection against objects falling from levels above should also be provided. Barriers using sheeting below guardrails down to floor level is an effective means of protection. Insisting that workers tie and secure their tools and equipment to them physically, using a lanyard is a useful technique (Holt, 2001).

Laborers fall into trenches, some more than 2m deep. This is very dangerous as the impact of the fall can kill or injure them severely or materials and equipment could fall and crush them. Materials and equipment should not be left close to the edges of excavations and should be stored away from the working area when not in use. Edges should be protected by rigid barriers if trenches are more than 2m deep (Davies & Tomasin, 1990).

## **1.8 Personal Protective Clothing**

Personal protective clothing or PPE would refer to protective clothing, or other gear designed to protect the wearer's body or clothing from injury by electrical hazards, heat, chemicals, and infection, for job-related occupational safety and health purposes (Hughes & Ferrett, 2005).

PPE is to be used as a control measure. It will not eliminate the hazard and will present the wearer with the maximum health risk if the equipment fails. Successful use of PPE relies on good user training, the availability of the correct equipment at all times, and good supervision and enforcement.

There are several types of personal protective equipment, such as:

- safety boots
- hearing protection
- eye protection
- hard hats
- hand protection
- protective clothing
- safety harnesses or belts



**Figure 1.5: Correct use of ladder and safety harness**

Specialist PPE would be required in certain circumstances, with different types of gloves being used for the handling of chemicals and another type for the handling of steel. Respiratory protection would also vary for hazardous dusts, fumes and solvents.





**Figure 1.6: Hard hat, ear muffs, gloves & safety goggles**

Eye protection comes in three forms, they are, spectacles, goggles and face visors. Spectacles are suitable for low-risk hazards, goggles are better used for dust and solvent vapors because they fit tightly around the eyes. Visors offer protection to the face as well as the eyes and do not steam up so readily in hot and humid environments.

It is necessary that employees wear and use PPE when instructed to do so by a person with authority and employers shall ensure that the PPE provided is: -

- Suitable for its intended use.
- Correctly sized and fitted to the individual user.
- Used by employees who are trained in its use and understand its performance.
- Correctly stored when not in use.
- Cleaned and checked at regular intervals, usually every time it is used.
- Disinfected and sanitized before use by another person.
- And used by everyone that needs protection.

When selecting PPE, several factors need to be considered. These include the nature of the hazard (the severity of the hazard and its associated risk will determine the quality of protection required), comfort and user acceptability, compatibility with other PPE, training and maintenance requirements and costs (Hughes & Ferrett, 2005).



It is important to note that the appropriate PPE should also be made available to visitors and other members of the public when visiting construction sites. The use of PPE cannot be stressed enough and it is vitally important that site agents and managers lead by example in its use and enforce it even if it means taking disciplinary action against the defaulting individual.

### 1.9 Some Important Figures Are Given Below:



Figure 1.7: Safety instruction and safety sign



Figure 1.8: First AID box at construction project for safety



**Figure 1.9: Working at height with safety harness**



**Figure 1.10: Worker Working with proper safety**



**Figure 1.11: Pure drinking water supply at site**

EXHIBIT E



Print Form

**PLANNING, DESIGN AND CONSTRUCTION  
Hot Work Permit Request**

PD&C Project No. \_\_\_\_\_

Date of Request: \_\_\_\_\_ (Two (2) working days prior to the required date)

**Note - If an emergency, check here:**  Check Box

To: Jonathan M. Chase, Director, Department of Safety and Health  
Fax: 215-762-7899

Requested By: \_\_\_\_\_  
(Contractor)

Indicate building name, building #, floors, areas or rooms requiring clearance; include room numbers by campus plans and, if possible, the actual room numbers.

Enter

Reason for Hot Work: \_\_\_\_\_

Start Date: \_\_\_\_\_ Time: \_\_\_\_\_

Completion Date: \_\_\_\_\_ Time: \_\_\_\_\_

Permit requested for: (Subcontractor) \_\_\_\_\_

Foreman: \_\_\_\_\_

Signature of Superintendent: (GC/CM) \_\_\_\_\_

Comments:

Enter here

cc: Project Manager - Planning, Design & Construction  
Project Manager - UNICCO (for Creese, MacAlister, Phys Ed Ctr. & all Dormitories)  
Property Manager - API (for 3001-101 Market)  
Property Manager - API (for other API properties)

Fax: 215 895-6733  
Fax: 215 895-6701  
Fax: 215 222-0620  
Fax: 215 662 5924

**Figure 1.12: Work Permit for Construction**

## **CHAPTER 2**

### **Literature Review**

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#### **2.1 Introduction**

Chapter two of the thesis is the literature review chapter which describes the literature review undertaken in completing this research project. A systematic review approach consistent with the research objectives was adopted to ensure that the gap in the knowledge is effectively identified and that the methodology applied to accomplish the research objectives are best aligned with the existing approaches. The literature review is considered very important in writing research papers and thesis. Randolph (2009) suggested that a defective literature review is one of the many reasons which can derail the thesis, paper or dissertation. A faulty literature review may result in a flawed thesis or dissertation due to the fact that comprehensive research cannot be performed without a full understanding of the existing literature in the relevant area (Boote and Beile, 2005). The literature review of the thesis also gets due considerations by the examiner as well. A research conducted by the Mullins and Kiley (2002) concluded that most of the examiners get a perception of the whole thesis from the literature review. If the literature review is found poor, the examiners assume that the rest of the thesis would also have problems. To ensure that the literature review is best aligned to the research objectives of the project, the literature review is divided into a total of eleven sections in this chapter. The aim, objectives and the research rationale discussed in chapter 1 served as a guide to engage with the literature review associated with different parts of the research. The literature review presented in this chapter provided a base to finally proceed towards the development of toolkits and guidelines to improve the safety performance in the construction industry in Bangladesh. It was considered important to start from the construction industry itself; therefore, section 1 of this chapter highlights the construction industry in different countries and regions including Bangladesh. In section 2, the literature review on the causes of accidents in construction is presented. Section 3, of the chapter, presents the literature on the cost of accidents in construction. The literature review on the heat stress and its implication in construction is outlined in section 4. The Occupational Safety and Health Regulations applicable in construction are covered under section 5. In section 6, the construction worker's health factors that affect their safety and productivity performance are discussed. The literature review on the body pain experience of workers and its impact on worker's safety and productivity are presented in section 7. Finally, in section 8 of this chapter, the literature review on the safety culture and safety climate is presented. All these sections of the literature review are further expanded one by one in the next sections.

## **2.2 Health, Safety and Security Definition**

Safety refers to procedures and other matters taken to keep workers from being injured or getting sick. Security overlaps safety somewhat because it can also mean protecting workers from injury, but it is broader and refers to other threats as well, such as sexual harassment and theft.

### **Health**

The protection of the bodies and minds of people from illness resulting from the materials, processes or procedures used in the workplace.

### **Safety**

The protection of people from physical injury. The borderline between health and safety is ill-defined and the two words are normally used together to indicate concern for the physical and mental well-being of the individual at the place of work.

### **Welfare**

The provision of facilities to maintain the health and well-being of individuals at the workplace. Welfare facilities include washing and sanitation arrangements, the provision of drinking water, heating, lighting, accommodation for clothing, seating (when required by the work activity), eating and rest rooms. First aid arrangements are also considered as welfare facilities.

## **2.3 Environmental Protection**

Environmental Protection includes programs that are aimed at reducing risks to the environment from contaminants such as hazardous materials and wastes, fuels, and oils. These programs address pollution prevention measures and regulatory compliance by providing procedures for safely working with these materials, inspecting the storage vessels and locations, and designating preventative maintenance procedures. Also included are environmental emergency plans, which provide the appropriate actions to be taken in the event of a spill or release.

Arrangements to cover those activities in the workplace which affect the environment (in the form of flora, fauna, water, air and soil) and, possibly, the health and safety of employees and others. Such activities include waste and effluent disposal and atmospheric pollution.

### **Accident**

Defined by the Health and Safety Executive as ‘any unplanned event that results in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of a business opportunity’. other authorities define an accident more narrowly by excluding events



that do not involve injury or ill-health. This book will always use the Health and Safety Executive definition.

### **Near Miss**

Is any incident that could have resulted in an accident. Knowledge of near misses is very important since research has shown that, approximately, for every ten 'near miss's events at a particular location in the workplace, a minor accident will occur.

### **Dangerous Occurrence**

Is a 'near miss's which could have led to serious injury or loss of life. Dangerous occurrences are defined in the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (often known as RIDDOR) and are always reportable to the Enforcement Authorities. Examples include the collapse of a scaffold or a crane or the failure of any passenger carrying equipment.

### **Hazard and Risk**

A hazard is the potential of a substance, activity or process to cause harm. Hazards take many forms including, for example, chemicals, electricity and working from a ladder. A hazard can be ranked relative to other hazards or to a possible level of danger. A risk is the likelihood of a substance, activity or process to cause harm. A risk can be reduced and the hazard controlled by good management. It is very important to distinguish between a hazard and a risk -the two terms are often confused and activities such as construction work are called high risk when they are high hazard. Although the hazard will continue to be high, the risks will be reduced as controls are implemented. The level of risk remaining when controls have been adopted is known as the residual risk. There should only be high residual risk where there is poor health and safety management and inadequate control measures.

## **2.4 Problems Encountered in the Construction Site & Industry**

Construction sites are dangerous places. Some of the dangers-like heavy construction equipment-is obvious. But there are also hidden dangers of working in construction that, while not obvious, lead to injuries every day.

Protecting construction workers and creating a safe construction environment requires companies to go beyond the minimum safety, we covered the top 7 issues facing the construction industry. which was read by thousands of people and helped construction companies solve their problems. We decided that we should update this list, and check in on the new challenges that construction business owners were facing. The construction industry is developing day by day, but the construction industry challenges are still fairly similar. If you are running your own construction business, you are likely experiencing many of these yourself. Or perhaps you

haven't realized that these problems have been holding you back, and you'll find the piece of advice you've been missing. Either way, there's a lot to be gained by recognizing the key issues in your construction business and working towards fixing them. Without further ado, let's get into the top 7 issues facing the construction industry.

#### **2.4.1 Workers Need Proper Tools and Equipment**

It can be surprisingly common for workers to start a job without proper tools and equipment, particularly if they are quickly switching between tasks. Your organization's safety program should emphasize that workers should never start any job (no matter how small) without all of the required tools and safety equipment -accidents only take seconds to happen.

#### **2.4.2 Continuous Safety Training is Necessary**

Laws and policies surrounding safety in the workplace are constantly changing, and a number of factors can change safety policies -including new laws and standards, incidents, new equipment and new projects. This means that safety training is not a one-time thing! Conducting regular safety training to teach new safety practices, as well as to reinforce old ones, is crucial to a successful safety management program.

#### **2.4.3 Tracking for Compliance**

While your organization may have a robust safety program in place, it won't be fully effective if proper tracking for compliance is not implemented. Your organization needs a centralized system to ensure procedures are being followed. (If you're looking for a solution to manage and report business risk, compliance, and performance metrics easily, Certainty Software is here to help!)

#### **2.4.4 The Safety Practices of Contracted Organizations**

Working on a large construction project can often mean that general contractors and sub-contractors are also sharing the job site. Safety issues can arise if those companies have less than desirable safety cultures. Management should ensure that any contractors present on the job site are abiding by the organizations safety rules and procedures, as well as following company policy on tracking for compliance.

#### **2.4.5 Prioritizing Safety, Along with Schedule and Budget**

Being on-schedule and on-budget are the bottom line of any construction business. Before standardized safety regulations, many workers were constantly put at risk due to an emphasis on

speed and budget. However, these days it's known that a healthy workforce is also a cost-effective workforce. The total cost of fatal and nonfatal injuries in the construction industry is estimated at nearly \$13 billion annually. Safety needs to be considered as an equal to schedule and budget.

#### **2.4.6 Having an Aging Workforce**

Most studies suggest that injuries are less frequent but more severe among older construction workers. Data shows that worker compensation costs increase with the age of workers, in part due to greater lost work time per incident. Organizations can mitigate this risk by adapting the workplace to fit the needs of older workers. This can be done by using lighter tools and materials as well as emphasizing ergonomic working practices.

#### **2.4.7 Poor Habits and Resistance to Change**

Poor habits from previous work places can be difficult to shake. This may be especially present in new employees who haven't yet adjusted to your safety culture. Very experienced workers can also be resistant to change and may think "we've done it this way for 20 years, why does it need to change now?" Continuously reinforcing the safety program, and offering rewards for change will help make sure all workers are on the same page when it comes to safety.

### **2.5 Performance Costs Implied within Health, Safety and Security**

In order to maintain a healthy working environment, the cost of safety is those incurred in order to comply with legal requirements with respect to accident prevention, to implement measures to prevent accidents during construction work and to improve health and safety conditions in all areas of the work performed. The cost of health and safety was generally perceived as a necessary and beneficial business expense. According to, avoidance or reduction of accident and work-related ill health costs per se does not appear to be the primary motivating factor for effective health and safety management. However, acknowledged that health and safety failures might ultimately impact on the financial performance of an organization through any of the higher level factors like customers and client expectation, worker's morale, productivity, efficiency and service delivery etc. In view of the above position, argue that safety investment cannot be absolute and a rational judgment for safety cost is required and maintain that costs associated with rigorous safety parameters in developing countries might simply be unjustifiable and that the stakeholders cannot bear the safety cost for economic survival if the real cost of accident is too low in the economy. Estimates that the cost of implementing Health and Safety systems within a construction company lies between 0.5% and 3% of total project costs.



### **2.5.1 Cost of Accident (CoA)**

The Cost of Accident (CoA) is the final measure that can readily be related to by all stakeholders as it can be expressed as a percentage of organizational business volume or construction completed. It could also be categorized as being either direct or indirect which collectively constitutes the total Cost of Accident and it is noted that in Bangladesh, the estimated CoA is around 5% of the value of the completed construction. The indirect costs of accidents are 14.2 times the direct costs. A report from the Health and Safety Authority Research Series (HSARS 02/2007) shows that Employer costs from the accidents included salary costs for replacement staff or overtime payments, production and productivity losses, retraining costs, personal injury claim compensation, repair bills, medical & travel expenses and increased supervision. Literature has enabled us ascertain the likely hood of negligence of health and safety compliance in construction projects. The empirical analysis would further provide us with detailed insight to this phenomenon.

### **2.5.2 Overview of Efficiency and Cost Effectiveness Development in the Industry**

Every year the construction industry accounts for a disproportionate injury rate when compared to the all - industry average. In recent years, incident rates have declined as a result of improvements in safety management. While there is a great deal of knowledge regarding the safety management strategies of highly effective construction firms, little is known about the cost - effectiveness of these strategies. Interviews with 26 representatives of construction firms headquartered in the US were undertaken to quantify the cost of implementing common safety program elements by: (1) quantifying cost for each element per US\$1 million of project scope; and (2) determining the distribution of safety funding to each element. Using these cost data and effectiveness ratings from previous research, the cost - effectiveness of 13 safety program elements was quantified. The results indicate that the most cost - effective safety program elements are subcontractor selection and management and upper management support and commitment. Alternatively, the least cost - effective elements are the employment of a full - time safety manager and record - keeping. The information presented in this paper may be used by practitioners to direct resource investments, strategically select a subset of safety program elements when resources are limited, and to justify additional resource investment in accident prevention.

## **2.6 Strategic Decisions in Construction Health, Safety and Security**

It is important to consider health and safety issues through the entirety of a project, from planning and design to construction and evaluation. This will not only reduce costs but improve productivity through better predictive capabilities and management of operational and production costs. Proper integration of Health and Safety strategies into the processes will also allow for innovations in the design and construction processes of the project (Work Safe Victoria, 2010). Contractors undertake the construction project using a team comprising of different department. Most of the contributors make decisions that affect health and safety at the worksite. In some cases, the project team consists of external members such as advocacy groups or regulatory agencies. It is important that the construction company identify health and safety issues relates to the sector during the decision making process. A construction company should understand interests of all the stakeholders and establish proper processes while complying with the highest quality health and safety standards that are specific to the sector. The company should make sure that decisions made in response to interests of the stakeholders are consistent with the OHS standards.

The supply chain in the construction industry is fragmented with very little communication taking place between the individuals that initiate, manufacture, design, utilize, and/or maintain the facilities. Lack of communication between different team members can prevent establishment of shared goals and objectives that will negatively affect health and safety at the organization level. Poor communication and the formal distance between the construction and the design department is especially identified as a major barrier to implementation of effective health and safety procedures within the organization. It has also been linked with higher incidence of fatalities at the construction worksite. As compared to other department, constructors have a deep understanding of the processes mainly due to specialized knowledge, training and expertise of the individuals. Moreover, they are directly responsible for the project outcomes. As a result, they usually have a greater interest and motivation in ensuring the work is performed safely with minimum safety and health risk for the workers. They can provide advice to the decision makers about OHS before the start of the construction process. When they fed knowledge about the construction process 'upstream' at the initial phase of the construction project, it will result in better decision making with greater chances of health and safety risks being reduced eliminated completely at the source.

## **2.7 Decision Making within the Construction Industry**

Early decision-making and the prevention of construction safety risks are very important for the safety, quality, and cost of construction projects. In the field of construction safety risk

management, in the face of a loose, chaotic, and huge information environments, how to design an efficient construction safety risk management decision support method has long been the focus of academic research. An effective approach to safety management is to structuralize safety risk knowledge, then identify and reuse it, and establish a scientific and systematic construction safety risk management decision system. Based on ontology and improved case-based reasoning (CBR) methods, this paper proposes a decision-making approach for construction safety risk management in which the reasoning process is improved by integrating a similarity algorithm and correlation algorithm. Compared to the traditional CBR approach in which only the similarity of information is considered, this method can avoid missing important correlated information by making inferences from multiple sources of information. Finally, the method is applied to the safety risks of subway construction for verification to show that the method is effective and easy to implement.

## **2.8 COVID-19 Guidance for the Construction Site**

OSHA is committed to protecting the health and safety of workers and workplaces during the COVID-19 pandemic. The agency is issuing a series of industry-specific alerts designed to help employers keep workers safe. Take the following steps to reduce risk of exposure to the coronavirus for construction workers:

- Instruct sick workers to stay home.
- Implement physical distancing practices to maintain at least six feet between co-workers/contractors/visitors, including while inside work trailers.
- Keep in-person meetings (including toolbox talks and safety meetings) as short as possible, and limit the number of workers in attendance.
- Provide and have all workers wear face coverings (i.e., cloth face coverings or surgical masks) that have at least two layers of tightly woven breathable fabric, unless their work task requires a respirator. Face coverings should be provided at no cost to workers.
- Continue to use other normal control measures, including personal protective equipment (PPE), necessary to protect workers from other job hazards associated with construction activities.
- Provide and ensure workers use the supplies necessary for good hygiene practices. If workers do not have immediate access to soap and water, use alcohol-based hand sanitizers that contain at least 60 percent ethanol or 70% isopropanol.
- Do not allow workers to share tools and equipment. If sharing cannot be eliminated, clean and disinfect between each use.
- Clean and disinfect portable jobsite toilets and fill hand sanitizer dispensers regularly.

- Train workers on COVID-19 policies and procedures in a language they understand.
- Ensure policies encourage workers to report any safety and health concerns.

## **2.9 Occupational Health, Safety and Security**

Safe work is one of the fundamental rights of the workers. Occupational safety and health is an important component of decent work agenda. It means the condition of workplace where workers work is free from all kinds of hazards and risks. Safe work environment ensures safety and health for everyone at work preventing hazards and risks. Risk comes in many forms-repetitive tasks, long hours of work, exposure to harmful substances like gas and fumes, noise, insufficient lighting, damage to equipment, and psychological and physical oppression. It is estimated that globally around 160 million people are affected by avoidable occupational diseases and more than two million workers die from work related accidents each year (Kwame, Kusi and Lawer, 2014). The suffering caused by such accidents and illnesses to workers and their families is incalculable. In economic terms, the ILO has estimated that 4 percent of the world's annual GDP is lost as a consequence of occupational diseases and accidents. Besides, employers face costly early retirements, loss of skilled staff, absenteeism, and high insurance premiums due to work-related accidents and diseases. As a fast growing developing country, Bangladesh is gradually flourishing in its commerce and industry; and, at the same time, the number of workers is also increasing in industries and factories. But the country is faced with occupational health and safety hazards in its industries. A large number of workers lose their valuable lives and are injured because of poor occupational safety and health conditions. Though there is no government source of data on how many workers suffer from occupational diseases and accidents in Bangladesh each year, according to the Bangladesh Institute of Labor Studies (BILS) newspaper based survey, a total of 5909 workers died and 14413 workers were injured in different occupational accidents during last ten years (2002-2012). Also in this survey it is too observed that 708 workers died in the year of 2012 due to different workplace accident around the country; among them 554 were male workers and 154 were female. Total numbers of injured workers were 701; among them 588 were male and 113 were female workers. And in 2013, in a single incident, Rana Plaza Building collapse, the lives of 1138 workers were lost, and total 1912 workers were killed and 5738 workers in 2013 were injured due to workplace accident and violence. The current regulatory framework of the country on occupational health and safety refers mainly to the workers of industries but does not cover all occupations of the country. The main laws related to occupational health and safety in this country is the Bangladesh Labor Act 2006. There are a number of other laws and regulations which also have some provisions related to occupational health and safety. Due to weak implementation of the regulatory provisions

regarding OSH, the standards of workforce and industries are often not enforced. In spite of having enormous problems, hazards, accidents, and complaints relating to OSH condition of the country, getting a complete and comprehensive picture of OSH in Bangladesh is not an easy task since the information on this issue is locating at various sources, and even there is dearth of necessary information. Due to change of time and change in nature of OSH problems and hazards, the existing OSH profile developed in 2002 has become less capable to meet the information needed in this regard. Thus, developing a new profile, which will ultimately update the existing one, on OSH condition of the country is long overdue. The core objective of this report is to update the National Occupational Safety and Health Profile of Bangladesh 2002 and develop a new profile of the national occupational safety and health. To this end, specific objectives of the study are to analyze the (a) laws and policies relevant to occupational safety and health in line with the country's human rights and labor rights obligation to occupational safety and health; (b) strengths, capacities and weaknesses of institutions involved in promoting occupational safety and health; (c) state of the occupational safety and health in major labor intensive sectors of the country; and (d) OSH related structures, and collaboration amongst stakeholders. For updating the National OSH Profile, information has been collected from both the primary and secondary sources. Secondary information includes reviewing and analyzing the main OSH related laws and regulations, data, statistics and information on existing state of occupational safety and health in Bangladesh. A number of key informant interviews and focus group discussions have been carried out to draw on the primary information (see Annex 1 for an overview of the study design). The study is presented in four core sections. The next section provides the background of the study exhibiting the economic, demographic, and labor context of the country in relation to country's obligation to OSH and legal settings. The third chapter is the analysis of the national laws and policies related to OSH. The fourth chapter analyses the OSH related institutions and structures, and collaboration amongst stakeholders. The fifth chapter analyses the strengths, capacities and weaknesses of the state of inspection for promoting occupational safety and health. The sixth chapter exhibits the state of the occupational safety and health in major labor intensive sectors of the country. The conclusion and policy implications are drawn in the final chapter.

## **2.10 Role of Contractor, Sub-contractor and Health and Safety Officers**

Construction Regulations put into place by the Minister of Labor governs the actions and responsibilities of all those present on construction sites in Bangladesh. Contractors and safety officers therefore need to address issues of H&S according to this schedule in the execution of

their duties. Management is therefore legally required by law to enforce Occupational H&S and ensure that their workers are not injured (Geminiani & Smallwood, 2008).

**Main contractors** are responsible for the following in the execution of their duties (LexisNexis Group, 2006):

- Provide all sub-contractors appointed with relevant sections of the H&S specifications.
- Appoint each contractor in writing.
- Ensure that each contract implements and maintains the H&S plan and that periodic audits are done at least once a month.
- Stop any work by a sub-contractor which is not in accordance with the H&S plan.
- Provide the sub-contractor with sufficient H&S information and appropriate resources when changes are made to design or construction.
- Ensure that every sub-contractor is registered with a compensation fund or a licensed insurer.
- Ensure that provision has been made by all contractors in their tenders for the cost of H&S.
- Discuss and negotiate contents of the H&S plan with the sub-contractor.
- Ensure a copy of the H&S plan is made readily available.
- Ensure that an H&S file is opened and kept on site and is readily available.
- To hand over a consolidated H&S file to client upon completion of the work.
- Make available an updated list of all sub-contractors on site accountable to him as well as the type of agreement between parties and the work being done.
- Ensure that the sub-contractor to be appointed has the necessary competencies and resources.

**Sub-contractors** are responsible for the following (LexisNexis Group, 2006): -

- Ensure that the sub sub-contractor to be appointed has the necessary competencies and resources.
- Shall co-operate with the principal contractor in accordance with the Act.
- Provide the main contractor with any information which might affect the H&S of any person or which might justify a review of the H&S plan.

The duties and responsibilities of safety officers are not specified in the H&S Act.

However, Levitt & Samelson (1994) recognize their basic goal as encouraging management to adopt effective ways to keep the workforce safe and healthy as they carry out their daily activities. Safety officers merely advise, guide, monitor and support the decisions made by top management with regard to site safety as safety on the construction site is not the

responsibility of safety professionals' but that of the site managers, superintendents and foremen (Levitt & Samelson, 1994).

Activities executed by safety professionals toward achieving the above mentioned goal include (Levitt & Samelson, 1994):

- Introduction of H&S considerations into planning at all stages of the project construction cycle.
- Working with all levels from top management to laborers to ensure that everyone is in agreement and will adhere to the H&S plan.
- Development of orientation and training programs.
- Encouragement of people at all levels to participate in appropriate training courses.
- Advising on record-keeping systems for use by management by which supervisors can be held accountable for H&S.
- Monitor themselves or help those responsible monitor the insurance claims and reserves.
- Assist in monitoring of H&S performance through job inspections, work procedure analysis, near-miss incidents, accident and injury record analyses, safe behavior observation and other methods adopted on that specific site.
- Keeping their organizations updated on H&S matters as well as new management methods for integration of H&S into total job performance.
- Working together with other safety professionals to develop cooperative industry-wide programs and materials.

Legislation states that a safety officer should be appointed at the early design stage where his input could be used to improve and refine the scheme design (Section 6, clause 6). However, in an interview with Mr. Moodley (2009), a safety officer for a large enterprise main contractor at a local Durban site, he says that this is not done in practice as safety officers are usually appointed at a later stage after the design has been completed and construction begins. The International Labor Organization (ILO) in Occupational Safety and Health Series (1979) further provides for general obligations of supervisors and safety officers:

### **Supervisors**

- In small projects a supervisor should be appointed if more than two workers are employed.
- His main task is to prevent workers from engaging in unauthorized action that is strictly prohibited by safety regulations as this will endanger both themselves and their workmates.

## **Safety officers**

- Acts as an instructor and advises the employer in the carrying out of safety measures.
- His primary duty is to monitor the workers constantly to see that they use their safety equipment in the correct manner and work in a safe way.

### **2.11 Falls and Fall Protection**

The construction industry generates a disproportionate number of fatalities, injuries and disease relative to any other industry in Bangladesh. These occur as a result of accidents due to the ever present hazards on construction sites (Smallwood, 2004). This is because construction work involves numerous occupational risks, such as work at heights (use of scaffolding, gangways and ladders; work on roofs); excavation work (use of explosives, earthmoving machines); lifting of materials (use of cranes, hoists), and so on, which are specific to this type of industry (López-Valcárcel, 2001). The most common accidents that occur as identified by Davies & Tomasin (1990) are:

- Falls
- Stepping or striking against objects
- Strain due to lifting and carrying objects and machinery
- Mishandling of machinery
- Electric shocks
- Injury due to earthmoving vehicles
- Fires and explosions

### **2.12 Methods Used to Promote and Ensure Compliance**

Although it cannot be quantified, it can be inferred that the construction regulations have had a positive impact on reducing H&S accidents (Smallwood et al., 2009). Contractors and safety officers should adopt and implement the regulations stated in the legislation to effectively eradicate the occurrences of fatalities and injuries on their sites. The following methods are some of the ways in which contractors and safety officers can further enhance their control procedures (IRCA, 2003).

#### **2.12.1 Risk Assessments for Activity-Site Specific**

Risk assessments should ideally be performed stringently before the start of the project and constantly during the project. Reason being is that a number of tragic events could occur at any time with the heavy duty power tools being used by laborers daily. The risk assessment is there



not only to protect the workforce but the contractor as well because in the event that something was to happen, the contractor would not be held liable because the contractor, being a reasonable man, had checked for possible threats of danger.

### **2.12.2 Method Statement**

The method statement of a company is a declaration of all companies' beliefs and values. The value of its employees should be of the utmost importance. Therefore, it has to be frequently visited to ensure that it is maintained and supported throughout the project.

### **2.12.3 Safe Working Procedure**

By making sure all people working at heights are equipped and knowledgeable about their safety harness and the correct way of wearing their protective gear. The safety officers have to ensure that all participants are guarded against the ever present dangers on construction sites.

### **2.12.4 Health and Safety Inductions Before Proceeding to site**

There is no need to elaborate the importance of the induction. It serves as indemnity to the employer that the workers know the risks involved in their line of work and agree to abide by the rules set out. These inductions also screen each person to verify if they are medically and physically fit for the task at hand.

### **2.12.5 Toolbox Talks**

It has been noted that many sites undergo a weekly ritual of gathering a congregation of labor and explaining to them the hazards of their environment. And while one may contest that this procedure is monotonous, some of the labor need to be constantly reminded so that they know how their actions impact the people around them. These toolbox talks, in order to be effective, should be held at least once every week.

### **2.12.6 Encourage Participation of Safety Strategies**

It has been found that word of mouth communication is more effective than rote learning. Therefore, management should try to make their safety talks and instructions as interesting enough without being condescending, so that it can encourage workers to help out their fellow man. They should make training sessions freely available to willing participants so that it can be practiced throughout their career.

### **2.13 Safety Culture and Safety Climate**

The construction industry contributes largely to the development and overall economic growth of a country. A study conducted by Global Construction Perspectives and Oxford Economics (2011) reports that the construction sector provides more than 11% of the global Gross Domestic Product. In Bangladesh, the number of construction industries is increasing rapidly day by day. In the present scenario there is a trend of constructing high rise building, flyover and bridge to mitigate the people's need of shelter and transportation. Therefore, like Bangladesh all the developing countries are investing funds and workers for the development of its infrastructure, economy and urbanization. According to the estimation of International Labor Organization (ILO) nearly 110 million workers are involved worldwide in the construction sector which is almost 5-10% of the total population. But unfortunately construction industry is one of the most vulnerable industries in the world due to its unique nature. In most of the cases construction workers provide their service in a very risky environment where no sufficient safety measures are taken into consideration. Therefore, workers in construction sites are victim to fatal and or non-fatal accidents which leads to death, injuries and illness. Nowadays, for this reason improving site safety is a major concern for the construction industries. An effective practice of safety culture is the key to defend accidents and all types of hazards in construction site. Safety culture can be measured by both qualitative as well as quantitative approach. The qualitative approach includes observations, case studies, group discussion etc. and quantitative approach include surveys, interviews etc. Many researches have been carried out throughout the world on the safety culture practice in the construction project but very little study is available in a large scale in Bangladesh. This research work used questionnaire survey as a tool for the assessment of safety culture on the running construction project in Bangladesh. About 25 cases are considered and analyzed to picture the overall scenario of safety measure and practice in the construction sectors in Bangladesh. Finally, a summary on the lacking on the safety measures and suggestion to minimize it were drawn.

## CHAPTER 3

### Methodology

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#### 3.1 Introduction

This chapter describes the research methodology adopted for the different components of the research project. Considering the aim and objectives of the study, both the qualitative and quantitative research methods were employed. These two methods of research in relation to the research objectives are briefly explained in the first section followed by a detailed description of the methods and tools used in the study. This chapter further sheds light on the sampling process, data collections and data analysis. The research method used for each component of the research is discussed and explained with relevant justifications. To develop a theoretical relationship between the research methods and research methodology adopted in this research project, the next section explains common research methods used in construction followed by the research methodology adopted to achieve the research objectives of this research.

#### 3.2 Research Approach and Process

##### 3.2.1 Research Approach

Academically, research is defined as a systematic study or process of enquiry that is aimed at increasing the sum of human knowledge. For the research to hold true it has to be distinct and each section explained fully on its own (Holt, 1998). There are two widely used paths which form the basis of the research conducted by those in the construction industry, qualitative and quantitative approaches (Holt, 1998). A qualitative approach is described as a systematic and objective location, evaluation and synthesis of evidence, using methodologies in order to establish facts about the certain misconceptions and draw conclusions on such (Walliman, 2005). Holt (1998) mentions that this approach involves a complex approach as the process involves analyses of various informants' opinions and comprehensive data. Qualitative methodologies make use of the following approaches but are not limited to them:

- Descriptive approach - describes what the problem is after careful review of data related to the study. This allows the reader to fully ascertain what the issues relating to the topic are, and as a result the reader is thereafter persuaded into choosing the topic that seeks to solve the problem.

- Explanation approach - fully explains to clear the matter in the briefest way so that the reader can create the full picture in his mind. It explains why something happens or happened as well as the causes and effects of such a happening.

Since this research seeks to investigate the causes and effects of non-compliance by Bangladesh contractors with the H&S regulations, it can be partially viewed as explanatory in the form of exposing the procedures followed when the incident has occurred.

Qualitative methods explore the relationship of events, their views and opinions which do not include numerical data. It attempts to examine the situations in order to establish what the norm is by using textual instead of numerical data.

Quantitative approach is defined as the investigation into the problems society has through testing the hypothesis using numerical or statistical approaches. This approach is regarded as one that is analytical in nature because statistics form the basis of tests which are formulated for the testing of the hypothesis. Data gathered using the quantitative approach is derived from surveys and statistical tests (Holt, 1998).

Furthermore, Holt (1998) comments that there are many research methods that exist with surveys, experiments and case studies being the most widely used within the property and construction industry for research purposes. Leedy (2005) mentions that the nature of the data used, the objectives of the study together with the questions formulated will significantly affect one's choice of the method to be followed.

Walliman (2005) states that:

- Surveys are one of the most important elements of research although it is criticized for its narrow approach as interviewees will answer according to their own experiences. It is essential that the questions to be asked are kept as simple as possible for statistical purposes.
- Experiments have an advantage of allowing the researcher to artificially control the outcome of the experiment through ensuring that the constituents are appropriate for the purposes of yielding the preferred outcome. This approach has been criticized as not being investigative since the person who conducts the experiment knows what to expect and therefore controls the outcome rather than discovering the underlying issues that propel such to happen.
- Case studies are preferred when the research will involve extensive use of data to present various ideas to offer a wider understanding of the subject.

Furthermore, Holt (1998) discusses the importance of formal and informal interviews as one of the commonly used methods for conducting research. Since the structure of a survey is almost the

same as that of an interview, the two can be used instead of the other and vice versa. In this regard the research report adopts a quantitative approach as it makes use of statistics gathered from the survey questionnaire responses from contractors and H&S officers. Structured interviews were also carried out to assess the effectiveness of H&S plans implemented on sites. Walliman (2005) states that the research methodology should not be restricted to one method of data collection for the purpose of research as it may result in bias to that particular method. Holt (1998) agrees that the use of different methods to collect data for the purposes of research will prove more reliable than when it is only restricted to one method.

### **3.2.2 Research Process**

The research process is a systematic guide for obtaining findings, data collection, developing data analysis as well as formulating the conclusion. The systematic structure of objectives is set in such a way that they complement one another and they afford a flow in the research through ensuring that the objectives interlink whilst remaining interdependent.

### **3.3 Research Methodology and Methods**

A mix research approach that includes quantitative and qualitative research methods was adopted to achieve the aims and objectives of this research. The complete research methods are explained in here Briefly, this research was carried out in a total of four stages including literature review, data collection, data analysis, and writing the thesis. The next sections describe the different activities of the four stages used to complete this research project. These activities are discussed in more detail in below.

#### **3.3.1 Stage I: Literature Review:**

1. Background research.
2. Research proposal development, submission, revision, and approval.
3. Development of Data Collection Tools, submission, revision and approval.
  - a) Interview questionnaire for construction site safety.
  - b) Interview questionnaire for worker's health profile.
  - c) Interview questionnaire for safety climate factors.
  - e) Safety climate questionnaire.
4. Finalizing and justification of sample size for different studies.

### **3.3.2 Stage II: Data Collection:**

1. Visiting the construction sites and persons for data collection.
2. Selecting the unsafe condition area and mark in our hardcopy.
3. Taking interview to workers and supervisor physically.
4. Assisting the respondents to complete the questionnaire completely.

### **3.3.3 Stage III: Data Analysis:**

1. Checking the collected responses data as we collected from site and readable before interring into thesis book.
2. Calculating different averages and ratios as part of descriptive analysis.

### **3.3.4 Stage IV: Writing the Thesis:**

1. Writing up the thesis and submission.

## **3.4 Research Aim and Objectives**

The aim of this study is to investigate the causes and effects of non-compliance with the H&S procedures by contractors in the Bangladeshi construction industry. In order to achieve the above mentioned, aim a research methodology is developed to accomplish four objectives.

- (1) Investigating the H&S Act, policies used to promote and ensure compliance within sites, hazard and prevention methods and management systems for safe construction.
- (2) Defining the causes and effects of non-compliance with H&S procedures and determining practices on construction sites.
- (3) Assessing the practicality of the H&S plans and investigating their view towards eliminating contractor's non-conformance with H&S procedures.
- (4) Developing an action plan to enhance the effectiveness of contractors' H&S plans in Bangladesh.

## **3.5 The Nature and Characteristics of the Research**

This research is an investigative study and attempts to collaborate with contractors, safety officials, i.e. Department of Labor (DoL) as well as Government to integrate a system which will improve the obvious non-compliances that exist in the construction industry. These non-conformances are often ignored or not investigated further which ultimately result in abnormally high H&S accident statistics. An action plan for the incorporation of these ideals into the H&S practices is formulated and should be adopted by all influential parties mentioned.

### **3.6 Materials**

In this thesis project we have used some materials are follow:

1. Safety papers those are signed by assign organization.
2. Safety barrier.
3. Safety helmet.
4. Safety gloves.
5. Safety googles.
6. Safety belt.
7. Safety shoes.
8. Safety vest.
9. Musk.
10. Hand sanitizer.
11. Safe water.
12. Fast AID box
13. Cotton gloves.
14. Surgical gloves.
15. Scaffolding.
16. Pipe etc.

### **3.7 Investigation the Safety, Health & Environment**

The construction industry involves risky and unhealthy operations which result in many human tragedies, discourage workers, disrupt construction, delay progress, and adversely affect cost, productivity, and reputation. Construction managers focus mainly on productivity in terms of cost, quality, and time. Construction project can never achieve its objectives unless construction professionals become aware of the safety-related issues. Workers working in the construction industry are incessantly bared to unsafe working conditions and have to confront several kinds of hazards. This embraces exposure to sound, dust and toxic substances, issues of ergonomics, stress etc. Every construction should involve in safety practices to reduce injuries in their respective sites. Workers behavior is an extremely important factor in workplace safety as many accidents are often caused by insecure actions, in which combinations of human behavior are the consequence of such perceptions. The Occupational Safety and Health Act were passed in 1970 to protect employees by stating that employers have a legal obligation to provide their employees with a safe working environment safety protection in construction area. This is especially important in construction, as there are a number of hazards and risks to site workers

that are experienced every day. All parties with full support of Malaysia government should play major roles and responsibilities by making sure that appropriate safety practices are carried out to minimize the accident rates in the construction sites. Accidents in construction sites are unplanned occurrence involving movements of person, objects or materials which may result in injuries, damages and losses to properties or human. The majority of accidents happen as result of unsafe acts and unsafe condition. Since all hazards in construction are not always possible to be identified and eliminate therefore through effective accident investigation, construction accidents can be prevented just by identifying the main root cause of those accidents. The main objective behind this paper was to create awareness among construction workers about various safety-related protections in the construction industry.

### **3.8 Discussion**

#### **3.8.1 Physical survey**

To assess the real scenario of construction safety, health and security the physical survey was conducted in different construction sites. There are some sites that we go to differently and some of the sites we had visited by all team members. Below I will mention the site name & location and visited person.

01. Site Name: HSIA Terminal 3 Building.

Location: HSIA Dhaka.

Visited by: Md. Sajjad Hossain.

02. Site Name: HSIA Import & Export Cargo Terminal Building.

Location: HSIA Dhaka.

Visited by: Md. Sajjad Hossain.

03. Site Name: 6 Storied Building.

Location: H 20, R 20, Nikunja 2, Khilkhet, Dhaka.

Visited by: Md. Sajjad Hossain.

04. Site Name: 2 Storied Mosque at BNS Hazi Mohsin.

Location: Dhaka Cantonment.

Visited by: Md. Khalid Hasan.

05. Site Name: National Disaster Management Center.

Location: Shaheenbag, Dhaka.

Visited by: Md. Khalid Hasan.

06. Site Name: 12 Storied Car Parking Building.

Location: Navy Headquarter, Banani, Dhaka.



- Visited by: Md. Khalid Hasan.
07. Site Name: Pachasaratia Meher Ali Khan High School.  
Location: Pachasaratia, Nagarpur, Tangail.  
Visited by: Md. Munna Ahmed.
08. Site Name: Vadra Government Primary School.  
Location: Vadra, Nagarpur, Tangail.  
Visited by: Md. Munna Ahmed.
09. Site Name: 7 Storied Building.  
Location: H 53, R 2, Block G, Aftabnagar, Dhaka.  
Visited by: All Team Members.
10. Site Name: 7 Storied Building.  
Location: H 54, R 2, Block G, Aftabnagar, Dhaka.  
Visited by: All Team Members.
11. Site Name: 7 Storied Building  
Location: H 56, R 2, Block G, Aftabnagar, Dhaka.  
Visited by: All Team Members.
12. Site Name: 7 Storied Building.  
Location: H 13, R 1, Block G, Aftabnagar, Dhaka.  
Visited by: All Team Members.
13. Site Name: 8 Storied Building.  
Location: H 1, R 1, Block K, Aftabnagar, Dhaka.  
Visited by: All Team Members.
14. Site Name: 8 Storied Building.  
Location: H 3, R 1, Block K, Aftabnagar, Dhaka.  
Visited by: All Team Members.
15. Site Name: 8 Storied Building.  
Location: H 10, R 1, Block K, Aftabnagar, Dhaka.  
Visited by: All Team Members.

### **3.8.2 Questionnaire Design**

During the Physical Survey in sites, we have asked some safety and health related questions to the workers and supervisor to know their knowledge about safety. Questions are given below.

1. What is the Safety?
2. How can you improve your workplace safe?

3. Why do we need safety? / How important is safety? / What is the importance of your safety to work?
4. What is Safety Audit?
5. What Is Safety Policy?
6. What are 5 safety practices?
7. What is Basic Safety Rules?
8. What is Confined Space?
9. What is an excavation considered as a confined space?
10. What is personal protective equipment?
11. How do you care and maintain hand tools?
12. What are the different types of hazards?
13. Do You Know What Is Safety Tag?
14. Tell Me Cause of Accidents in Manual Handling?
15. Explain Me How Many Types of Sign Boards?
16. What Is First Aid?
17. What Is House Keeping?
18. What Are the Responsibility for Workers for Safety?
19. What is the purpose of The Workplace Safety and Health Act?
20. What is Work Permit?
21. Who make an accident report?
22. What is the maximum distance between two adjacent accesses in a long excavation?
23. What is the importance of a Tool box meeting?
24. What is work at height?
25. What are the duties of a supervisor?
26. What are the hazards in constructions?
27. Explain How Many Types Inspection?
28. Explain How to Control the Chemical Hazards?

29. How is your filling working here? Sounds safe or dangerous?
30. How old are you? What is your educational Qualification?
31. What kind of safety material is provided for safety?
32. Whether complete safety is provided while working?
33. Your accommodation & drinking water is provided, is it hygienic?
34. Why you don't want to wear safety clothes properly on the site?
35. Did you take any training on safety?
36. Do you have first aid box in your site? Do you have safety dress?
37. Whether there is a field consultation about work safety before starting work?
38. On the site whether there is adequate self-protection?
39. Using heavy equipment what kind of safety you follow?

### **3.8.3 Physical survey result**

To assess the real scenario of construction safety, the physical survey was conducted in different construction sites in Bangladesh. From Fig. 27, 30, 31, 34 it is shown that the labors are working without any fall protective tools. According to the BNBC-2006, the slab must be guarded against falling. Not only the slab but also any opening in walls, slabs as well as edge of the slab and staircases must be guarded against falling. But the actual scenario during construction does not satisfy the labor safety regulations. As a result, the proximity of fatalities is increasing day by day. From the Fig. 21, 22, 24, 26, it is clear that the labors are working without hand gloves, safety boots. According to the BNBC-2006, the area where personal protective equipment is necessary must be used. In this figure the necessity of boots, hand gloves are essential, but no uses were found during construction. The labors were asked why they were not using boots, hand gloves. The labor claimed against contractor for not providing the safety boots, helmets, hand gloves and other protective equipment. Contractor is the main responsible person to ensure the safety of construction workers. Fig. 21, 22, 26, 26 shows such kind of working environment that does not satisfy the BNBC-2006. As a result, the workers are facing skin diseases and other body injuries happen. As workers are only responsible person of their family, their injury turn their family into more poverty. When we conducted the physical survey, it was observed that the workers were painting and cutting tiles without eye protective equipment, gloves and respiratory protection which is shown in Figs. 22 and 23. In spite of having the regulation for eye protection for labor, the contractor violates the rules. Impact hazards include

flying objects such as chips, fragments, particles, sand and dirt. These hazards typically result from tasks like chipping, grinding, machining, masonry work, wood-working, sawing, drilling, chiseling, powered fastening, riveting and sanding. These objects or sparks are usually very small but can cause serious eye damage such as punctures, abrasions and contusions. Serious injury may be happened as workers are not provided the eye protective tools.



**Figure 3.1: Safety meeting for engineer's, supervisors and workers**



**Figure 3.2: Toolbox meeting for workers**



**Figure 3.3: Toolbox meeting for night shift workers**



**Figure 3.4: Worker working with proper PPE**





**Figure 3.5: Removing waste from site**



**Figure 3.6: Worker working with helmet, hand gloves and mask**



**Figure 3.7: Proper Housekeeping at construction site**



**Figure 3.8: Worker working with proper safety**





**Figure 3.9: Hard safety barrier provided at work place**



**Figure 3.10: Worker working without PPE**





**Figure 3.11: Worker Working without hand gloves and eye protection**



**Figure 3.12: Worker working without hand gloves and eye protection**



**Figure 3.13: Worker working without safety**



**Figure 3.14: Working with hand gloves and face protection**





**Figure 3.15: Worker working without PPE**



**Figure 3.16: Worker working without fall protection**





**Figure 3.17: No hand gloves and shoes for worker**



**Figure 3.18: Poor housekeeping at construction site**

In the case of stair and lift, it is essential that the protection against falling must be needed according the BNBC-2006. But the observation resulted that there was no fall protective measurement during construction which is shown in Fig. 32. It was observed that the safety belt was provided by contractor but workers were not using during lift installation. As a result, workers and other related person of construction may experience in hazard. How safety rules are avoided in the construction project in shown in Figs. 32 and 33 in the stair and lift core section. As a result, the workers may fall from height and their life may be lost. According to the Fig. 27, 28, 33 it is clear that the workers are working without helmets, hand gloves which were not observed during physical survey. Eye protection system is very poor. But the BNBC says that the proper safety measurement is needed during lift installation. Physical survey showed that the contractor violates the building construction regulation. Having no skin protection, eye protection, the sparking resulting from welding may harm the skin which may lead to skin cancer. As the intensity of light was very high, the eye may be damaged due to the lack of safety. Fig. 34 shows the uncovered and unprotected hazardous materials with no safety measure that is the most crucial potential factor of influencing accident and fatalities in results. The Fig. 37 shows that the electrical wires are kept randomly which may cause the electrocution. In our country more than 40% worker die due to electrocution. On the other hand, the coil spreads spark which was uncovered. As a result, the proximity of happening fatalities is increasing day by day. Sometimes workers do not get any proper treatment if injury happens and workers bear their treatment cost for his own. No compensations are provided to the workers for injury and loss of life.



**Figure 3.19: No safety barrier, safety shade and staging at site**



**Figure 3.20: Pure water supply and toilet for workers**





**Figure 3.21: No safety barrier at lift opening**



**Figure 3.22: Worker working without safety shoes and helmet**



**Figure 3.23: No safety barrier provided at floor opening**



**Figure 3.24: Unhygienic toilet at construction site**





**Figure 3.25: No safety barrier provided at floor opening**



**Figure 3.26: No fire extinguisher provided beside electrical box**



**Figure 3.27: Poor housekeeping at workplace**



**Figure 3.28: No hard barrier provided at danger area**





**Figure 3.29: Without rubber gloves worker working at soft soil area**



**Figure 3.30: Temperature measuring for all workers at covid-19 situation**



**Figure 3.31: Construction site visit with team members**



**Figure 3.32: Construction site visit with team members**

## CHAPTER 4

### Data Analysis, Results and Discussion

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#### 4.1 Introduction

The engineers, contractors, project managers and labors were included in this survey. The opinion of university teachers related to construction field was also included here. The questions were thrown in separately within the worker as well as engineer, project manager and contractor. Authors visited 15 construction sites respondent's data were observed. The demographic information of respondents. At the time of the whole survey various complications and impediments were faced. Although the worker and engineer were shown their willingness to give the answer of the question, the contractor, project manager and related person of contractors were shown unwillingness to take part in the survey. All the construction sites were visited physically so that the given data from construction stakeholder could be checked in accordance with the actual evidence present in the sites.

#### 4.2 Demographic information

##### 4.2.1 HSIA Terminal 3 Building

Table 4.1: Case Scenario:

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	4	4	Medium
2	Steel Particle	Would not be expected to be serious	2	3	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	2	2	Low
4	Shutter/Formwork	Fitting Should be done properly	4	4	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	2	3	Low
6	Rebar, Wire	Much risk in time of that condition	4	4	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	2	3	Low



**Table 4.2: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	2	20%	Normal
Medium-Risk	3	30%	Normal
Low-Risk	5	50%	Medium

**Table 4.3: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	2000	100%
Female	Sex	-	-
≤ 20 years old	Age	150	7.5%
21-30 years old	Age	1200	60%
31-40 years old	Age	520	26%
≥ 40 years old	Age	130	6.5%

**Table 4.4: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing	✓		
Availability of First aid Box	✓		
Securing Covering and Fencing of Floor Opening	✓		
Head Protection	✓		
Foot Protection	✓		
Hand Protection	✓		
Eye Protection	✓		
Face Protection	✓		
Fall Protection	✓		
Ear Protection	✓		
Wearing Mask	✓		
Precautions in case of fire	✓		
Fencing of Machinery	✓		

Safe Working next to Machinery	✓		
Suitable Striking Gear	✓		
Safe “Self-acting machines”	✓		
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists	✓		
Precautions relating to revolving machinery	✓		
Safe use of pressure plants	✓		
Safe means of access	✓		
Covering and fencing of dangerous spaces	✓		
Precautions relating to carrying of weights	✓		
Precautions against exposure to dangerous fumes in confine space	✓		
Safety measures relating to explosive or flammable gas	✓		
Rest Break	✓		
Child Care		✓	
Tool Box Meeting	✓		
Scaffolding	✓		
Safety Training	✓		
Ladder	✓		
Personal protective equipment	✓		
Personal hygiene	✓		

#### 4.2.2 HSIA Import & Export Cargo Terminal Building

**Table 4.5: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	3	2	Low
2	Steel Particle	Would not be expected to be serious	4	4	Medium
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	2	2	Low
4	Shutter/Formwork	Fitting Should be done properly	4	4	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	2	3	Low

6	Rebar, Wire	Much risk in time of that condition	3	4	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	2	3	Low

**Table 4.6: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	2	20%	Normal
Medium-Risk	3	30%	Normal
Low-Risk	5	50%	Medium

**Table 4.7: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	1500	100%
Female	Sex	-	-
≤ 20 years old	Age	150	10%
21-30 years old	Age	700	47%
31-40 years old	Age	400	27%
≥ 40 years old	Age	250	16%

**Table 4.8: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing		✓	
Availability of First aid Box	✓		
Securing Covering and Fencing of Floor Opening	✓		
Head Protection	✓		
Foot Protection	✓		
Hand Protection	✓		
Eye Protection	✓		
Face Protection	✓		
Fall Protection	✓		



Ear Protection	✓		
Wearing Mask	✓		
Precautions in case of fire	✓		
Fencing of Machinery	✓		
Safe Working next to Machinery	✓		
Suitable Striking Gear	✓		
Safe “Self-acting machines”	✓		
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists	✓		
Precautions relating to revolving machinery	✓		
Safe use of pressure plants	✓		
Safe means of access	✓		
Covering and fencing of dangerous spaces	✓		
Precautions relating to carrying of weights	✓		
Precautions against exposure to dangerous fumes in confine space	✓		
Safety measures relating to explosive or flammable gas	✓		
Rest Break	✓		
Child Care		✓	
Tool Box Meeting	✓		
Scaffolding	✓		
Safety Training	✓		
Ladder	✓		
Personal protective equipment	✓		
Personal hygiene	✓		

#### 4.2.3 6 Storied Building, Nikunja 2, plot#20, Road#20

**Table 4.9: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	5	High
2	Steel Particle	Would not be expected to be serious	2	3	Low

3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	5	5	High
4	Shutter/ Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	5	5	High
6	Rebar, Wire	Much risk in time of that condition	4	4	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	3	4	Low

**Table 4.10: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	5	50%	High
Medium-Risk	3	30%	Medium
Low-Risk	2	20%	Normal

**Table 4.11: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	20	80%
Female	Sex	5	20%
≤ 20 years old	Age	-	-
21-30 years old	Age	12	48%
31-40 years old	Age	8	32%
≥ 40 years old	Age	5	20%

**Table 4.12: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines		✓	
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	

Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	
Fencing of Machinery		✓	
Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines		✓	
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access		✓	
Covering and fencing of dangerous spaces		✓	
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding		✓	
Safety Training		✓	
Ladder		✓	
Personal protective equipment		✓	
Personal hygiene		✓	

#### 4.2.4 2 Storied Mosque, BNS Hazi Mohsin, Dhaka Cantonment

**Table 4.13: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	3	2	Low
2	Steel Particle	Would not be expected to be serious	4	3	Medium
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	3	Medium
4	Shutter/Formwork	Fitting Should be done properly	3	2	Low
5	No Railing or Wall on Stair	Many time the chance to fall down	4	3	Medium
6	Rebar, Wire	Much risk in time of that condition	3	2	Low
7	Rebar Remains out Stair	May highly responsible for injuries in leg	4	3	Medium

**Table 4.14: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	2	20%	Normal
Medium-Risk	4	40%	Medium
Low-Risk	4	40%	Medium

**Table 4.15: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	68	100%
Female	Sex	-	-
≤ 20 years old	Age	-	-
21-30 years old	Age	18	26.5%
31-40 years old	Age	29	42.5%
≥ 40 years old	Age	21	31%

**Table 4.16: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing	✓		
Availability of First aid Box	✓		
Securing Covering and Fencing of Floor Opening	✓		
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire	✓		
Fencing of Machinery	✓		
Safe Working next to Machinery	✓		
Suitable Striking Gear	✓		
Safe “Self-acting machines”	✓		
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists	✓		
Precautions relating to revolving machinery	✓		
Safe use of pressure plants	✓		
Safe means of access	✓		
Covering and fencing of dangerous spaces	✓		
Precautions relating to carrying of weights	✓		
Precautions against exposure to dangerous fumes in confine space	✓		
Safety measures relating to explosive or flammable gas	✓		
Rest Break	✓		
Child Care		✓	

Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene	✓		

#### 4.2.5 National Disaster Management Center, Shaheenbag

**Table 4.17: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	4	4	Medium
2	Steel Particle	Would not be expected to be serious	4	2	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	3	Medium
4	Shutter/Formwork	Fitting Should be done properly	3	2	Low
5	No Railing or Wall on Stair	Many time the chance to fall down	4	3	Medium
6	Rebar, Wire	Much risk in time of that condition	3	2	Low
7	Rebar Remains out Stair	May highly responsible for injuries in leg	4	3	Medium

**Table 4.18: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	2	20%	Normal
Medium-Risk	4	40%	Medium
Low-Risk	4	40%	Medium

**Table 4.19: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	35	100%
Female	Sex	-	-

≤ 20 years old	Age	-	-
21-30 years old	Age	11	31.43%
31-40 years old	Age	16	45.71%
≥ 40 years old	Age	8	22.86%

**Table 4.20: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing	✓		
Availability of First aid Box	✓		
Securing Covering and Fencing of Floor Opening	✓		
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection	✓		
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire	✓		
Fencing of Machinery	✓		
Safe Working next to Machinery	✓		
Suitable Striking Gear	✓		
Safe “Self-acting machines”	✓		
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists	✓		
Precautions relating to revolving machinery	✓		
Safe use of pressure plants	✓		
Safe means of access	✓		
Covering and fencing of dangerous spaces	✓		

Precautions relating to carrying of weights	✓		
Precautions against exposure to dangerous fumes in confine space	✓		
Safety measures relating to explosive or flammable gas	✓		
Rest Break	✓		
Child Care		✓	
Tool Box Meeting	✓		
Scaffolding	✓		
Safety Training	✓		
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene	✓		

#### 4.2.6 12 Storied Car Parking, Navy Head Quarter, Banani, Dhaka

**Table 4.21: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	4	4	Medium
2	Steel Particle	Would not be expected to be serious	3	2	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	4	Medium
4	Shutter/Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	3	3	Low
6	Rebar, Wire	Much risk in time of that condition	3	2	Low
7	Rebar Remains out Stair	May highly responsible for injuries in leg	4	4	Medium

**Table 4.22: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	2	20%	Normal
Medium-Risk	4	40%	Medium
Low-Risk	4	40%	Medium



**Table 4.23: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	150	100%
Female	Sex	-	-
≤ 20 years old	Age	20	13%
21-30 years old	Age	65	43%
31-40 years old	Age	40	27%
≥ 40 years old	Age	25	17%

**Table 4.24: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing	✓		
Availability of First aid Box	✓		
Securing Covering and Fencing of Floor Opening	✓		
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire	✓		
Fencing of Machinery	✓		
Safe Working next to Machinery	✓		
Suitable Striking Gear	✓		
Safe “Self-acting machines”	✓		
Casing and Guards for new Machines	✓		

Precautions in relation to cranes, lifts and hoists	✓		
Precautions relating to revolving machinery	✓		
Safe use of pressure plants	✓		
Safe means of access	✓		
Covering and fencing of dangerous spaces	✓		
Precautions relating to carrying of weights	✓		
Precautions against exposure to dangerous fumes in confine space	✓		
Safety measures relating to explosive or flammable gas	✓		
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene	✓		

#### 4.2.7 Pachasaratia Meher Ali Khan High School

**Table 4.25: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	5	High
2	Steel Particle	Would not be expected to be serious	2	2	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	3	Medium
4	Shutter/Formwork	Fitting Should be done properly	4	4	High
5	No Railing or Wall on Stair	Many time the chance to fall down	3	3	Medium
6	Rebar, Wire	Much risk in time of that condition	4	3	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	3	2	Low

**Table 4.26: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	4	40%	High
Medium-Risk	4	40%	Medium
Low-Risk	2	20%	Normal

**Table 4.27: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	40	100%
Female	Sex	-	-
≤ 20 years old	Age	-	-
21-30 years old	Age	13	32.5%
31-40 years old	Age	20	50%
≥ 40 years old	Age	7	17.5%

**Table 4.28: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	

Fencing of Machinery	✓		
Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access	✓		
Covering and fencing of dangerous spaces	✓		
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene	✓		

#### 4.2.8 Vadra Government Primary School

**Table 4.29: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	5	High
2	Steel Particle	Would not be expected to be serious	2	2	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	3	Medium
4	Shutter/Formwork	Fitting Should be done properly	3	2	Medium

5	No Railing or Wall on Stair	Many time the chance to fall down	3	3	Medium
6	Rebar, Wire	Much risk in time of that condition	4	4	High
7	Rebar Remains out Stair	May highly responsible for injuries in leg	4	4	High

**Table 4.30: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	4	40%	High
Medium-Risk	4	40%	Medium
Low-Risk	2	20%	Normal

**Table 4.31: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	33	100%
Female	Sex	-	-
≤ 20 years old	Age	2	6%
21-30 years old	Age	21	64%
31-40 years old	Age	7	21%
≥ 40 years old	Age	3	9%

**Table 4.32: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	

Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	
Fencing of Machinery		✓	
Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access	✓		
Covering and fencing of dangerous spaces		✓	
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene		✓	

#### 4.2.9 7 Storied Building, Aftabnagar, Plot#53, Road#2

**Table 4.33: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	4	High
2	Steel Particle	Would not be expected to be serious	5	4	High
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	4	High
4	Shutter/Formwork	Fitting Should be done properly	4	4	High
5	No Railing or Wall on Stair	Many time the chance to fall down	3	2	Medium
6	Rebar, Wire	Much risk in time of that condition	3	3	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	2	2	Low

**Table 4.34: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	5	50%	High
Medium-Risk	4	40%	Medium
Low-Risk	1	10%	Normal

**Table 4.35: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	18	100%
Female	Sex	2	10%
≤ 20 years old	Age	10	50%
21-30 years old	Age	5	25%
31-40 years old	Age	3	15%
≥ 40 years old	Age	2	10%

**Table 4.36: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply		✓	
Clean and Sanitary Latrines		✓	
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening	✓		
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	
Fencing of Machinery	✓		
Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”	✓		
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists	✓		
Precautions relating to revolving machinery	✓		
Safe use of pressure plants	✓		
Safe means of access	✓		
Covering and fencing of dangerous spaces		✓	
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	



Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene		✓	

#### 4.2.10 7 Storied Building, Aftabnagar, Plot#54, Road#2

**Table 4.37: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	5	High
2	Steel Particle	Would not be expected to be serious	1	1	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	4	High
4	Shutter/Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	4	3	Medium
6	Rebar, Wire	Much risk in time of that condition	3	3	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	4	3	Medium

**Table 4.38: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	3	30%	Medium
Medium-Risk	5	50%	High
Low-Risk	2	20%	Normal

**Table 4.39: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	15	100%
Female	Sex	2	12%
≤ 20 years old	Age	10	59%

21-30 years old	Age	5	29%
31-40 years old	Age	1	6%
≥ 40 years old	Age	1	6%

**Table 4.40: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines		✓	
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection	✓		
Foot Protection	✓		
Hand Protection	✓		
Eye Protection	✓		
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask	✓		
Precautions in case of fire		✓	
Fencing of Machinery	✓		
Safe Working next to Machinery	✓		
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines		✓	
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access		✓	
Covering and fencing of dangerous spaces	✓		
Precautions relating to carrying of weights		✓	

Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting	✓		
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment	✓		
Personal hygiene		✓	

#### 4.2.11 7 Storied Building, Aftabnagar, Plot#56, Road#2

**Table 4.41: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	4	High
2	Steel Particle	Would not be expected to be serious	4	3	Medium
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	4	High
4	Shutter/Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	4	3	Medium
6	Rebar, Wire	Much risk in time of that condition	3	3	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	3	2	Medium

**Table 4.42: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	3	30%	Medium
Medium-Risk	5	50%	High
Low-Risk	2	20%	Normal

**Table 4.43: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	20	80%
Female	Sex	5	20%
≤ 20 years old	Age	12	48%
21-30 years old	Age	5	20%
31-40 years old	Age	3	12%
≥ 40 years old	Age	5	20%

**Table 4.44: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	
Fencing of Machinery		✓	
Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”	✓		
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists		✓	

Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access	✓		
Covering and fencing of dangerous spaces		✓	
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene		✓	

#### 4.2.12 7 Storied Building, Aftabnagar, Plot#13, Road#1

**Table 4.45: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	5	High
2	Steel Particle	Would not be expected to be serious	3	2	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	4	High
4	Shutter/Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	4	3	High
6	Rebar, Wire	Much risk in time of that condition	3	3	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	3	3	Medium

**Table 4.46: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	4	40%	High
Medium-Risk	4	40%	High
Low-Risk	2	20%	Normal

**Table 4.47: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	12	86%
Female	Sex	2	14%
≤ 20 years old	Age	5	36%
21-30 years old	Age	4	29%
31-40 years old	Age	3	21%
≥ 40 years old	Age	2	14%

**Table 4.48: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply		✓	
Clean and Sanitary Latrines		✓	
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire			
Fencing of Machinery	✓		

Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access	✓		
Covering and fencing of dangerous spaces		✓	
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene		✓	

#### 4.2.13 8 Storied Building, Aftabnagar, plot#1, Road#1

**Table 4.49: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	4	4	High
2	Steel Particle	Would not be expected to be serious	2	2	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	5	4	High
4	Shutter/Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	3	3	Medium

6	Rebar, Wire	Much risk in time of that condition	4	4	High
7	Rebar Remains out Stair	May highly responsible for injuries in leg	2	2	Low

**Table 4.50: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	5	50%	High
Medium-Risk	3	30%	Medium
Low-Risk	2	20%	Normal

**Table 4.51: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	20	100%
Female	Sex	-	-
≤ 20 years old	Age	10	50%
21-30 years old	Age	3	15%
31-40 years old	Age	5	25%
≥ 40 years old	Age	2	10%

**Table 4.52: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines	✓		
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	



Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	
Fencing of Machinery		✓	
Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access	✓		
Covering and fencing of dangerous spaces		✓	
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene		✓	

#### 4.2.14 8 Storied Building, Aftabnagar, Plot#3, Road#1

**Table 4.53: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	5	5	High
2	Steel Particle	Would not be expected to be serious	5	4	High

3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	4	High
4	Shutter/Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	4	3	Medium
6	Rebar, Wire	Much risk in time of that condition	4	2	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	3	2	Medium

**Table 4.54: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	4	40%	Normal
Medium-Risk	4	40%	Normal
Low-Risk	2	20%	Medium

**Table 4.55: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	10	77%
Female	Sex	3	13%
≤ 20 years old	Age	7	54%
21-30 years old	Age	3	23%
31-40 years old	Age	2	15%
≥ 40 years old	Age	1	8%

**Table 4.56: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines		✓	
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	

Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	
Fencing of Machinery	✓		
Safe Working next to Machinery	✓		
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines	✓		
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access	✓		
Covering and fencing of dangerous spaces		✓	
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	
Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene		✓	

#### 4.2.15 8 Storied Building, Aftabnagar, Plot#10, Road#1

**Table 4.57: Case Scenario:**

SL. No	Hazard Type	Description	Severity Rating	Probability Rating	Comments on Risk
1	Brick Particle	Low injury but huge amount then big risk	4	4	High
2	Steel Particle	Would not be expected to be serious	2	2	Low
3	Bamboo Flat Stairs	Moving of bamboo, can occur injury	4	3	Medium
4	Shutter/Formwork	Fitting Should be done properly	4	3	Medium
5	No Railing or Wall on Stair	Many time the chance to fall down	3	3	Medium
6	Rebar, Wire	Much risk in time of that condition	4	3	Medium
7	Rebar Remains out Stair	May highly responsible for injuries in leg	3	2	Medium

**Table 4.58: Categories of Hazard:**

Category	Quantity	Percentage	Significance
High-Risk	3	30%	Medium
Medium-Risk	6	60%	High
Low-Risk	1	10%	Normal

**Table 4.59: Demographic Characteristic of Respondents:**

Demographic	Characteristics	Freq.	Percentage
Male	Sex	20	100%
Female	Sex	-	-
≤ 20 years old	Age	5	25%
21-30 years old	Age	12	60%
31-40 years old	Age	2	10%
≥ 40 years old	Age	1	5%

**Table 4.60: The Main Safety and Facilities for Workers Which Are Not Practicing at Bangladesh:**

Item	Yes	No	Percentage
Pure Water Supply	✓		
Clean and Sanitary Latrines		✓	
Facilities of Washing and Bathing		✓	
Availability of First aid Box		✓	
Securing Covering and Fencing of Floor Opening		✓	
Head Protection		✓	
Foot Protection		✓	
Hand Protection		✓	
Eye Protection		✓	
Face Protection		✓	
Fall Protection		✓	
Ear Protection		✓	
Wearing Mask		✓	
Precautions in case of fire		✓	
Fencing of Machinery		✓	
Safe Working next to Machinery		✓	
Suitable Striking Gear		✓	
Safe “Self-acting machines”		✓	
Casing and Guards for new Machines		✓	
Precautions in relation to cranes, lifts and hoists		✓	
Precautions relating to revolving machinery		✓	
Safe use of pressure plants		✓	
Safe means of access	✓		
Covering and fencing of dangerous spaces	✓		
Precautions relating to carrying of weights		✓	
Precautions against exposure to dangerous fumes in confine space		✓	
Safety measures relating to explosive or flammable gas		✓	
Rest Break	✓		
Child Care		✓	

Tool Box Meeting		✓	
Scaffolding	✓		
Safety Training		✓	
Ladder	✓		
Personal protective equipment		✓	
Personal hygiene		✓	

### 4.3 Data organization

#### Statement 1:

➤ What is the Safety?

**Ans.** The condition gives you freedom from danger, hazards, risk and accident that may be converting into injury, property damage, loss of materials and even death.

➤ How can you improve your workplace safety?

- Ans.**
- (a) Train employees well.
  - (b) Reward employees for safe behavior.
  - (c) Use labels and sign.
  - (d) Keep things clean.
  - (e) Make sure employees have the right tools and have regular equipment inspections.
  - (f) Implement safety protocols from the start.

#### Statement 2:

➤ Why do we need safety? / How important is safety? / What is the importance of your safety to work?

**Ans.** A safe and healthy workplace not only protects workers from injury and illness, it can also lower injury, increase productivity and quality and raise employee morale. In other words, protecting workers is the right thing to do.

➤ What is Safety Audit?

**Ans.** Safety audit is the process that identifies unsafe conditions and unsafe acts the plant and recommended safety improvement. Walk through it evaluates the unsafe condition noticeable to the naked eye during work through the plant.

#### Statement 3:

➤ What Is Safety Policy?

**Ans.** Any company has a social and legal obligation to provide a safe and health working environment to all his improvement to all his employees.

**Statement 4:**

- What are 5 safety practices?

**Ans.** They don't know the answer of this question.

The answer is like...

- (a) Improve safety culture.
- (b) Hazard Communication.
- (c) Ensure everyone is wearing PPE.
- (d) Use tools and machines properly.
- (e) Always be aware of emergency exits and plans.

**Statement 5:**

- What is Basic Safety Rules?

**Ans.** They don't know the answer of this question. The answer of this question is...

- (a) Stay alert -and stay alive
- (b) Wear the right clothes-work clothes should fit properly.
- (c) Use the right tools-if you need a hammer, get a hammer.
- (d) Learn how to lift-lifting takes more than muscle: it is an art.

**Statement 6:**

- What is Confined Space?

**Ans.** An area which is small and enclosed or an area where one entry and exits or where a man can't work comfortably in any location is called confined space.

- What is an excavation considered as a confined space?

**Ans.** They don't know the correct answer. The answer is like...

If depth is more than 1.2 meters.

**Statement 7:**

- What is personal protective equipment?

**Ans.** This is the equipment that is specially meant to enhance the safety of individual workers. The equipment is used by individual workers with an objective of enhancing their safety before using the equipment that is meant for collective safety.

- How do you care and maintain hand tools?

- Ans.**
- (a) Ensure that the hand tools are properly cleaned after they have been used.
  - (b) Use the hand tools exactly as per as the instruction.
  - (c) Ensuring that the hand tools are stored exactly where they should be stored.



**Statement 8:**

- What are the different types of hazards?

**Ans.** Some of the most common types of hazards include mechanical hazards, chemical hazards, electrical hazards, fire hazards.

- Do You Know What is Safety Tag?

**Ans.** Safety tag can be defined a surface made of card or paper board on which English, local languages letters written for warning safety instructions to employees.

**Statement 9:**

- Tell Me Cause of Accidents in Manual Handling?

**Ans.**(a) Improper lifting.  
(b) Carrying too heavy loads.  
(c) Improper gripping.  
(d) Failure to use PPE.  
(e) Lifting greasy, oily and irregular objects.

**Statement 10:**

- Explain Me How Many Types of Sign Boards?

**Ans.**(a) Mandatory  
(b) Information  
(c) Fire  
(d) Caution  
(e) Wiring

**Statement 11:**

- What Is First Aid?

**Ans.** First aid is temporary and immediate care given to the victim of an accident.

- What Is House Keeping?

**Ans.** Housekeeping means not only cleanness but also orderly arrangement of operations, tools, equipment storage facilities and supplies.

**Statement 12:**

- What Are the Responsibility for Workers for Safety?

**Ans.** (a) Report unsafe condition to supervisor.  
(b) Do not operate the machine without knowing the operation.  
(c) Before starting the machine, whether the machine is in condition not.  
(d) use correct tools.  
(e) Follow the Safety rules.  
(f) Do not lift over load.

**Statement 13:**

- What is the purpose of the workplace safety and health act?

**Ans.** To protect worker safety and health in the workplace.

- What is Work Permit?

**Ans.** Work permit is the written document authorizing a person or a group to perform maintenance, inspection or construction work.

**Statement 14:**

- Who make an accident report?

**Ans.** Concerned area supervisor or site safety representative.

- What is the maximum distance between two adjacent accesses in a long excavation?

**Ans.** They don't know the answer. The answer is – A ladder must be present within 25ft. of employee's working in excavation.

**Statement 15:**

- What is the importance of a Tool box meeting?

**Ans.** The worker can be educated about safe rules and procedures, and their awareness can be improved on some special task its importance.

- What is work at height?

**Ans.** Work at height is when workers work above the ground in a place where the height is considerable.

**Statement 16:**

- What are the duties of a supervisor?

**Ans.** A supervisor is responsible of ensuring that all the things that are required for workers to work properly are available. These include providing proper tools which do not put the workers at risk.

- What are the hazards in constructions?

**Ans.** (a) Falling off from a height is one of the main hazards in constructions.

(b) An object falling on a worker is also a common hazard in construction.

(c) Being tripped by objects placed on the ground is also a common construction hazard.

**Statement 17:**

- Explain How Many Types Inspection?

**Ans.** They don't know the answer. The answer is...

There are five types of inspection:

(a) Continuous inspection-select employees/operators.

(b) Periodical inspection-material storage, firefighting equipment's, handling equipment's.

- (c) Intermittent inspection-un announced inspection done by safety officer, safety committee.
- (d) Statutory inspection-storage area, location at height.
- (e) Special Inspection-accident investigation.

**Statement 18:**

- Explain How to Control the Chemical Hazards?

**Ans.** The chemical hazards are control by engineering method, administrative method PPE.

- How is your feeling working here? Sounds safe or dangerous?

**Ans.** I feel so bad to work here. because there is no safety.it is very dangerous to work.

- How old are you? What is your educational Qualification?

**Ans.** I'm 32 years old & I have studied up to class five.

**Statement 19:**

- What kind of safety material is provided for safety?

**Ans.** They provide gloves, safety goggles and shoes, hard hats, vests.

- Whether complete safety is provided while working?

**Ans.** No. We didn't receive safety materials.

**Statement 20:**

- Your accommodation & drinking water is provided, is it hygienic?

**Ans.** Yes, they have provided accommodation & drinking water, but the accommodation is not healthy.

- Why you don't want to wear safety clothes properly on the site?

**Ans.** Actually we are not useful to wear safety clothes. Wearing safety clothes, I can't work comfortably.

**Statement 21:**

- Did you take any training on safety?

**Ans.** Yes, we have a safety academy for safety training.

- Do you have first aid box in your site? Do you have safety dress?

**Ans.** No, we don't have first aid box in our site. No, I don't have.

**Statement 22:**

- Whether there is a field consultation about work safety before starting work?

**Ans.** Yes, every morning before starting work, there is a tool box meeting.

- On the site whether there is adequate self-protection?

**Ans.** Yes. We have proper self-protection.

- Using heavy equipment what kind of safety you follow?

**Ans.** In our site, we didn't follow any safety.

## CHAPTER 5

### Conclusions and Recommendation

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#### 5.1 Conclusions

It was discovered that construction companies have one a framework for health and safety policy installed on construction site, but unfortunately do not comply with the policy. Despite haven identified the necessary equipment for a workable healthy and safe construction site, full compliance is still below the average. This has resulted in some forms of policy violation by the contractors and improper documentation of accidents on site since no strict measure is taken against anyone who breach conformance to the regulating policy. The analysis of the data also revealed that implementing health and safety programs on construction site tend to increase the overall cost of the project. In this vein, non-conformance to the policy which often result to accident also increase the overall cost of the project. Majority of the respondents amounting to 82% of the total respondent strongly agreed that the health and safety of the employees have a great impact on determining the quality output of the construction project. Unsafe design, poor safety planning and high rate of accidents were identified as an obstacle which inhibits the quality of construction output. If there are noticeable rates of accident in a particular construction site, and the management failed to put in place adequate safety measures, it may affect the health and productive capacity of the workers which in turn may affect the overall project delivery. It is hereby recommended that actions be taken to improve the health and safety of employees on any project site. Where health and safety policies are put in place, a unit or group should be saddled with the responsibility of make sure there is above the average compliance. The following should be put into consideration:

1. Appointment of a safety officer by a construction company to primarily ensure or enforce health and safety policies e.g., ensuring that workers on site always wear safety boots and helmets, etc.
2. On the job as well as off the job training should be provided to employees on their health and safety and its impact on the output of the project.
3. Cases of accidents and injuries should be acknowledged so as to make provision for accident investigation which aid effective accident control in future projects.
4. Regulating agencies e.g. the ministry of works and productivity should appoint his agent which will carry out regular and spontaneous visits to construction sites in order to keep the contractors in checks.

5. Severe measures and punishments should be meted out to contractors who violate safety policy, and where there is a recurring violation of policies, the contractor certificate may be rescinded. This research was aimed at assessing the impact of health and safety on the delivery of construction projects. It was deduced that health and safety have an impact on the delivery of a construction project either in terms of cost or quality. However, the research was unable to determine precisely how health and safety impact on the quality of a project output.

## **5.2 Finding of the Research**

After surveying the construction sites, we have found some issues in the sites, which we discuss accordingly.

First of all, we would like to talk about Hazrat Shahzalal international Airport Project Terminal 3 building and Import cargo and export cargo building, which is construct by the company of ADC.in this project we have seen they are highly follow the health, safety and security. Every morning before start the work there was a tool box meeting for the workers and engineers about following the safety. For workers and engineers they have safety induction center, where newly joined employees are trained by safety trainer. When we visit the site we didn't seen any major safety issue which is not following in the site. The category and significant on hazard is very low. The high risk is just 20%, the medium risk is just 30% and the low risk is 50%. For the worker the provided the pure water supply.in the site first aid box is available. Workers are using there PPE properly. Now if we talk about the 6 storied building at nikunja 2. In that project we did not seen any safety practicing properly at site. Workers are not wearing PPE properly. They didn't follow any safety. Significant on hazard is very high. The high risk percentage is almost 50%. Now the 2 storied mosque, BNS hazi mohsin, national Disaster Management Center & 12 storied car parking at navy headquarter. In these project we saw that some safety facilities are practicing at site and some are not. When we visit the site pure water supply, first aid box, covering of the floor opening are available at site. But the workers didn't wear there PPE properly, they don't have any safety training option. We have visited 2 construction project at tangail which is Pachasaratia meher ali khan high school and other is Vadra government primary school. In these two project we have seen a very low quality of safety practice. The case scenario was not so good enough. The percentage of high risk is almost 40%. Medium risk is about 40% and low risk is 20%. We found pure water supply for the workers. First aid box was not available at site workers are not using there PPE. There was no fencing of machinery. Floor opening was not protected by hard barrier and no safety caution was provided. For the workers there is no tool box meeting, no safety training. Finally, In our 7 sites in aftabnagar. The safety facilities are very poor. Some of the projects we have seen there is no pure

water supply for workers. The sanitary toilet was not so hygienic. During the construction the shutter was fall in down in the floor. The rebar was coming outside which is very dangerous. When they work on masonry work the brick particle are fall in the floor. The Significant on hazard is very high. Some of the site we have found pure water supply and some are not. No fast aid box at site. There is no personal protective equipment for the workers. No safety barrier is provided at floor opening and lift opening. They don't have any safety training and knowledge. There was no tool box meeting at site and the workers are not personally hygienic.

### **5.3 Research Output**

- This study reveals the major challenges faced by contractors in ensuring that compliance is maintained on sites.
- Further incorporated is the awareness given to all participants with regards to the adherence of optimum H&S practices in Bangladesh.
- An action plan is developed which when implemented properly shall assist contracting companies in ensuring that compliance is maintained at all times.
- This research will add to the body of knowledge in the related topics, with reference to the contractor's level of commitment to the H&S regulations.

### **5.4 Recommendations for Future Research**

#### **5.4.1 Recommendations to Contracting Firms**

- Construction companies should make it their goal to educate and increase the awareness of all parties involved of the causes and effects of site incidents because these incidents impact other workers, the project and the country's economy. Negative publicity on a construction project due to injuries or loss of life could have a lasting impression not only on the witnesses, but also on the order books of the company due to the loss of potential clients who will be influenced to take their business elsewhere.
- Firms should take a more proactive approach towards implementing the H&S plans on site through the integration of H&S procedures into the overall project management plans. The operations division should incorporate this into their daily routine. By implementing such plans, the companies will obtain a better safety rating as well as see the effects through a lowered incident rate on their sites.
- Firms who appoint sub-contractors should scrutinize such companies before hiring them. It is often found in industry that such companies rarely provide a proper and comprehensive safety file or plan, their employees are not provided with the necessary training and they do not practice safe work procedures. The choice of so-called 'fly-by-

night' sub-contractors could be to the detriment of the principal contracting company if there is an incident due to the negligence of the sub-contractor.

- Contractors must ensure that their labor force always makes correct use of the PPE provided to them; safe construction practice and the encouragement of enforcing such action will reduce accidents caused by carelessness. This will also bring awareness to them and empower them to teach their peers. Furthermore, contractors should continuously brief their labor force to maintain proper safety procedures on site and this can be achieved through repetitive teaching.
- Construction companies are advised to adopt the action plan developed by this research as an approach to improve their H&S practice and reduce the causes and effects of non-compliance on construction site.

#### **5.4.2 Recommendations to Government**

- Government is advised to instate a larger fine that will commensurate with non-adhering to H&S regulations. Furthermore, if a laborer is at fault and he is a repeat offender, then the construction company could take action in fining that individual for the non-compliance. It should be noted that if such a system is implemented, it would be important to monitor the system to ensure that the laborers are not taken advantage of and fined unnecessarily. Adopting this system will highlight the importance of each supervisor taking responsibility for his laborers and ensuring the attempt to minimize the number of incidents on construction sites.
- It is also felt that more emphasis should be placed on the responsibilities of the supervisor, in terms of legislature, with regards to the proper implementation of the H&S procedures. Non-compliance with the H&S plan attributed to the negligence or the non-enforcement on the part of the supervisor should lead to him being personally liable for a fine
- Government should instate a system for monitoring the competence of Department of labor officers on a regular basis and to ensure that these individuals are carrying out their duties in an efficient and effective manner.
- Government should create a skills development program, to ensure that workers are properly trained and competent before engaging in construction activities thereby reducing the related risk. This should be more for projects that are government funded.

### **5.4.3 Recommendations for Future Research**

- A follow up research should be conducted to investigate if there are any improvements within the construction sector in terms of H&S compliance.
- The same study should be conducted with other construction industry professionals to evaluate their input into the maintenance of good working systems in Health and safety practices in Bangladesh.
- The possibility of a government driven initiative where all H&S education related matters of the workers, be it private or public, are addressed to ensure that workers reach acceptable levels of competency before being discharged for work purposes.



## REFERENCES

### Books:

- Bangladesh National Building Code 2006*, Dhaka. 2006.
- Keller G, Warrack B., *Statistics for Management and Economics*, 6th Edition, Thomson Learning, Pacific Grove, CA. 2004.
- Kibert C.J., *Sustainable construction: green building design and delivery*. John Wiley & Sons 2016.
- Bourmpoula V., Kapsos S., Pasteels J.-M., *ILO labour force estimates and projections: 1990-2050* (2015 edition), ILO Geneva 2015.
- Dewri L., Amin M., Sen M., Faridi R., *A comprehensive study on the real estate sector of Bangladesh*, Real Estate and Housing Association of Bangladesh (2012) 1-83.

### Journals:

- Abdul Rahim Abdul Hamid MZAM, Bachan Singh, "Causes of accidents at construction sites," *Malaysian Journal of Civil Engineering*. 2008; 20(2):242-259.
- Adnan E, Sherif M, Ziad AM, et al, "Factors affecting labour productivity in building projects in the Gaza Strip," *J Civil Eng Manage*. 2007; 13 (4):245– 254.
- Ahmed S., Hoque M.I., Islam M.H., Hossain M, "A Reality Check of Status Level of Worker against Skilled Worker Parameters for Bangladeshi Construction Industry," *Journal of Civil Engineering and Construction* 7(3) (2018) 132-132.
- Hollnagel E, "Safety-I and Safety-II," *the past and future of safety management*. CRC Press 2018.
- Ahmed S, "Barriers to implementation of building information modeling (BIM) to the construction industry," *Journal of Civil Engineering and Construction* 7(2) (2018) 107-113.
- Kabir Q.S., Watson K., Somaratna T, "Workplace safety events and firm performance," *Journal of Manufacturing Technology Management* 29(1) (2018) 104-120.
- Ahmed S., Islam H., Hoque I., Hossain M, "Reality check against skilled worker parameters and parameters failure effect on the construction industry for Bangladesh," *International Journal of Construction Management* (2018) 1-10.
- Ulubeyli S., Kazaz A., Er B, "Health and safety perception of workers in Turkey: a survey of construction sites," *International Journal of Occupational Safety and Ergonomics* 20(2)(2014) 323-338.
- Tiwary G., Gangopadhyay P., "A review on the occupational health and social security of unorganized workers in the construction industry," *Indian Journal of Occupational and Environmental Medicine* 15(1) (2011) 18.

- Leigh JP, Waehrer G, Miller TR, et al., “Costs differences across demographic groups and types of occupational injuries and illnesses,” *American Journal of Industrial Medicine*. 2006;49(10):845–853.
- Husin NH, Jusoff K., “Management of Safety for Quality Construction,” *Journal of Sustainable Development*. 2008;1(3):41–47.
- Kadiri ZO, Nden T, Avre GK, et al, “Causes and Effects of Accidents on Construction Sites (A Case Study of Some Selected Construction Firms in Abuja F.C.T Nigeria),” *IOSR Journal of Mechanical and Civil Engineering (IOSR–JMCE)*. 2014;11(5):66–72.

**Articles from published conference proceedings:**

- Ahmed S., Sobuz M.H.R., Haque M.I., “Accidents on construction sites in Bangladesh,” A review, *4th International Conference on Civil Engineering for Sustainable Development (ICCESD 2018)*, KUET, Khulna, Bangladesh, 2018, pp. 9-11.
- Patel DAJ, Kumar Neeraj, “An estimate of fatal accidents in Indian construction,” *Paper presented at the Proceedings of the 32nd Annual ARCOM Conference*. 2016.
- Coble RI, “The environment as a construction Safety Concern,” *Paper presented at the Proceedings of the 5th Annual Rinker International Conference focusing on Construction Safety and Loss Control*, Florida. 1994.

**Reports:**

- Bangladesh Occupational Safety, Health and Environment Foundation (OSHE)*.  
Occupational Safety and Health Profile of Construction Sector, Dhaka. 2009.
- Bangladesh Occupational Safety, HaEF*. OSHE’s Workplace Accident Survey Report– 2015.  
Dhaka, Bangladesh: *Bangladesh Occupational Safety, Health and Environment Foundation*. 2015.
- Dong XS, Wang X, Daw C, “Fatal falls among older construction workers,” *Hum Factors*. 2011; 54 (3):303–315.
- Forum for Physical Development of Bangladesh (FPD)*. 2nd Round Table Discussion on Occupational Safety and Health in Construction Sector. 2013.
- M.A., Kohn J.P., “Fundamentals of occupational safety and health. Rowman & Littlefield 2018,”
- Guo H., Yu Y., Skitmore M., “Visualization technology-based construction safety management,” *Automation in Construction* 73 (2017) 135-144.
- Zhang S., Teizer J., Lee J.-K., Eastman C.M., Venugopal M., “Building information modeling (BIM) and safety” Automatic safety checking of construction models and schedules, *Automation in Construction* 29 (2013) 183-195.

Bust P.D., Gibb A.G., Pink S., “Managing construction health and safety: migrant workers and communicating safety messages,” *Safety Science* 46(4) (2008) 585-602.

BBS, *Report on Labour Force Survey*, Dhaka, 2018.

Jamal M.U.A.M., “Safety management issues in construction industry of Bangladesh,” *Civil Engineering*, Bangladesh University of Engineering & Technology, Dhaka, Bangladesh, 2015.

Mahmud MA, “Corruption in Plan Permission process in RAJUK,” a study of violations and proposals. Transparency International Bangladesh. 2007.

**Thesis:**

Berardi U., *A cross-country comparison of the building energy consumptions and their trends*. *Resources, Conservation and Recycling* 123 (2017) 230-241.

Jama MU, *Safety management issues in construction industry of Bangladesh*. (Master in Engineering thesis programme postgraduate), Bangladesh University of Engineering And Technology, Dhaka, Bangladesh. 2015.

Danso FO, MS Thesis., *Occupational health and safety issues involving casual workers on building construction sites in Ghana, a Kumasi study*. Kwame Nkrumah University of Science and Technology. Ghana. 2010.

**Website:**

[35] ILO, *Construction: a hazardous work*, 2015, 2015.

[http://www.ilo.org/safework/areasofwork/hazardo us-work/WCMS\\_124597/lang-en/index.htm](http://www.ilo.org/safework/areasofwork/hazardo us-work/WCMS_124597/lang-en/index.htm) (Accessed April 7 , 2018 2018).