

# SAFETY MANAGEMENT PERFORMANCE MEASUREMENT IN REAL ESTATE SECTOR AND ITS IMPROVEMENT

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**Abstract** – In India the construction industry is the next largest employer next to agriculture and about 31 million public are employed in construction sector. Indian building industry is labour intensive including of semi- skilled and unskilled workers. The amount and evaluation of an organization's concern on health and safety conditions at work mostly aims at the provision of data about the existing situation and the growth of the strategies, processes and activities that are accepted by an organization with the view to keep H&S hazards under switch. The construction industry requirements a new paradigm for calculating safety performance on construction sites that is a positive approach rather than just dependent on the reactive data. The proactive method is able to provide vital feedback on performance before events occur. Through, literature review and factors recommended by experts were considered to categorize the factors. Almost 50 factors, were identified, analyzed and ranked. The survey implemented a quantitative approach over a questionnaire survey conducted amidst construction professionals such as Engineer, supervisor and senior engineer in the Ahmedabad. The majority of this is attainable only if the premeditated levels of productivity can be accomplished. All the equivalent, productivity or lack that department is one of the development construction industry most prevalent issues. Due to the hazardous nature of work, safety is a serious issue in the industry. The hazards of construction industry make it most important to pay more consideration to construction site safety and to improve the safety of the construction sites. The main goal of this study is to reduce risk as much as possible and pay more attention to safety to reduce the risk of death.

**Key Words:** Accident Control Measures, Safety Management, Level of Performance, Hazards, Safety Indicator

## 1. INTRODUCTION

The most dangerous industry in the whole country is the building industry because there are so many accidents happening day by day that's why. Excessive accidents are caused by not understanding the current public safety expressed as unsafe follows and behavior. The peoples don't understand safety properly that's the main reason for their

life is in risk. Establishing a moral and efficient safety culture undoubtedly helps organizations controller and decreases construction costs and increases their long-term operational effectiveness.

India's construction sector as the country's next-largest employer of the country afterward agriculture, providing jobs to more than 44 million public, and contributing closely 9% to the national GDP, yet, ironically, its workforce is more unprotected than somewhat other industrial sector of the country. In Ahmedabad construction workforces enjoy no authorized protection, their on-site deaths are 20 times higher than those in Britain, 26% of the deaths outcome from falling from a height, and nearly 78% of the workers work in risky environment.

To eliminate construction-related accidents, operation of safety package is regarded as a main strategy by equally government and private sectors. The main goal of this study is to reduce risk as much as possible and pay more attention to safety to reduce the risk of death.

### 1.1 NEED FOR STUDY

In India construction industry, it is necessary to reduce the accidents of day to day and to identify loopholes in safety management practices of real estate projects furthermore Exploring strategies to implement occupational safety and health best practice.

### 1.2 OBJECTIVE

There are mainly two objectives of this research work. First is to investigate the exactly what factors affected safety on construction project & to study the various safety measures in real estate projects.

### 1.3 LITERATURE REVIEW

Several literatures were studied in order to increase a strong view on safety management and safety practices in construction industry. Literature review of 20 paper showed

that the factor affecting safety performance and its improvement. After sorting the papers and publication which were relevant to the topic. Furthermore, these papers & publications which were sorted to the relevancy of the current topic. Many other sources such as techno social platform (Quora, LinkedIn), books were referred. Here, the key factors safety in construction industry which imparted their effect directly or indirectly for the company profitability.

## 2. RESEARCH METHODOLOGY

In this study, factors that affect the safety performance building construction has been obtained from various literature studies. Questionnaires were designed on structural basis to get information about the personal data of the respondents and their experience on issues related to safety in construction. About one hundred questionnaires were sent to the construction industry by mail and interviews were conducted among construction personnel namely contractor, client, consultant, and engineer. The data collected were analysed using the FAII (frequency adjusted imported index) method to rank the factors contributing to safety on construction sites. The FAII for each factor was computed from the analysis of the rating indicated by the respondents with the use of five-point Likert scale. The value of 5,4,3,2 and 1 were respectively defined as below. After ranking suggestions can be provided for improving the safety performance.

**Table -1** Importance Scale for Ranking the Factors

Very Low	Low	Medium	High	Very High
1	2	3	4	5

### 2.1 DATA COLLECTION

Data collection is a vital aspect of any type of research training. Data is collected from several sites including Residential and Commercial plans it can be classified into two types namely, quantitative approach and qualitative approach. Qualitative approach seeks to gain insights and to realize people's perceptions, or opinion towards a particular object. As well, it is secondhand when a limited quantity of knowledge about the topic are available. Quantitative approach seeks to collect factual data and to study relationship between facts and how such facts and relationships accord with theories and findings of any research executed previously. The research through literature reviews and discussion with some person involved in the construction project identified a total of 50 factors which are mainly affecting in the safety performance at construction site. The data will be collected from residential and commercial construction projects located in

Ahmedabad. Several difficulties occurred during the collection of data such lock down, unavailability of engineers & contractors. So, an online questionnaire was drifted to the contractors and engineers.

### 2.2 QUESTIONNAIRE DESIGN

The questionnaire survey is isolated into two segments. The first segments comprise of overall data like type of organization, experience, estimation of their project etc. and the second segments comprises of the factors affecting construction site safety for Evaluation.

### Sample Size Calculation

The formulation under was used to govern the sample size of unlimited population:

$$SS = (Z^2 \times P \times \{1 - P\}) / C^2$$

Where,

SS = Sample Size

Z = Z value (for e.g.: 1.96 for 95% confidence Interval)

POP = Percentage picking a choice, expressed as decimal, (0.50 used for sample size needed)

C = Confidence Interval (0.1)

$$S = (1.96^2 \times 0.50 \times \{1 - 0.50\}) / (0.1^2)$$

$$S = 96.04$$

**Table -2** Number of Engineers and Developers

CITY	DEVELOPER/ BUILDER	CONTRACTOR/ ENGINEERS
AHMEDABAD	915	957
TOTAL	1872	

Number of developer/ builders, contractor/ engineers in Ahmedabad are taken from Ahmedabad urban development authority (AUDA). So total number of populations is 1872.

$$SS = \frac{SS}{1 + \frac{SS-1}{POP}} \qquad SS = \frac{96.04}{1 + \frac{96.04-1}{1872}}$$

$$= 92.39 \approx 92 \pm 5$$

**Table -3** Responses Percentage

No. of Questionnaires Distributed	No. of Responses received	No. of taken Responses	Percentage of valid respondent to no. of distributed questionnaire
100	95	91	91%

### 2.3 DATA ANALYSIS

Data Analysis is the procedure of systematically applying statistical as well as intelligent frameworks to depict and represent the evaluate data. A basic part of ensuring data information honesty is the exact and appropriate analysis of research findings.

From questionnaire survey collected 43 (offline) and 48 (online) responses as data collection & that collected data has to be analyzed to find out the most important factors affecting safety management. So, here frequency adjusted importance index method has been used. From the (FAII) method we found out the top most factors. Based on the both the frequency index (FI) and the Relative important index (RII), the frequency adjusted importance index will be calculated below formula will be used to compute the (FAII) method.

$$FAII = RII * (F.I.) (\%)$$

$$RII = \frac{\sum W}{A.N}$$

Where,

W = Ratings provided to each parameter (ranging from 1 to 5),

A = Highest rating (i.e. 5 in this circumstance),

N = Total respondents.

$$FI = \sum W \left( \frac{n}{N} \right) * \frac{100}{5}$$

Where,

W – weight specified to each factor by the respondents (1 to 5)

n – Frequency of the responses

N – total number of responses

### 2.4 DATA ANALYSIS PROCEDURE & OUTPUT IN FAII

#### Find Out Relative Index of Each Factor

#### Find Out Relative Ranking of Each Factor

Afterwards finding the frequency adjusted importance index, they are settled in a hierarchical order (i.e. from top to bottom). So, by finding out the relative ranking of each factor we can know about the most vital and least important factor out of all the factors.

### 2.5 TOP 10 SAFETY FACTORS

Table -4 Top 10 Factors

SR.NO	FACTORS	ΣW	RII	FI	FAII= RII*(F.I.)
1.	Safety signs are placed in hazardous place in site	415	90.217	89.64	80.870
2.	Every operator shall be properly qualified	400	86.956	86.4	75.130
3.	Scaffolding of mobile tower are check every day	395	85.869	85.32	73.263
4.	Prepared any emergency action plan to meet any emergency on site	390	84.782	84.24	71.420
5.	Special area for storage of petrol, flammable material etc.	388	84.347	83.808	70.690
6.	Safety training provided by organization	383	83.260	82.728	68.880
7.	Safety supervision	378	82.173	81.648	67.093
8.	Safety net is provided while working at height	372	80.869	80.352	64.980
9.	Workers wear ear defender in noisy condition	368	80	79.488	63.590
10.	Lack of safety awareness	365	79.347	78.84	62.557

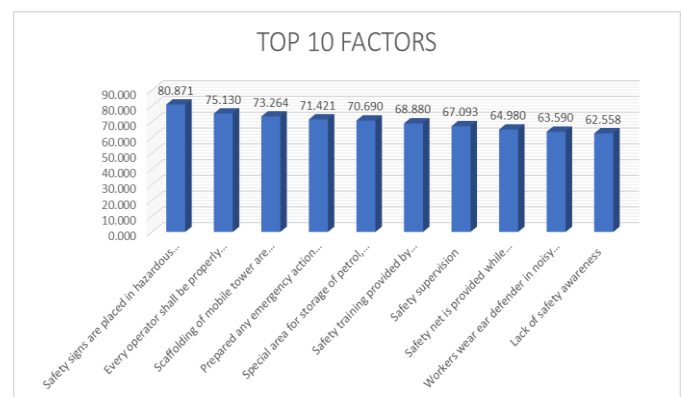


Chart -1 Top 10 Factors

### 3. CONCLUSIONS

Construction activities are most dangerous compare the other industry because in construction industry use of big machines, dangerous materials that's why work environment of construction project very dangerous. All these cause many accidents so it is necessary to use safety at all levels. Safety isn't a choice safety is a compulsory act that always mention and all accident are preventable. This study identified 50 factors underwriting to the safety plans and then estimated their degree of importance and genuine status founded upon the respondents.

It has been recognized that safety management is the utmost important area in a construction work. In this research, we conclude the following things:

**Table -5 Top 10 Factors and its recommendation**

<b>Safety signs are placed in hazardous place in site</b>	Safety signs are hardly placed on every site. It is visible to all for main safety.
<b>Every operator shall be properly qualified</b>	There is absence of information about how to use equipment's on place and also absence of management.
<b>Scaffolding of mobile tower are check every day</b>	Most of construction sites not frequently checked mobile tower therefore it is hazardous for work.
<b>Prepared any emergency action plan to meet any emergency on site</b>	Giving to act of wellbeing policy there is essential of emergency action plan to meet emergency this consideration also failure out on construction site.
<b>Special area for storage of petrol, flammable material etc.</b>	Fire precaution & fire extinguisher is not placed at flammable area.
<b>Safety training provided by organization</b>	The organization should provide safety training every week.
<b>Safety supervision</b>	In order to guarantee safety, safety engineer or officer should continuously be present at building site to check the implementation of safety in the sites.
<b>Safety net is provided while working at height</b>	While workforce is work in high level safety net is necessary.
<b>Workers wear ear defender in noisy condition</b>	All the workforces should be providing with personal protection equipment's (PPE) to confirm their own safety. Proper remedies and measures should be occupied in every construction site to avoid any chance of incidence of any kind of accidents
<b>Lack of safety awareness</b>	The supervisor and all the workers have enough experience and knowledge to encourage the workforces to perform their work carefully.

If we manage safety in well manner we save time and cost. Regarding the cost of the building safety, the common of the all respondents approved that the cost of safety less than 3%. Safety directly affects the life so it should be taken care of and reduce as much as possible.

### 4. RECOMMENDATIONS

#### Checklist

- Safety in height working checklist
- Scaffolding safety checklist
- Electrical work inspection checklist
- General safety inspection checklist
- Safety erection checklist

#### Report

- Safety minute of meeting report
- General site safety inspection report
- Crane equipment inspection report
- Safety audit report

#### Work permit system

- Permit to work on machinery
- Night work permit
- Entry permit
- Height work permit

#### The government

- Government should create a safety department and punish those who do not follow the safety at the site mostly.
- Government course should be conducted on how to increase safety and should be done every year.

#### The consultant

- The consultant should state which factors are risky and which should lead to accidents that cause public concern.
- The consultant visits the site and checks to see if all machinery and tools are ok. If not, they tell the contractor or workforce.

#### The contractor

- The contractor should keep in mind that every worker follows safety and workers who do not follow safety should be penalized.
- The safety meetings should be held at short intervals because of this safety stays in the mind of the workforce.
- In construction industry it is recommended that the contractors should train their labours, promote the safe site environment for labours and thought them on the most proficient technique to avoid the any incident.

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