



ANALYSIS OF SAFETY MANAGEMENT IN CONSTRUCTION BY USING SPSS V26

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Abstract—The building industry is essential for the social and economic growth of all nations. Multiple studies have verified the significance and function of the construction sector in a nation's economy. In profit-oriented businesses, it is typical for construction stakeholders, such as owners, contractors, sub- contractors, or suppliers, to solely prioritize completing projects to satisfy quality standards, with a greater emphasis on finishing them within the designated timeframe and budget. Safety is commonly regarded as a subordinate concern. The absence of drive in promoting a culture of safety has led to a subpar safety track record, especially within the construction sector.

INTRODUCTION:

Davies and Tomsin (1996) state that there are several factors that contribute to the inferiority of accident records in the construction industry compared to those in the manufacturing business. In the manufacturing industry, there is typically a stable and regulated working environment, where the work method and equipment remain unchanged over extended periods of time. Furthermore, the labour force tends to remain steady. The workers in the plant will possess extensive information of the potential dangers present in their work environment and the necessary precautions to be taken in order to minimize these hazards. Nevertheless, the situation in the construction industry is distinct due to the dynamic nature of the working environment and the migratory nature of the labour force.

The construction industry poses health and safety risks due to its fragmented structure, the uncertain and technically complex nature of construction work, the uncontrollable production environment, employment practices, and the financial and time pressures faced by project participants.

The construction industry comprises various entities that have both direct and indirect impacts on the construction process. The construction industry encompasses a wide range of organizations, such as property developers, architects, engineers, quantity surveyors, accountants, lawyers, management contractors, engineering contractors, civil engineering contractors, labourers, sub-contractors, and specialty tradespeople. Similar intricacy can be observed at construction sites. Workplace construction procedures encompass activities such as working at elevated levels, physical labour, contact with dangerous substances, demolition, assembly of structures, lifting operations, scaffolding, and ground preparation. These processes also require

managing diverse workforce and frequent relocation of worksites.

Rowlinson and Lingard (1996) have identified several key reasons that contribute to the poor safety records in the construction sector. These characteristics include the prototype nature of building projects, the temporary nature of labour, the low educational attainment of the workers, and the high reliance on subcontracting. The global standardization of building accident data is lacking, and many countries do not report statistics on accidents. Developing countries lack accurate information regarding accidents due to inconsistent or insufficient recording and reporting practices. Accident reports in numerous countries are released on a yearly basis; however, the data lacks standardization. Global accident estimates facilitate the comparison of various regions and countries, hence enhancing safety measures. A global assessment was done in 1998 across 175 countries. The average number of non-fatal accidents was 264 million, whereas there were 350,000 fatal occupational accidents, encompassing both the industrial and construction sectors.

The disparity in accident rates between industrialized and poor countries is striking. Developing countries have a zero accident strategy in order to ensure the safety of their infrastructure construction projects. The process of industrialization in developing countries introduces novel circumstances to the construction sector. The building industry in poor nations lacks the ability to recognize potential dangers. The International Labour Organization (ILO) gathers and disseminates worldwide accident rates, which are derived from notification systems and country recording. Furthermore, it provides an estimation of non-fatal accidents occurring within the construction business, in addition to the fatal ones.

To minimize accidents and mitigate harm to workers



and equipment, governments worldwide are dedicated to creating a safe and healthy work environment. The dedication is demonstrated via the implementation of workplace and health and safety laws that are based on performance. These laws create broad objectives and assign explicit responsibilities to promote self-regulation within the construction industry (Mohamed 1999).

Certain countries rely entirely on government oversight to regulate workplace safety. The regulation of safety in construction in the United States of America (USA) is overseen by governmental agencies, including the Occupational Safety and Health Administration (OSHA). OSHA enforces stringent rules and regulations to ensure compliance with safety and health standards at construction sites (Jannadi and Assaf 1998). In Kuwait, the regulation of safety is overseen by two government bodies, namely Kuwait Municipality (KM) and the Ministry of Public Work (MPW), along with the High Committee for Safety and Security at the state level (Kartam and Bouz 1996). The Ministry of Construction in China has the primary responsibility for supervising the construction industry. This includes implementing new strategies and policies, such as developing programs for growth, regulating construction markets and institutions, and monitoring construction safety (Tam et al 2004).

The United Kingdom, Singapore, and Hong Kong have implemented a self-regulatory strategy for safety, in which owners (including contractors) are obligated to establish, execute, and sustain a safety management system (Ng et al 2005). In Singapore, the legislation regarding safety at construction sites is regulated by the requirements outlined in the Factories Act (Chapter 104). The Factories (Building Operations and Work of Engineering Construction) regulation mandates that all individuals responsible for construction worksites with contract values of S\$10 million or higher must adhere to a safety management system specified in the 1999 code of practice for safety management system for construction worksites (Teo et al 2005). The employer bears the duty for workplace safety in Finland, with the enforcement of occupational safety and health legislation falling under the purview of the state's Labour Inspection Service, as stated by Yranheikki and Savolainen in 2000.

The Building and other Construction Workers (Regulations of Employment and Condition of Service) Act was implemented in India on March 1, 1996. According to this legislation, it was anticipated

that the State and Central Governments would be required to announce regulations. The central government also issued central regulations in November 1998. Only a few of states have established regulations, while the remaining states have yet to develop their own set of guidelines. Consequently, the announcement and enforcement of rules in India are still deficient. However, when it comes to the accident rate, there is a scarcity of reliable statistics in comparison to other countries. Between 2004 and 2008, the central sector in India reported a total of 79 death accidents and 45 catastrophic incidents, according to Indiatat 2010. Thus far, no organization has been designated to gather such documents, and no voluntary initiatives have been undertaken in this matter. According to a survey undertaken by the International Labour Organisation (ILO), there are 165 injuries per 1,000 workers during construction activities (Construction Industry Development Council (CIDC) 2003). The high incidence of injuries is mostly attributed to the insufficient or non-existent presence of a safety management system. This research thoroughly examines the aspects that impact safety in construction sites and suggests potential solutions for an effective safety management in construction industry.

The construction industry continues to grow as the demand for infrastructure, homes, and office spaces grows by the day. Since the construction industry is so dynamic, it is vulnerable to a range of health risks. As a result, protection is a top priority in the construction sector to ensure a healthy working environment. Safety experts have determined that risky behaviours cause the majority of workplace injuries, and that controlling these behaviours is one of the keys to effective accident prevention and a low accident rate on construction sites. Identifying the critical success factors that influence the implementation of safety management in construction projects is the primary aim of this research. In order to assess the safety management system experience of contractors and clients from a variety of construction projects, a questionnaire survey is utilized to conduct this research.

Safety in construction industry is much more important. This project is about to increase safety in the building industry performance. The study is primarily to define the critical success factors that affect the implementation of construction safety management. This analysis is to recognize and solve major problems in the building sector with various solutions related to work situations that affect project safety performance. Statistical



analysis will be performed by using IBM SPSS v26. tool package.

PROBLEM IDENTIFICATION

The construction industry is widely regarded as one of the most perilous sectors compared to others. Undoubtedly, safety is a significant concern in the construction industry. The construction industry is a significant component of a country's economy, particularly in terms of its capacity for generating jobs. However, accidents, incidents, injuries, and fatalities persist without any reduction on construction sites worldwide, maintaining a consistently high frequency (Hinze 1997). The construction industry's inadequate safety record has consistently been emphasized. The safety management system in the construction industry has been neglected and not pursued systematically. The main cause of the high injury rates is essentially the absence or insufficiency of safety management systems. It is imperative to establish comprehensive safety management systems for building sites and enforce safety standards to prevent accidents.

To minimize the occurrence of accidents or incidents and hence reduce losses, it is crucial to guarantee strict adherence to safe working practices. The sole method to ascertain the presence of safety is through measurement, as the adage goes, "if you do not keep score, you are merely engaging in practice." Measurement is essential for identifying the components that contribute to the possibility for accidents and determining the need for control. The prevailing reactive strategy commonly employed in the majority of construction organizations fails to provide insight into the level of site safety or the prevailing safety culture. Solely depending on post-accident data will not provide adequate knowledge to enhance the degree of safety. Some authors dealt with climatic approach and behavioural approach to determine the level of safety in organizations, which will not give true safety level at the site. It is imperative to build proactive safety performance measurement tools to assess the level of safety applied at a site. The current study examines the limitations of existing tools for measuring safety performance and proposes a framework for a new tool. Overall, safety management is widely regarded as the paramount principle on construction sites for mitigating the occurrence of accidents, injuries, and fatalities. The Indian construction sector must identify the factors that

impact safety at building sites due to a dearth of research in these domains. This research has included significant elements to assess the level of safety upheld at construction sites in India. This research also examines the attitudes and perceptions of workers towards the safety management measures currently in place at the site. In recent years, safety management has become increasingly significant in the construction industry. This study examines the optimal implementation of safety management practices to prevent accidents on construction sites. This study is undertaken

with regard to the Indian construction industry.

RESEARCH OBJECTIVES

- To analyze the major factors that affect safety with respect to construction industry in India.
- To create an innovative framework for the administration of safety systems in the construction industry.
- To create a novel framework for evaluating safety performance, including both positive and negative performance indicators.
- To create a novel electrical safety audit approach that is care- fully conceived, strategically planned, and effectively executed.
- To investigate the causes of accidents in building sites.
- To investigate the strategies employed by Indian enterprises to ensure workplace safety.
- To investigate the optimal implementation of safety management methods in the construction industry.

SUMMARY FROM LITERATURE

- The current study project focuses on safety inspections, which are regarded as one of a safety manager's primary responsibilities.
- To avoid accidents, construction site safety must be thoroughly examined. UAVs (Unmanned Aerial Vehicle) can detect important threats and immediately implement accident prevention actions.
- A substantial advantage of using drones on job sites comes both before and during construction.
- Planners and designers can help to prevent accidents and make building sites safer for workers.
- The essence of safety inspections is direct monitoring on a construction site, such as excavation trenches, specific locations, employees, floors, and so on.

Figure illustrates the methodological approach undertaken in the present investigation.

METHODOLOGY

Implementing an effective safety management system in a construction site is crucial to ensure the well-being of workers and the prevention of accidents. The methodology for safety management in a construction site typically involves several key steps: Safety management in construction sites is a critical aspect of ensuring the well-being of workers and the successful completion of projects. The methodology for effective safety management involves a combination of proactive planning, continuous monitoring, and a commitment to creating a culture of safety.

Firstly, a comprehensive risk assessment must be conducted before any construction work begins. This involves identifying potential hazards, evaluating their severity and likelihood, and implementing measures to mitigate or eliminate risks. This initial step lays the foundation for a targeted safety plan tailored to the specific conditions of the construction site.

The second step involves establishing clear safety policies and procedures. These documents should outline the responsibilities of all personnel, from workers to managers, in adhering to safety protocols. Training programs should be implemented to ensure that everyone understands and follows the established safety procedures. Regular safety meetings and toolbox talks can reinforce key safety messages and provide a forum for addressing concerns and sharing best practices.

A third key component is the provision of personal protective equipment (PPE). All workers should be equipped with the necessary gear, such as helmets, gloves, safety glasses, and harnesses, depending on the nature of the work. Regular inspections should be conducted to ensure that PPE is in good condition, and replacements should be provided as needed.

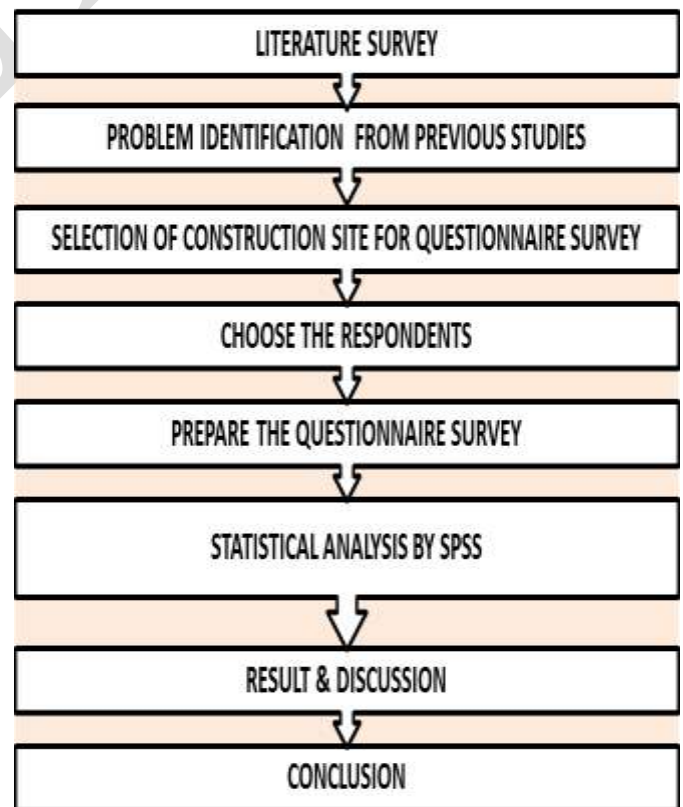
Continuous monitoring and supervision play a crucial role in safety management. Site supervisors and safety officers should conduct regular inspections to identify potential hazards and ensure that safety measures are being followed. Reporting systems should be in place to encourage workers to report unsafe conditions or behaviours promptly. Incident investigations should be conducted whenever there is an accident or near-miss to identify the root causes and implement corrective actions.

Additionally, incorporating technology, such as sensors,

cameras, and other monitoring devices, can enhance safety management by providing real-time data on site conditions and potential risks. Emerging technologies like Building Information Modelling (BIM) can be utilized for virtual simulations to identify and address safety concerns before construction begins.

Finally, fostering a safety culture is essential for long-term success. This involves creating an environment where safety is prioritized and embraced by all levels of the organization. Recognizing and rewarding safe behaviour, as well as addressing safety concerns promptly, contribute to building a culture that values the well-being of workers and emphasizes the importance of safety in all construction activities.

An effective safety management methodology in construction sites involves comprehensive risk assessment, clear policies and procedures, proper training, provision of PPE, continuous monitoring, and the establishment of a strong safety culture. By integrating these elements, construction projects can minimize risks, protect the well-being of workers, and ultimately achieve successful outcomes. Figure 3.1 illustrates the methodological approach undertaken in the present investigation.





CONCLUSION

Safety management is a critical aspect of any organization for ensuring the following:

- Well-being of employees
- Protecting assets
- Maintaining operational integrity.

The subsequent critical factors that have been identified through an analysis of literature review are:

1. Risk Assessment and Hazard Identification
2. Safety Training and Education
3. Safety Policies and Procedures
4. Communication
5. Leadership Commitment
6. Regular Inspections and Audits
7. Use of Technology

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