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Assessment of Safety Management for Public Construction Sites in Nashik

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***Abstract*— Accidents are regrettable occurrences that take place unexpectedly and without intent, frequently causing harm or damage. Construction hazards on the type of construction work. Although these happen by chance, this probability is always high in the construction sector. Safety is an essential part of construction projects for workers. Studying in the construction industry improves safety performance. The main objective of safety management is to identify the critical success factors responsible for the execution of safety management in construction projects. The Indian society and economy have suffered human and financial losses due to the poor safety record in the construction industry. Safety management is essential for the desired changes in the system of work and attitude. It develops a sense of safety in work activities. It helps in acquiring basic knowledge of hazards and precautions. There are many safety problems in the construction industry, such as a lack of knowledge about the necessity of earth connection for power tools and a lack of knowledge about cable protection from mechanical damage. Most large firms have a safety policy on paper, but employees are generally unaware of its existence. Nevertheless, several significant constructors exhibit a safety concern and have established various safety procedures.**

The main idea is to perform a quantitative analysis to determine the correlation between the perception of workers on safety concerning their work performance. Due to the presence of risks in construction sites, it is essential to know how the implementation of workers is affected by their awareness of danger. From this study, information on the construction workers' perception of risk would help improve the management of any construction site, helping the safety and health unit of any company develop an outline of safety procedures specific to their workers. A total of 50 respondents were surveyed from different companies within the province of Nashik.

Keywords*— *Safety, Construction, Management, Risk and Hazards, Occupational Safety and Health.

I. INTRODUCTION

In India, the construction industry is the second largest employer compared to agriculture.

The construction sector of civil engineering is among the most hazardous in the world. The number of fatal accidents at the construction sites is quite alarming, and the primary cause was the fall of persons from height and through Openings.The Indian construction industry is currently very large and complex, utilising the most recent staffing and technology. Constraints in terms of safety and health issues are seen in tandem with the growth of the construction industry. 7.5% of all workers worldwide are employed in the construction industry, and 16.4% of all fatal workplace accidents occur there. Construction workers are five times more likely than average to die on the job workers in the manufacturing sector, but they also have a 2.5 times greater chance of suffering serious injuries.In accordance with a recent International Labour Organization study, which cited a local aid group survey demonstrating that 165 out of every 1,000 workers suffer work-related injuries, The number of accidents involving construction workers is highest in India. Accident victims are not limited to construction workers; the general public, including children, is also impacted. These mishaps damage the reputation of the construction sector, which leads to a labour shortage. In the past few decades, the need for safety awareness among construction industries was realized. This is a result of the high costs of workplace accidents, workers' compensation, insurance premiums, indirect damages, and legal fees.. Every year, considerable time is lost due to work-related health issues and site accidents.Accidents on construction sites and health issues are caused by a variety of factors. The Occupational Safety and Health Administration's investigation into the factors that contribute to construction fatalities revealed that falls account for 39.9% of fatalities, objects being struck accounting for 8.4%, being caught in the middle of an incident accounting for 1.4%, and electrocution accounting for 8.5%. Labor safety can be achieved using a variety of

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strategies, including site layout, first aid, lighting, personal protective equipment, welfare, safety management, policy, organisation, training, and committees The leading causes of construction site accidents are facilities, a lack of communication between the various departments involved, and improper inspections. May cause Construction site accidents due to the factors such as the Building parts and earth masses collapsing, objects and pieces of work falling on workersfalls people falling from great heights, ladders, and stairs, loading, unloading, and transporting loads, working on machines, and blasting with explosives Every effort must be made to raise the level of awareness among employees and management about the importance of workplace health and safety. It is highly desirable to decrease the rate of labor accidents for employees working in the construction industry worldwide. Many preventive measures to address this problem have been proposed and carried out. However, accidents keep occurring with depressing regularity. Hence, new effective measures for preventing labor accidents are always keenly anticipated. Construction projects carried out on a large scale follow reasonable safety measures as a separate safety department is available in these companies. But small-scale projects taken up by local contractors must be aware of the safety requirements that could prevent construction site accidents. Preventing labor accidents, occupational illness, and injuries should be a primary concern of all employers. The paper examines the current safety status in the workplace and creates a safe working environment for the employees of construction companies. The study included physical visits to different construction sites, collecting data and feedback regarding the number of workers, nativity of the workers, total work hours, and work shifts from construction site workers using a questionnaire. Information about the number of accidents in small and large construction sites, the cause, and the type of injuries suffered by the workers was collected and examined.

II. LITERATURE REVIEW

A. PROBLEM STATEMENT

Since the Occupational Health and Safety Act was passed, there has been an increase in interest in health and safety in India. In order to improve the standard of the working environment and prevent costly liabilities, the majority of the business enterprises in Nashik were previously operating without institutional or individual capacity for occupational health and safety management must now develop that capacity

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The Factories Act (1951) underwent numerous revisions before being replaced by the Occupational Safety and Health Act (2018), which amended and expanded its scope of application to places of employment besides factories. It is applicable to all places of employment, whether they are temporary or long-term. The Act aims to protect others from risks to their safety and health brought on by or connected to the activities of those at work while also ensuring the safety, health, and welfare of those who are working.The Act requires the employer to follow all safety and health rules, regulations, directives, and procedures by taking all necessary precautions to ensure his safety. Use appropriate safe work practises, preventative measures, and control

s at all times to ensure his health and the health of anyone else in his workplace. The employee must ensure his or her own safety and health, as well as the safety and health of others who may be affected by his or her actions or omissions at work, and must follow all safety and health procedures, requirements, and instructions. Violation of the provisions is thus considered an offence. The Act calls for the appointment of a director as well as occupational safety and health officers to oversee the requirements' implementation. Still, this notwithstanding, accidents continue to happen on construction sites, some with fatal implications. (Occupational Health and Safety Act, 2018). The pain and suffering endured by workers and their families as a result of such accidents and illnesses is immeasurable. In terms of economics, the ILO estimates that occupational diseases and accidents cost the world 6% of its annual GDP. Employers face costly early retirements, skilled staff loss, absenteeism, and high insurance premiums as a result of work-related accidents and illnesses. However, many of these tragedies are avoidable by implementing sound prevention, reporting, and inspection practices. 2008 Engineers Against Poverty report

B. AIM

The study aims to examine the awareness of construction site workers in the construction sector in Nashik.

C. OBJECTIVES

The general purpose of this research is to determine the relationship between workers' perceptions of safety and risk with their performance.

Specifically, this study aims to:

1. To assess the level of awareness and measure the performance of construction site workers by conducting surveys validated by safety officers within the locale of Nashik.
2. To identify the factors affecting safety management through a Literature review.
3. To conduct a Questionnaire Survey among the construction firms in Nashik to identify the major causes of accidents on site.

III. METHODOLOGY

Before A quantitative research design is used in this study to investigate workers' safety and risk perception in various construction sites in Nashik. The problem is quantified using this design. producing numerical data that can be converted into usable statistics.

1. Research Instrument

A variety of related studies were reviewed, which may serve as the reference for the analysis of this study. The data will gather through a survey questionnaire. The researchers will

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provide a letter of request addressed to some of the construction companies around Nashik to approve a survey of workers at the site. To achieve the objectives of this research, questionnaires are deemed the most effective tool for collecting information.

Questionnaire Design:

The survey instrument—a questionnaire—will be designed based on references to COSH/BOSH. The test for the level of awareness has three parts:

- First, the level of understanding/perception regarding the presence of hazards and risks to workers at the site;
- Second, the level of awareness of workers regarding the existence of safety procedures; and
- Third, the level of understanding and knowledge in implementing safety procedures.

The questions are meant to identify the level of awareness of
Safety and risk and to measure their performance. A survey questionnaire enables the workers to respond to the related questions by answering the level of awareness and measuring performance on a Likert scale. Thus, a validated questionnaire will be adapted for this study to collect and analyze data.

A. LITERATURE REVIEW

The construction industry is hazardous. The performance of the sector in occupational health and safety is inferior. In developing countries, occupational health and safety standards are even lower. In the Indian construction industry, Organisational Health and Safety (OHS) has never been given prime importance. Even though the construction industry in India is significantly booming, there need to be proper initiatives undertaken by the government to implement OHS rules and regulations.

Construction Workers' Perceptions of Safety Practices Organizational Characteristics and Worker Perceptions.

These are some of the most important factors influencing the safety
of the environment on construction sites. Although some of the workers' perceptions may appear absurd to others, these elements are a part of their reality. Worker behaviour is an important factor in workplace safety because many accidents are caused by insecure actions, which result in combinations of human behavio
ur.

The purpose of this research was to look into workers' perceptions of safety practises in their regular workplace and on a construction site. The workers had received very little education and had a limited culture of safety awareness, which led them to believe that their lack of precaution was the leading cause of accidents.

Construction Occupational Health Risk Assessment Survey

Many building construction activities are risky to the health and
safety of workers. It affects the productivity and overall performance of the construction project and diminishes the workforce, labor force, etc. The study aims to identify the factors affecting occupational health risks during construction and the different diseases associated with construction occupations. Construction of any facility or building involves several vast activities such as Excavation, Foundation, RCC work, Masonry work, Plastering of our windows, Plumbing, Installation door Painting, and Electrification. Many other miscellaneous work activities are different. Workers can be exposed to various risks at the workplace, like chronic exposure to harmful substances, accidents, physical stress, natural disasters, or any malicious act.

Accidents Severity; Global Occupational Safety and Health Practice

This literature review focuses on research undertaken from the 1980s onwards. The study aims to identify workplace safety and health management gaps and propose future research areas. The review adds value to the existing electronic database by integrating research results. A systematic literature review approach was used to identify existing gaps. The studies undertook the studies through keywords and safety-related topics.According to the literature, various characteristics of workplace safety and health problems stem from a lack of operational activities by employees, an internal working environment, and an external environment that impose hazards on employees temporarily, permanently, and on working environments. Many studies have questioned the integration of multidisciplinary approaches and collaborative models of a hub and peripheral industries to protect workplace safety hazards and develop a multilevel model

.

Construction Workers' Perceptions of Risk in Construction Safety

(January 2010 to April 2019).

These are empirical studies of construction workers' risk perception over time.

B. MAJOR FINDINGS FROM THE LITERATURE

Following are the various significant findings of the reviews as follows:

1. There is a lack of understanding about how to use pieces of equipment on-site and also lack of management.
2. Owners of large projects should more actively participate in construction safety management in each stage of project execution, including project design contract selection, contract development, the construction phase, selecting safe contractors, and developing the safety culture on the projects through safety training and safety recognition programs.
3. Employee perceptions, safety behaviors, and environmental or situational features can be accessed through safety climate surveys, peer observations, and systems audits/inspections.
4. The construction site should have excellent and structured safety practices, namely safety policy, education and training, site safety inspection, safety auditing, safety meeting, site safety organization, personal protective equipment, emergency support and safety measuring devices, fall protective systems, and safety promotions.

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5. Warning signs, guides, or reflectors should be displaced where necessary on-site.
6. Construction companies should look to improve their policy or construction design to cope with environmental factors.
7. Behavior-based safety management should be proposed to rectify human ware failures.
8. Project management personnel should contribute to safety climate development by improving their Conceptual skills as long as they include safety as one of the crucial aspects when performing their roles.
9. Continuous safety development should include six steps. These steps involve creating safety regulations, identifying the hazard, assessing and evaluating risk, deciding precautions, recording findings, and updating results concerning the work condition.

C. SIGNIFICANCE OF STUDY.

Following are the various significant findings of the reviews as follows:

1. There needs to be more knowledge about how to use the equipment on-site and a need for more management.
2. Owners of large projects should more actively participate in construction safety management in each stage of project execution, including project design contract selection, contract development, the construction phase, selecting safe contractors, and developing the safety culture on the projects through safety training and safety recognition programs.
3. Employee perceptions, safety behaviors, and environmental or situational features can be accessed through safety climate surveys, peer observations, and systems audits/inspections.
4. The construction site should have excellent and structured safety practices, namely safety policy, education and training, site safety inspection, safety auditing, safety meeting, site safety organization, personal protective equipment, emergency support and measuring devices, fall protective systems, and safety promotions.
5. Warning signs, guides, or reflectors should be displaced where necessary on-site.
6. Construction companies should look to improve their policy or construction design to cope with environmental factors.
7. Behavior-based safety management should be proposed to rectify human ware failures.
8. Project management personnel should contribute to safety climate development by improving their conceptual skill as long as they include safety as one of the crucial aspects when performing their roles.
9. Continuous safety development should include six steps. These steps involve creating safety regulations, identifying hazards, assessing and evaluating risks, deciding precautions, recording findings, and updating results about the work condition.

IV. RESULT AND DISCUSSION.

A total of 50 respondents were subjected to the questionnaire survey. To validate the questionnaires, they came from various companies for safety implementations in the City of Nashik, Maharashtra.

A. Survey Results

All the construction sites surveyed by the researchers are registered, and many implement safety hazards at the site. As noted, the company employers of the surveyed participants vary within their class.

Table 1- The Level of Awareness or Perception regarding the Presence of Hazard and Risk of Workers on Site.

This first part is made up of 13 questions. The responses on the questionnaire may be (1) MA – Very Much Aware; (2) A – Aware; (3) SA – Slightly Aware; and (4) NA – Not Aware.

Questions	Tally of Responses			
	MA	A	SA	NA
1. Workers recognized all the hazards in the construction site.	22	24	3	1
2. Working on a construction site can impair your health in the long run.	20	25	5	0
3. Considering the nature of the workplace, workers' safety is important.	41	5	4	0
4. The employees know who will be responsible for the health and safety in the construction site.	6	37	7	0
5. Safety incentive program can cause a worker to work safely.	26	20	4	0
6. Hazards present in the workplace are sometimes ignored by the workers to get the job done.	32	12	4	2
7. Workers' safety is the priority of the company.	22	20	8	0
8. There is safety material as displayed on the construction site.	12	27	11	0
9. There is a clinic on-site to provide first aid in the event of an accident.	14	25	11	0
10. Workers are aware of the emergency procedure during a fire or earthquake.	12	23	15	0

Table 2- The Level of Awareness or Perception regarding the Presence of Safety Procedure on Site.

This part is made of 6 questions. The responses on these may be (1) E – Excellent; (2) G – Good; (3) A – Average; (4) P – Poor; and (5) V – Very Poor.

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Questions	Tally of Responses				
	E	G	A	P	V
1 Knowingsafety issues.	4	10	31	3	2
2 Safety equipment helps to avoid or prevent accidents.	17	19	8	3	3
3 Workers undergo safety seminars and training.	0	13	24	10	3
4 The company has enough safety equipmentfor workers.	13	11	15	6	5
5 The company actively encourages employees to work safely.	1	15	27	4	3
6 The company has establishedgoals for safety performance.	4	16	23	5	2

Table 3- The Level of Awareness or Perception regarding the Implementation of Safety Procedures on Site.

This last part has 16 questions. The responses on the questionnaire may be: (1) A – Always; (2) S – Sometimes; and
(3) N – Never.

Questions	Tally of Responses		
	A	S	N
1. Wearing of PPE in the construction site.	24	23	3
2. Construction workers know how to use protective equipment.	24	23	3
3. Workers agree that all accidents can be prevented.	22	24	4
4. Safety work policies and procedures are effectively communicated to workers.	7	37	6
5. Company has procedures for reporting and investigating accidents, dangerous occurrences, and diseases.	6	38	6
6. All construction workers are using the safety equipment that they have been provided.	11	34	5
7. Construction workers report to their supervisor lately about safety issues on this job site.	4	30	16
8. The company and workers collaborate on how to manage health and safety	9	33	8
9. Workers have undergone the mandatory 8hour (occupational safety and health) OSH in construction site	8	26	16
10. Personal protective equipment is regularly inspected for workers' safety	3	26	21
11. Everyone is wearing PPE while on-site	3	22	25
12. Workers are trained in handling materials	3	36	11
13. Damaged tools are removed from the site	4	20	26
14. The workers caution other workers about unsafe practices	6	27	17
15. Compliance with safety policies and procedures slow down the operation	4	36	10
16. Construction types of machinery and equipment is inspected regularly	3	21	26

Table 4- The Level of Perception regarding Performance of Workers on Site: This first part contains ten questions.

The responses on the questionnaire may be (1) SA – Strongly Agree; (2) A – Agree; (3) D – Disagree; and (4) SD – Strongly Disagree.

Questions	Tally of Responses			
	SA	A	D	SD
1. Works faster and effectively when not wearing safety gear.	9	25	12	2
2. Works faster when not having a safety procedure to follow.	4	23	16	7
3. Not wearing PPE on construction sites makes the job easier but riskier	8	30	9	3
4. Jobs get faster when everyone knows how to use PPE.	32	14	9	0
5. Weather PPE affects individual performance.	29	14	4	3
6. History of accidents in a workplace makes a worker hesitate.	18	21	6	5
7. Working in the high-end part of a high-rise building makes a worker hesitate.	7	28	6	9
8. Awareness of emergency the procedure makes a worker perform at his full potential.	15	27	6	2
9. Fall arresters make you work effectively while	19	22	9	0

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V. CONCLUSIONS

Following are the Results from Table-1,2,3,4 respectively:

I. As the no. of workers is more in the aware section, we can say that workers are aware of the Presence of Hazards and Risk of Workers on Site.

II. As the no. of workers are more in the Average section, workers are averagely aware of the Presence of Safety Procedure on Site.

III. As the no. of workers are more in the Sometimes section, the workers don't tend to implement safety procedure every time while working on site.

IV. As the no. of workers is more in the Agreed section, the workers feel safer performing with the safety gears on.

From here, workers respond powerful when they know that the safety protocols and procedures are properly implemented on-site. It is not enough that they know that there is a safety measure. Safety must be strictly executed to ensure their safety.

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