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CHALLENGES AND SOLUTIONS RELATED TO SAFETY IN THE CONSTRUCTION INDUSTRY

Rommana Yousuf,
M.Tech Scholar,
Department of Civil Engineering,
RIMT University, Chandigarh, I*ndia*

Abstract : This study is based on a comprehensive overview of safety in the construction sector, emphasising a strategic approach to addressing the main safety-related problems. Safety difficulties arise during construction, particularly in underdeveloped nations where proper standard application is frequently overlooked. There have been attempts to solve this issue, but the outcomes have not been great. This study was conducted to investigate the safety perceptions, attitudes and behaviour of construction workers and management safety practices in a construction industry. The results showed that the majority of the construction industries have poor degree of risk awareness and do not seem to take safety as an important issue. However there is no significant relationship between safety attitude and behaviour with age, gender, educational level, job title held or years working in the construction industry.

IndexTerms **- Construction, safety, industry, frequency, awareness.**

I. INTRODUCTION

Construction industry is considered as one of the most hazardous industry across the world. The number of structures constructed for commercial, residential, and office purposes has increased. Due to the growing need for homes, offices, and other types of infrastructure facilities, the construction business is still growing. Because the building business is so complex, it is vulnerable to a number of risks. Therefore, in order to provide a hazard-free workplace, safety is of utmost importance in the construction sector. Safety professionals have envisioned that serious workplace accidents are caused by unsafe activities, and their management is one of the keys to effective accident prevention that will result in low accident rates in the construction industry. It is highly challenging to estimate the number of fatal incidents at construction sites because there is no data on this subject for a variety of reasons. Their goal is to finish projects to the desired quality in the least amount of time and money. Recklessness is the main cause of these risks on construction sites. After agriculture, construction is the second-largest financial sector in India. Over the previous 50 years, it has made up about 40% of the improvement venture. Construction is the primary line of work for around 16% of India's working population.

About 35 million people are employed by India's construction industry, which generates assets worth more than 200 billion rupees. Nearly 11% of India's GDP is attributed to construction. But this unsteady progress has a darker side. Despite the significant financial investment, the construction industry pays little attention to the safety of individuals who labour in its lower rungs. Every day, hundreds of people, including female employees, die either from falls, electrocutions, or being buried under rubble. Between 2013 and 2016, there were 377 worker injuries and 1,092 fatalities. 60% of the aforesaid deaths were caused by falls from heights, 25% by building wall collapses or building collapses overall, and 15% by electrocution.

II. CORE ELEMENTS FOR SAFETY PROGRAMMES IN CONSTRUCTION INDUSTRY

1. Leadership in Management
2. Worker Participation
3. Hazard Control and Prevention
4. Education and Training
5. Program Evaluation and Improvement
6. Communication and Coordination of Employees on Worksite

III. AIMS AND OBJECTIVES

The principal aim of this research is to present general overview of the current state of safety in the construction industry. To reach the aim of this research following objectives were made:

To present a graphical analysis of the responses and explain how building sites are actually doing.

- Examining the information gathered from building sites.
- Findings and Discussion.

IV. SOURCES OF DATA

Data was collected from four zones of three Construction Companies:

- **Jehlum Construction Company**
- **Hanief Group of Infrastructure Pvt. Ltd.**
- **Ramky Infrastructure Pvt. Ltd..**

Ramky Infrastructure Pvt. Ltd.

ZONE 1

Location: Sangam J&K
Site: Bridge Construction

Table 1- Zone 1 Specifications

01	Span of Bridge	360m
02	Width of Bridge	10.5m
03	Area	4000m^2
04	No. of abutment in one Lane	2
05	No. of piles in one Abutment	11
06	No. of piers in one Lane	3
07	No. of piles in one Pier	6
08	Total Piles in one Lane	40

Safety Measures Adopted

- All employees must be provided with appropriate Personal Protective equipment like gloves, goggles, helmet shoes and safety jacket etc.
- Safety net should be used for fall protection
- Broken and defected tools should not be used. These should be reported for repair for replacement.
- Inspecting wire ropes on suspension scaffolds before and after every shift.
- Only experienced and qualified welders should be allowed to do welding, heating or cutting.

Figure 1- Construction of Bridge in Sangam by Ramky Infrastructure.

ZONE 2

Location: From Lethpora to Barsoo
Site: Construction of Road

Table 2-Zone 2 Specifications

01	Length	4.6km
02	Width	7m
03	Area	3220m^2
04	No. of Culverts	2
05	Height of Culvert	2m
06	Width of shoulder	1.5m
07	Divider	0.5-4m

Safety Measures Adopted

- All Employees must be provided with appropriate Personal Protective Equipment like gloves, glasses, shoes, helmets safety jacket etc.
- Keeping and maintained well signs.
- Proper training to the workers
- Provide rubber boots while placing and handling concrete.

Hanief Group of Infrastructure Pvt. Ltd.
ZONE 3
Location: Railway Tunnel, Banihal J&K
Site: Construction of Railway Tunnel

Table 3-Zone 3 Specifcations

01	Length	3km
02	Height	7m
03	Diameter	6m
04	Area located for site	12500m^2

Safety Measures Adopted

- All employees must be provided with appropriate personal protective equipment (PPE) like gloves, goggles, safety helmets, shoes etc.
- Provision of safety trainings.
- Ventilation is required to remove polluted air, gases and smoke produced.
- Adequate supply of pure and hygienic air to be maintained.
- Head light in each end and a whistle with a tone of sufficient volume shall be provided.

ZONE 4
Location: Village Bankote, Banihal J&K
Site: Construction of approach road from NH to Railway Tunnel.

Table 4-Zone 4 Specifications

01	Length	2km
02	Width	5m
03	Area for site	10,000m^2

Safety Measures Adopted

- Keeping and maintained well signs
- Proper safety training to workers.
- Proper dress code to workers especially working in night shift.
- Wear rubber boots while placing and handling concrete.
- Protect your eyes from cement dust.
- Wear long sleeves and full sleeves trousers to protect your arms and legs.

Figure 2- Road construction in Bankote, Banihal J&K by Jehlum Construction Company

V. RESULTS AND DISCUSSION

5.1 OBSERVATIONS RECORDED FROM FOUR ZONES BASED ON QUESTIONNAIRE

Table 5-Interview details

Position of Person	Number of Persons
Site Manager	4
Site Engineer	8
Site Officer	2
Supervisor	2
Contractor	2
Labours	100
Total	118

5.2 DESCRIPTIVE RESULTS OF RESPONDENT GROUPS

The responses were received from 18 members that is Site Managers, Site Engineers Supervisors and Site Officers of 4 Zones of Construction Site A and B respectively.

Table 6-Results Obtained from Respondent Groups

No.	Factors	Number of Responses					RII	Rank
		n_5	n_4	n_3	n_2	n_1		
01	Workmen trained in material handling	6	11	1			0.86	4
02	Safety policy on paper		1	8	9		0.51	13
03	Safety plans and procedures executed	11	7				0.92	1
04	Employees given specialized safety training where needed	4	14				0.84	5
05	Safety materials displayed on site		4	13	1		0.63	11
06	Statements made for critical activities		2	4	11		0.47	15
07	First Aid centre on Site	1	3	11	3		0.62	11
08	Any arrangement with hospital for emergency treatment	4	7	7			0.76	10
09	Proper arrangement for regular collection and disposal of waste materials			6	12		0.46	16
10	Walkway clearly defined and unobstructed			3	9	6	0.36	20

11	Local scrap yard provided			4	12	2	0.42	18
12	Easy access for electrical panel, fire Extinguisher, First Aid boxes			10	6	2	0.48	15
13	Safety harness while working at height	1	15	2			0.81	7
14	Workers wearing full body safety equipments like shoes helmet goggles, jacket etc.			3	9	6	0.36	20
15	Workers anchoring their harness properly before working at height	2	4	5	7		0.61	12
16	Workers Using suitable PPE as per hazards	7	11				0.88	2
17	Proper flooring done with adequate bearing capacity	6	8	4			0.82	6
18	Stacks protected from collapse			2	5	9	0.33	21
19	Fire precautions taken when flammable materials stored				9	6	0.22	26
20	Fire extinguishers available on site				10	8	0.30	24
21	Excavation sloped/step back or shored properly	4	8	6			0.78	8
22	Safe access provided for vehicles in excavation areas			8	9	1	0.48	15
23	Excavation area free from falling material			2	2	14	0.26	27
24	Adequate precautions taken while removing timber supports		3	7	4	4	0.50	14
25	Gas test conducted in confined areas				9	9	0.30	24
26	Workmen trained before working in confined area			2	7	9	0.32	22
27	Register maintained to enter the names of workers while entering or leaving the confined area				10	13	0.25	25
28	Cables protected from mechanical damages	6	11	1			0.87	3
29	Scaffolds designed as per load requirements	4	10	4			0.80	9
30	Hand-rails and toe boards fixed for the platform		1	6	11		0.48	15
31	False-work designed by competent person and rechecked by concerned engineer	6	11	1			0.86	4
32	Life lines provided while anchoring points			4	7	7	0.37	19
33	Fall arresters provided while climbing rope ladders	3	8	7			0.76	10
34	Safety nets fixed where needed			7	10	1	0.47	16
35	Appropriate tools provided for the job				10	8	0.31	23
36	Power tools provided with earth connections		4	11	3		0.61	12

VI. CONCLUSION

Four separate Jammu & Kashmir locations were assessed based on safety precautions taken. This study has also covered a thorough evaluation of the safety practises used across all of the facilities. Understanding safety management within the construction industries was required for my research in order to establish a framework of recommendations for enhancing safety performance at the construction site. In order to do this, a variety of strategies were employed, all of which take safety management into account. A safety officer's responsibilities include locating potential production-loss dangers, gathering risk information, alerting upper management to safety-related legal obligations, and conducting accident investigations. Workers should receive safety training to inform them of the risks and dangers present when working on a site and the potential consequences for their lives. They should be educated on the value of safety. In light of the suggested adjustments, it was determined that a process for evaluating competency, experience, education, and abilities was required.

Several strategies can be used to reduce accidents and increase safety, such as:

- Establish accountability at all levels.
- Consider safety throughout project planning.
- Replace certain people with robots.
- Adopt cutting-edge safety training, such as virtual reality training • Ensure that staff are qualified for safety.
- Ensure that the personnel have the appropriate training for the desired working environment.

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