

## EVALUATION OF WORKFORCE SAFETY CULTURE IN CONSTRUCTION PROJECTS

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### Abstract

**Purpose** - This paper aims to determine the factors affecting in carrying out safety management in construction projects.

**Methodology** - A different case studies are used to assess safety attitudes and perceptions.

**Findings** - Safety attitudes and views of participants, Safety-related incidents

**Significance** - It is important for every organization to formulate and apply safety policies to safeguard its employees from unsafe construction methods. A specific procedure will be established depending on the company's size, total employees, and attitude of the company's management

**Results** - Study findings showed that safety issues exist in the construction sector, such as lack of knowledge, failure to wear personal protective equipment (PPE) and violations of safety regulations.

**Keywords** - *Accidents, Construction Industry, Employee safety & health, Safety Management.*

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### 1. Introduction

#### 1.1 General:

In India, the construction industry ranks second after agriculture and it has the highest accident rate in terms of any other industry. Safety and Health in the construction sector is a major problem here. Large and small contractors differ significantly in numerous developing countries like India. Even so, many large companies maintain a safety policies, most workers are unaware of them. Still, some large construction firms have built various safety procedures.

### 2. Background of the Study

Employee involvement in developing a safety program may contribute to site safety. Employees know the hazards on a field better than their employers and can make suggestions to reduce accidents. Additionally, by participating in the safety orientation, planning processes and training employees recognize that they are implementing their own safety program. In addition, people who maintain good safety records can be recognized. The safety and site engineers should be well advised to deal with the accidents when it occurs and carry necessity procedures to counteract the injuries. Besides the horrific human losses resulting from accidents, these statistics have also had a substantial economic impact. Furthermore, work disruptions can be caused by accidents and reduces work performance during investigations conducted by the safety department of the companies,

insurers, safety and health officers. Furthermore, contractors face an increase in insurance rates and a decrease in reputation due to a decreased level of confidence.

Additionally, designers can play an important role in reducing accidents and thereby enhancing worker safety. Worker safety should be integrated into the design process and, ideally, should be continuously updated throughout construction. The poor safety performance of the construction industry requires sufficient attention from all stakeholders to address the enormous problems of construction accidents and enhance safety performance. It also identifies factors that impact the safety of the construction industry in India. These factors have been identified as the leading cause of accidents in the construction industry.

### **3. Basic Terminology**

#### *3.1 Accidents:*

Accidents are unforeseeable, unwanted events that may or may not cause injury or property damage. The inability to complete an assigned task due to damage. Unplanned event but capable of resulting in injury, illness, or damages called "Near misses". The causes of accidents can be categorized into two groups: **unsafe acts and unsafe conditions**.

#### *3.2 Unsafe conditions:*

These are hazardous conditions or circumstances that could lead directly to an accident.

#### *3.3 Unsafe Act:*

An unsafe act occurs when a worker ignores or is not aware of a standard operating procedure or safe work practice designed to protect the worker and prevent accidents.

#### *3.4 Safety Management:*

On construction sites, safety is often neglected, even though it is a critical requirement. It has long been known that construction workers suffer more fatal injuries and nonfatal injuries than other workers. In order to prevent accidents at the site, the appropriate safety measures should be taken to prevent loss of life, suffering and damage from preventable accidents.

#### *3.5 Employee safety & health:*

In the field of occupational health and safety, standards are developed to ensure that jobsite hazards are eliminated, mitigated, or replaced. Workplace incidents can also be minimized with OHS programs. The Occupational Health & Safety program covers more than first aid and safe use of heavy machinery, it also covers infection prevention and ergonomic best practices as well as addressing workplace violence.

#### *3.6 Hazards:*

An occupational hazard is a source or situation that poses a risk of harm to people, property, the environment, or any combination of these. Workplace hazards can include machinery that makes noise, a moving forklift, chemicals, electricity, working at heights, repetitive jobs, or abusive behaviour.

### *3.7 Causalities in Construction Activities:*

By examining how various entities that play a major role on construction sites can influence the root causes of accidents, this study seeks to resolve the problem of an unsatisfactory understanding of site safety roles. Construction accidents are likely to result from a combination of the following causes.

- Not following safety instructions to maintain equipment.
- Disregards common sense and makes a person irrational in such situations.
- Tendency to act before thinking can result in people taking hazardous shortcuts
- Inattentiveness, daydreaming
- Emotional instability
- High anxiety level
- Unnecessary exposure to risks
- Carelessness and recklessness
- Fatigue
- Inadequately trained or untrained workers
- Working at unsafe speeds
- Overconfidence or false confidence

## **4. Methodology**

Using a literature review on an international basis, similar research projects have been reviewed. A significant number of papers meeting the review criteria were found when searching Scopus, Science Direct, and Google Scholar databases using the keywords "workplace safety" and "construction accidents due to lack of safety". Selection of the studies was based on the following criteria:

- (a) The study was empirical and focused on variables associated with safety,
- (b) the data included construction workers, unsafe behaviour and accidents at work,
- (c) was published between 2002 and 2021,
- (d) was available online,
- (e) was published in a refereed journal, and
- (f) was written in English.

## **5. Review of Literature**

### *5.1 Introduction:*

A construction injury directly affects the individuals involved as well as the work itself. These impacts include the personal suffering of the injured worker, construction delays and productivity losses, increased insurance rates as a result of injuries, and the possibility of liability lawsuits for all parties involved in the project. Indirect effects include revenue losses for the owner due to late delivery of projects and a reduction of work force morale. Accidents and deaths on construction sites

typically are caused by falls, object strikes, being trapped in or between objects, electrocutions, and a variety of other factors including toxic gases, drowning, and fires. As a rule, most companies follow OSHA-compliant safety guidelines and policies. But most accidents and injuries on construction sites result from not following safety protocols.

Three conditions are necessary for a successful safety program:

- The ability to lead and manage.
- Ensure safe working environment.
- Work habits that promote safety should be practiced by every employee.

**Hashem.M. Al-Tabtabai (2002)** had analysed that most of the construction accidents and serious injury in Kuwait are occurs due to lack of safety measures, not using PPE, lack of judgement, where the most relevant were the lack of analysis and work processes, planned work observations and worker training; Finally, they conclude that occupational accidents are mostly the result of a lack of controls, followed by unsafe acts.

**Raufdeen Rameezdeen, Chaminda Pathirage, Saman Weerasooriya (2003)** The author had analysed the data of a construction accident that occurred in Spain between 2003 and 2008 and found that the accident rate is unrelated to age. Generally, depending on age, the likely consequences of an accident can vary, with the least severe being experienced by those between 20 and 24 years of age and also, he concluded that a large company is not always necessary safer than a small company in the aspect of fatal accidents. A worker who is older is more likely to suffer from an accident. There is a need to establish fitness for work programs for older workers and special training plans.

**Ivan W.H. Fung, Vivian W.Y. Tam, Tommy Y. Lo, Lori L.H. Lu (2009)** has used a case study to prove the reliability and workability of the developed Risk Assessment Model for examining the current safety problems in the construction, investigating the various types of risk occurred on different work environments. In order to promote occupational injury prevention priorities for workers across different trades, a Risk Assessment Model has been developed as a prototype tool for the evaluation of risks.

**Antonio López Arquillos, Juan Carlos Rubio Romero, Alistair Gibb (2012)** conducted a study on likely causes of construction accidents in Spain, in order to identify suitable mitigating actions. He carried out literature review study for data collection. He found that a large company is not always necessarily safer than a small company in the aspect of fatal accidents, Workers with more experience don't have the best accident fatality rates, and accidents away from their usual workplaces have more severe consequences.

**Li Xiaoyong and Ma Wendi (2012)** examines the status of safety management in the industry to explore the risk-prone activities on construction sites, to identify the factors affecting construction site safety, to propose suggestions for improving safety performance. He collected the data using literature and questionnaires. As he reported, the behaviour of contractors in safety management is very concerning, including the failure to provide personal protective equipment, regular safety meetings, and safety training.

**P.S.Sathish Kumar, M.Logesh Kumar (2012)** carried out a survey on the safety and labour criterions that are essential for a safe worksite. they adopted a questionnaire survey which was distributed among the construction sites and formal interviews with the key personnel at sites. Safety is a management initiative, which was found completely lacking on all most all the sites surveyed. They found that the safety policy & programs are not effectively implemented at the site. Construction sites generally ignore all aspects of safety. One of the main problems is that the most important measures aren't taken, including safety policies, worker awareness, and fall hazards.

**Kunal Patel, Priya Patel (2013)** describes how to identify the causes of accidents, how to prevent them and how to control and monitor the safety issues for workers at height. They used quantitative analysis for data collection and reported unprofessional practice and unqualified subcontractor & workers should be reframed from engaging high risks. The prevention of fatal accident can be achieved by getting the support from the Government, the main contractor, reputable developers & the interest parties.

**Ching-Wu Cheng, Tsung-Chih Wu (2013)** Based on data from occupational accidents involving foreign workers, they investigate the causes of accidents involving foreign workers, including employer shortcomings and worker unsafe acts. In order to collect data, descriptive statistics, correlation analysis, and analysis of variance (ANOVA) were used. Education and training, provision of personal protective equipment, translation of teaching materials and promotional materials into foreign workers native languages would all require employers to be more responsible in their safety during working operations.

**S. R. Meena, S. N. Pawar, P. M. Nemade, A. S. Baghele (2013)** This task involves evaluating the state of safety and health management in various construction activities, studying the health and safety of workers and reviewing the performance and safety awareness programs within the organization of the workers. Literature Survey was used for data collection. In order to observe the organization's performance with respect to safety, the safety management should be implemented. Additionally, the implementation of safety awareness programs, training and education, as well as management commitment to safety, will provide the operator with a safe working environment.

**Heap Yih Chong & Thuan Siang Low (2015)** aimed at identifying the causes and agents of accidents in Malaysia's construction industry. Their research adopted two research approaches like quantitative and qualitative analysis. According to SOCSO, between 2000 and 2009, 656555 accidents occurred in Malaysian industries (6.5% of all accidents) and 42775 were construction accidents. They reported the main causes of construction accidents are mainly striking against or being struck by objects, and falls and involve critical injuries and death issues.

**K.Mohammed Imthathullah Khan, K. Suguna and P. N. Raghunath (2015)** investigates about Mexican construction workers think about their safety practices on the job site. They collected the data by Questionnaire survey method and reports lack of knowledge about the necessary of earth connection for power tools and lack of knowledge about cables protect from mechanical damages is the main cause of accidents in workplace. Additionally, conducting safety audits and providing safety awareness at construction sites are found to have a significant influence on the aspect of safety at construction sites.

**Orji Solomon E, Enebe Eucharica C, Onoh Felix E (2016)** had found the factors that causes accidents and the types of accidents that is been encountered in building construction sites and the frequency of their occurrence. They had reviewed the consequences and causes of construction accidents through literatures and field survey to obtain data from respondents. And finally, they found that the labourers are the major class of workers that are responsible for construction accidents, fails to use personal protective equipment is the major factor that causes accident on sites and injuries.

**A.González, J.Bonilla, M.Quintero, C.Reye, A.Chavarro (2016)** they had analyzed the causes and consequences of occupational accidents occurred in Colombia. A quantitative survey was used to gather data for their study. After analysing the data, they concluded that occupational accidents are most commonly caused by a lack of safety controls and inattention to work safety.

**Ashish Kumar Dash, R. M. Bhattacharjee, Aftab Ahmad (2016)** analysed accident data and case studies to identify gaps. Using a real-life case study accident (Fatal accident due to fall of person from height) the authors examined the nature of the causes identified leading to the accident. Mine accidents in India are mainly investigated due to human error or non-compliance with

statutory rules. Reports show that in most cases, only the direct causes have been identified for fixing responsibilities and recommending solutions to prevent repeats.

**Ms. Lincy Joykutty (2017)** examines the strategic issues pertaining to employee safety and health in various manufacturing organizations. Questionnaire survey, Journals & Reference books was used for data collection. The public and private sectors within the manufacturing industry are collaborating in the area of safety and health on workforce. Sharing best practices, asking questions, and learning from each other can help improve safety and prevent loss of life.

**Sotiris Betsis, Maria Kalogirou, Georgios Aretoulis and Maria Pertzinidou (2019)**

They seek to identify possible trends and tendencies among the accidents sample. Descriptive analysis and corresponding codification of available data is used for their research. He showed the workers over the age of 54 tend to be fatally injured unlike younger ones. They also noted that workers younger than 24 have more accidents due to overworking and walking or bumping into dangerous objects, and workers aged 45 to 54 have more accidents caused by compression in or between objects.

**Kavya.K, T.Pradeep (2019)** tends to locate the fundamental driver of accidents, places with the big event, perilous sorts of work by factual examination. They adopted case study to retrieve the relevant journal papers. After the detailed investigation they observed safety personnel should be appointed in the sites to supervise the workers and the workers must be aware of the hazards and safety programs to prevent construction accidents.

**Shelly Stiles, David Golightly, Brendan Ryan (2020)** commentary on safe construction during and beyond COVID'19 covering the human factors challenges and practicalities of implementing COVID'19 measures. Descriptive analysis and research were carried out to find out the impacts. The benefits and opportunities that will arise from dealing with COVID'19 risks. Signifies that organizations have found that they can adapt rapidly, improve hygiene, redesign tasks, and adopt new technology. Suggests lessons for safety professionals to draw upon for the ongoing challenge of COVID'19.

**Seungho Jung, Jongkwon Woo, Chankyu Kang (2020)** proposes the ways to prevent similar accidents from occurring by analysing the main causes of these accidents. They adopt case study for their data collection and through the collected data they identified most of the chemical accidents were caused by human error, highlighting the need to confirm safety work permits and safety protocols, major accidents occurred during normal operations and maintenance processes. Although, there were fewer technical errors than human errors.

**Sanghyun Kim, Jungmo Lee, Chankyu Kang (2021)** examined non-routine work-related fatalities in the South Korean manufacturing sector between 2014 and 2018. The data collected for their analysis by means of questionnaire type survey. They found that the occurrence of accidental deaths in the manufacturing industry over the past five years has been found to be increasing of all fatalities in machinery/instrument manufacturing and metal processing industries due to many dangerous machinery and equipment.

## 6. Conclusion

The workplace in construction is typically more hazardous than other industries because of the use of heavy equipment, hazardous tools and materials, non-usage of PPE which increase every risk of accidents and serious injuries. All persons involved in construction have a responsibility to protect health and safety and improve working conditions from construction accidents as well as prevent them from happening in the first place. As a result of this study, safety management plays a crucial role in making construction sites safer through safety awareness, training, and safety audits.



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