

# Issues, Problems And Recommendations To Construction Field On The Basis Of Safety

**Mr.Anand Sekar.M.<sup>1</sup>, Mrs.R.Mahadevi<sup>2</sup>**

<sup>1</sup>PG Student, Construction Engineering And Management, The Kavery Engineering College, Mecheri,.

<sup>1</sup> Assistant Professor, Department of Civil Engineering, The Kavery Engineering College, Mecheri,.

**Abstract:** Construction, which is basic to developmental activities, provides vital infrastructure such as transport, communications, power, water, and accommodation. It is estimated that about 50% of our plan investment goes to the construction sector. India's construction industry that is providing livelihood to almost 10 percent of its population is the second largest occupation after agriculture yielding gross Rs.240, 000 crores. Thus safety is an important function in the management of construction projects. Because of the characteristics of decentralization and mobility in the construction industry, safety culture is crucially important. So to identify the safety issues and the problems a comprehensive safety climate questionnaire survey was conducted with sites and employees of the construction companies by categorizing it into three levels namely; high-level, medium-level and low-level. From the data we identify several factors by means of factors analysis; these factors will define the safety issues, prevailing in the site. This research can be useful for improving the safety and developing a new safety culture inside the organization.

**Keywords:** *Construction Project safety, problems, safety level*

## 1. INTRODUCTION

In recent years the concept of safety culture has attracted considerable attention especially in the dangerous industries, such as the nuclear industry and off-shore oil industry.

The construction industry is regarded as a dangerous industry due to two characteristics; decentralization and mobility. The meaning of decentralization is that the employees are separated by sites.

Although regulations and plans are available, they still have to make decision by themselves when facing specific problems. Mobility implies that employees in the construction industry move among the companies, sites, and positions more frequently than those in their traditional industries. Because of these two characteristics, while the promotion of safety management and working condition is achieved in a manner that is used by several industries to consciously improve safety performance, they are inadequate in the construction industry.

This is due to decentralization and mobility of the work force. One of the reasons is that in the construction industry, safety performance is more relevant to the human factors. It is especially important for a construction company to improve its safety culture to achieve better safety performance. A positive safety culture means the safety attitude and values of the company are totally accepted by its employees.

## 2. LITERATURE COLLECTION

**Xinyu Huang** (2006), this author identified the root causes of fall accidents and additional information that might be helpful in reducing the incidence of construction worker falls in the future. In the construction industry falls are the most frequently occurring types of accidents resulting in fatalities

**Ashwin Mahalingam and Raymond E. Levitt, M.** (2007), this author presents a detailed case studies of four comparable global infrastructure projects indicate that legal rules, cultural values and the prevailing economic situation in their countries of origin, influenced project participants' perception of safety

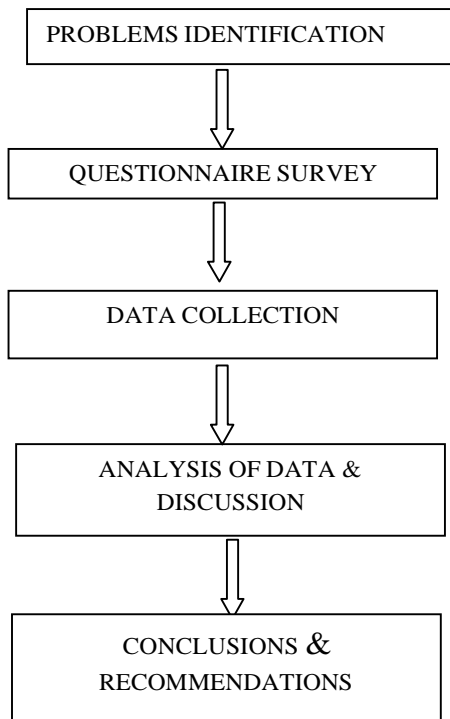
**Rafiq M. Choudhry; Dongping Fang; and Helen Lingard** (2009), this author determines safety climate that would enhance safety culture and positively impact perceived safety performance on construction projects. A safety climate questionnaire survey was conducted on the construction sites of a leading construction company and its subcontractors. By means of factor analysis, two underlying safety climate factors were extracted. Multiple regression analysis confirmed these climate factors, "management commitment involvement" and "inappropriate safety procedure and work practices" were significant predictors of workers' perceptions of safety performance

### 3. METHODOLOGY

Method proposed – Descriptive questionnaire survey method

This research is based on the questionnaire survey to be carried out in construction site of six companies by ranking the companies into three groups, namely,

- Low level Construction industry
- Medium level construction industry
- High level construction industry and
- ❖ A comprehensive questionnaire survey is to be conducted to workers of the selected six construction companies.
- ❖ The questionnaire for construction workers focuses on their experience with accident, experience in the industry, their safety awareness etc.
- ❖ The information regarding the personal protective equipment provided, sanitary facilities provided are obtained from the labour.
- ❖ Large number of sample is to be obtained from the six sites.
- ❖ The research methodology flow chart is given in the figure 3.1



**Figure (1): Methodology Adopted For Study**

### **3.1 QUESTIONNAIRE SURVEYS**

A questionnaire is a research technique consisting of a series of questions and other prompts for the purpose of gathering information from respondents.

### **3.2 DESIGN OF QUESTIONNAIRE SURVEYS**

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Although they are often designed for statistical analysis of the responses, this is not always the case. The questionnaire was invented by Sir Francis Galton.

Questionnaires have advantages over some other types of surveys in that they are cheap, do not require as much effort from the questioner as verbal or telephone surveys, and often have standardized answers that make it simple to compile data. However, such standardized answers may frustrate users. Questionnaires are also sharply limited by the fact that respondents must be able to read the questions and respond to them. Thus, for some demographic groups conducting a survey by questionnaire may not be practical.

### **3.3 Basic rules for questionnaire item construction**

- i) Use statements which are interpreted in the same way by members of different subpopulations of the population of interest.
- ii) Use statements where persons that have different opinions or traits
- iii) Think of having an "open" answer category after a list of possible answers.
- iv) Use only one aspect of the construct you are interested in per item.
- v) Use positive statements and avoid negatives or double negatives.

### **3.4 QUESTIONNAIRE ADMINISTRATION MODES**

Main modes of questionnaire administration are:

- i) Face-to-face questionnaire administration, where an interviewer presents the items orally.
- ii) Paper-and-pencil questionnaire administration, where the items are presented on paper.
- iii) Computerized questionnaire administration, where the items are presented on the computer.
- iv) Adaptive computerized questionnaire administration, where a selection of items is presented on the computer, and based on the answers.

## **4. ANALYSIS AND INTERPRETATION OF DATA'S**

### **4.1 INFORMATION ABOUT DATA COLLECTION**

The Questionnaire survey was conducted among 6 companies around Tamilnadu. Name of the company, designation of the respondent and name of the project are shown in Table 4.1. The respondents were from various departments. The average experience of the respondents was 6 years and varies from a minimum of one year to a maximum of sixteen years. The projects currently handled by the surveyed companies are residential complexes and commercial complexes.

**Table 1 Information about Data collection**

<b>NAME OF THE COMPANY</b>	<b>NAME OF THE PROJECT</b>	<b>DESIGNATION OF THE RESPONDENT</b>
<b>M/S Ahluwalia contracts india ltd.,chennai</b>	Columbia opalane	Project Engineer
<b>Elite contractors</b>	Cpc college	Project Engineer
<b>Covai builders</b>	Santoshm extension	Project Engineer
<b>Elegant contractors Contractor</b>	Jolly gem inn resort	Project Engineer
<b>G.S. Construction</b>	Golden nest	Project Engineer
<b>M.K.Architects</b>	Nri city centre	Project Engineer

#### 4.2 SOURCE OF RISKS

Sources for each Risk factor are mentioned in Table 2. Source mainly represents how the risk occurs in construction field, what are the factors cause the risks etc. For example risk factor is Electric shock, Source of electric shock is Construction workers are at risk of experiencing electric shock whenever they are exposed to cables or machines carrying electric current. Likewise for each risk factor source of risk is mentioned below.

**Table 3 Source of Risks for Risk Factors**

<b>RISK CATEGORY</b>	<b>RISK FACTORS</b>	<b>SOURCE OF RISKS</b>
<b>Environmental Harms</b>	Dust Pollution	This risk is always attributed to lack of personal protective equipment.
	Noise pollution	
	Solid Waste	This risk is always attributed to lack of technical guide.
	Water Waste	
	Toxic and Suffocation	This can arise from usage of non-environmental friendly material or lack of personal protective equipment.
<b>Electrocution</b>	Electric Shock	Construction workers are at risk of experiencing electric shock whenever they are exposed to cables or machines carrying electric current.
	Electrocutions	In some cases, an electrocution is a result of unsafe working conditions or various oversights by supervisors and foremen.

<b>Falling from Height</b>	Roof related falls	Roof related falls include skylight falls, falls off of roof structures, falls through existing openings, and other hazards.
	Crane falls on Site Construction	Operators can fall from great heights from their cranes, and alternatively cranes can lose their balance and topple, resulting in the injuries of many.
	Scaffolding	Scaffolding falls can arise from the lack of necessary protective measures.
	Elevator Shaft falls	Elevators in flooring are not properly marked.
	Holes in flooring on construction site	Holes in flooring are not properly marked.
<b>Falling Objects</b>	Hit by falling objects	This risk mainly results from poor safety conscientiousness of workers.
<b>Fires and Explosions</b>	Compressed gas explosion	That can arise from improper operation.
	Welding Accidents	That can arise from welding fumes, UV light, and sparks etc.
<b>Structure</b>	Structure Failure	A structure failure takes place when a building or other structure breaks in such a way that it cannot carry as great a load as it could before failure.
	Building Collapse	Building collapse can be caused by bad design, faulty construction, foundation failure, extraordinary loads, unexpected failure, or any combination of these causes.
<b>Use of Equipment</b>	Crane Accidents	That includes lightning, high winds, defective cranes, falls, and electrocution.
	Scaffolding	Scaffold accidents are connected with events like planking or supports giving way or the workers slipping or being struck by a falling object.
	Run over by operating equipment	This can arise from the lack of rigorous enforcement of safety regulations.

### 4.3 CATEGORIES FOR SAFETY RISK FACTORS

On basis of their nature of risk, risk factors are classified in to three categories mainly Environment, Occupational Health and Safety and Quality. Table 4.4 shows the Category of each Potential Risk Factors.

**Table 4 Categories for Safety Risk Factors**

RISK CATEGORY	RISK FACTORS	CATEGORY
<b>Environmental Harms</b>	Dust Pollution	Environment
	Noise Pollution	Environment
	Solid Waste	Environment
	Water Waste	Environment
	Toxic and Suffocation	OHS & Environment
<b>Electrocution</b>	Electric Shock	OHS
	Electrocutions	OHS
<b>Falling from Height</b>	Roof Related falls	OHS
	Crane falls on Construction Site	OHS
	Scaffolding falls	OHS
	Elevator shaft falls	OHS
	Holes in flooring on Construction site	OHS
<b>Falling Objects</b>	Hit by falling objects	OHS
<b>Fire and Explosion</b>	Compressed gas explosion	OHS
	Welding Accidents	OHS
<b>Structure</b>	Structure failure	Quality
	Building Collapse	Quality
<b>Use of Equipment</b>	Scaffolding Accidents	OHS
	Run over by operating Equipment	OHS

### 4.4 ACCEPTABILITY FOR SAFETY RISK FACTORS

On the basis of RPN calculated from occurrence, severity, and detection of potential risks, a specific risk is graded, and its acceptability is determined. The acceptability of risks is classified into four scenarios, including acceptable, moderate, undesirable, and unacceptable.

**Table 5 Acceptability for Safety Risk Factors**

Risk Factors	Acceptability of Safety Risk
Dust Pollution	Undesirable
Noise Pollution	Unacceptable
Solid Waste	Moderate
Water Waste	Moderate
Toxic and Suffocation	Moderate
Electric Shock	Moderate
Electrocutions	Acceptable
Roof Related falls	Unacceptable

Crane falls on Construction Site	Acceptable
Scaffolding falls	Undesirable
Elevator shaft falls	Acceptable
Holes in flooring on Construction site	Unacceptable
Hit by falling objects	Undesirable
Compressed gas explosion	Acceptable
Welding Accidents	Acceptable
Structure failure	Acceptable
Building Collapse	Acceptable
Crane Accidents	Acceptable
Scaffolding Accidents	Acceptable
Run over by operating Equipment	Acceptable

#### 4.5 MEASURES FOR RISK FACTORS

Measures for each Risk factors are shown in Table 4.5. Some of the measures like management training were already implemented in IMS implemented companies. These Measures will help the companies to avoid risks in construction projects.

**Table 6 Measures for Safety Factors**

<b>Safety Risk Factors</b>	<b>Measures for Safety Management</b>
Dust Pollution	Personal protective equipment
Noise Pollution	Personal protective equipment
Solid Waste	Environmental management training
Water Waste	Environmental management training
Toxic and Suffocation	Environmental management procedure
Electric Shock	Specific safety procedures
Electrocutions	Training and proper checking
Roof Related falls	Safety precautions and personal protection equipment
Crane falls on Construction Site	Qualification audit
Scaffolding falls	Proper training and safety precautions
Elevator shaft falls	Proper training and safety precautions
Holes in flooring on Construction site	Properly marked and protective measures
Hit by falling objects	Training and hard hat
Compressed gas explosion	Training and checking
Welding Accidents	Qualification audit

Structure failure	Quality checking
Building Collapse	Quality checking
Crane Accidents	Qualification audit and equipment checking
Scaffolding Accidents	Checking
Run over by operating Equipment	Safety training

In **Table 6**, it is indicated that five major potential risks, including —Roof related falls, —Noise Pollution, —Holes in flooring on construction site, —Hit by falling Objects, and —Scaffolding falls, are graded to be unacceptable. In construction, these events are considered as the most risky, found that falls from height represented the major severe injury problem, which was associated with different equipment and different tasks among different occupational groups in the construction process. The main goal of risk management is to keep risks at an acceptable level by maintaining the tolerable risks and following the programs in moving unacceptable risks to an acceptable level.

## 5. GUIDELINES FOR SAFETY IN CONSTRUCTION SITES

### 5.1 PREVENTION

Most accidents can be prevented by taking simple measures or adopting proper working procedures.. If we work carefully and take appropriate safety measures, there will definitely be fewer work injury cases, and our sites will become a safe and secure place to work in.

### 5.2 TIDY UP CONSTRUCTION SITE

- Keep passages clear all the time.
- Sort out materials and pile them up safely. The stacks should not be too high.
  - Beware of floor openings and ensure that they are fenced or covered.
- Remove refuse as soon as possible.
- Provide sufficient lighting.
- Familiarize with the location and the operation of fire-fighting equipment.

## 6. SAFETY ISSUES

### Safety Policy & Procedures

The safety policy is available with some contractors for their particular site. In some cases the safety program is incomplete, that is, there is no safety engineer or any other person responsible for safety at site and some doesn't have formal organization for safety.

### Safety Record-keeping

Safety record-keeping is urged to be maintained at the construction sites, to make awareness of safety in construction sites by the way to reduce the occupational accidents and illnesses. From the results of Questionnaire it is found that the most of the companies maintain record keeping only annually. The record keeping for accident frequency rate, Number of fatalities and dangerous occurrence happened.

### Welfare Measures

From the analysis, it was clear that 85% of the sites are available with first aid kits. Regular medical checkup is given about 28%.The welfare measures like labour colony ranks 21%, sanitary facilities like availability of good drinking water, latrines, lighting, etc., are provided about 21%.Insurance provided was about 33%. Even though education for children ranks zero, the welfare measures like recreation arrangement is surveyed to be minimal. In overall half of the respondents agreed that they were provided with basic amenities required for their day-today activities.



## Relationship between Management & Labors

Rapport here perhaps one of the major tasks to be performed by the management. Without carefully synchronized work tasks on the projects, confusion will develop between expertise and sub-contractors. Motivation towards safety and the outcome of conducting safety meetings results towards the “disagree” level.

## Emergency Plan

Majority of the sites have scored well in this criterion. Most of the sites surveyed have fire extinguishers available at the sites and have emergency numbers which have been displayed in some of the sites as well.

## 7. CONCLUSIONS

A local case study was conducted. The findings revealed that some potential risks, including Holes in flooring on construction site, Hit by falling objects, Noise Pollution, Elevator shaft falls, and Scaffolding falls are graded to , be unacceptable. Moreover, it is more important to pursue for continuous improvement to follow the safety norms and guidelines proposed above. Moreover it is very necessary to have a safety inspector irrespective of the project cost of the site in order to maintain the safety standards at the construction site, and the top management and engineers should know the value of safety at construction sites and should very strongly implement the safety norms. The issue of quality in construction and the process to achieve the required quality has only been lightly touched upon although there must be many important quality issues waiting to be discussed.

## REFERENCES

1. Alexander Laufer M, and William B.Ledbetter(1986),F “Assessment of Safety Performance Measures at Construction Sites” *Journal Construction Engineering and management Volume 112, No. 4, December,ASCE,pp 530-542*
2. Amr A.G.Hassanein and Ragaa S.Hanna(2008), “Safety Performance in the Egyptian Construction” *Journal of Construction Engineering and Management, Vol. 134, No. 6, June 1, ASCE, pp 451-455*
3. Ashwin Mahalingam and Raymond E.Levitt.M (2007), “Safety Issues on Global Projects” *Journal of Construction Engineering and Management, Vol. 133, No. 7, June 1, ASCE, pp 506-516.*
4. Banerjee.N(1995), ‘Implementation Issues in Safety Performance Excellence; ‘A Study of Construction Industry’, *Journal of Construction Engineering and Management, Vol 122, No 02, ASCE, pp 158-164.*
5. Donping Fang, X.Y.Huang; and Jimmie Hinze (2004), “Benchmarking studies on construction safety management in China”, *Journal Construction Engineering and management, Volume 130, No.3, June 1, ASCE pp 424-432.*
6. Donping Fang, Yang Chen and Louis Wong(2006), “Safety climate in Construction industry”, *Journal Construction Engineering and management, Volume 132, No. 6, June 1, ASCE, pp 573-581*
7. Edward J.Jaselskis, Stuart D.Anderson and Jeffrey S.Russell(1996) “Strategies for Achieving Excellence in Construction Safety Performance”, *Journal of Construction Engineering & Management, Vol.122, No.1, pp 61-70*