



# UNSAFE BEHAVIOR ANALYSIS: A DEEP QUESTIONNAIRE SURVEY IN CONSTRUCTION SITES

Meharnisa M.B.  
Student  
Department of SECM  
SNIT, Adoor, Kerala, India

Geethu M.S  
Assistant Professor  
Department of CE  
SNIT, Adoor, Kerala, India

**Abstract**—The numerous mishaps and injuries that take place on building sites in Kerala, India, highlight the need for in-depth research to prevent similar incidents in the future. An exhaustive questionnaire survey is a method for obtaining information on accidents and injuries that provides comprehensive data to identify root causes and develop prevention strategies. With this approach, injured or accident-plagued employees are required to complete a lengthy questionnaire that asks questions about the incident's circumstances, timing, tools, directives, and safety procedures. A detailed questionnaire survey is an efficient and affordable technique to gather information that may be tailored to the unique needs of Kerala construction sites. A comprehensive questionnaire survey can be a useful tool for enhancing safety on building sites in Kerala, despite its drawbacks such as response rate and questionnaire design. The data collected can help identify areas for development and lower the frequency of accidents and injuries on construction sites.

**Keywords**—Accident injury analysis, Deep questionnaire survey, Construction sites Kerala.

## I. INTRODUCTION

The construction industry is known for its inherent risks and the potential for accidents and injuries. Each year, numerous workers suffer from various types of injuries, ranging from minor incidents to severe accidents that can be life-altering. Consequently, it is of utmost importance to arrange safety and undertake comprehensive accident injury analysis to prevent future occurrences and protect the well-being of construction workers.

A comprehensive survey offers itself as a useful method for obtaining essential data from construction sites in order to address this critical problem. Researchers and industry experts can investigate the underlying causes, contributing variables,

and potential preventative actions associated with accidents and injuries in construction environments by using a questionnaire-based approach.

The main goal of this paper is to underline the importance of conducting in-depth questionnaire surveys on building sites. It can better comprehend the difficulties encountered and pinpoint areas for improvement through analyzing accident data, evaluating safety measures, and monitoring employees' awareness of and compliance with safety standards. Ultimately, the aim is to develop effective strategies that enhance construction site safety, minimize the occurrence of accidents and injuries, and create a secure working environment for all personnel involved.

### A. Objectives—

a. To find out the top factor that contributes unsafe activity in construction sites

This study aims to identify the top factor that contributes to unsafe activities on construction sites through a questionnaire analysis. It will assess various aspects such as individual behaviour, work environment, organizational factors, training, and communication. Through data analysis and thematic examination, the factors will be ranked based on their frequency and perceived significance. The findings of this study will provide valuable insights into the primary factor driving unsafe activities on construction sites, enabling stakeholders to develop targeted interventions and preventive measures to enhance construction site safety.

b. To find out the factors affecting cognitive failure on construction sites.

For construction sites to be safer, it is essential to comprehend the causes of cognitive failure. The main goal of this study is to pinpoint the elements that construction workers' cognitive performance is influenced by and analyze the number of factors, including fatigue, stress, workload, distraction, and

lack of training, through a thorough examination. Determine the key causes of cognitive failure by acquiring information through surveys and interviews. The results will be helpful in establishing focused interventions and methods to reduce cognitive errors, boost worker efficiency, and increase overall site safety and productivity.

#### **B. Scope–**

This study is to perform a thorough questionnaire survey to collect information on a variety of topics, such as the use of personal protective equipment, compliance with safety procedures, hazard awareness, communication techniques, and risk perception. To find trends, under lying causes, and potential dangers, the data will be evaluated. To increase construction site safety, recommendations for targeted safety initiatives, training programmes, and policies will be based on the findings. The purpose of this study is to advance workplace safety in the construction industry by revealing important information about risky habits.

## II. LITERATURE REVIEW

**Krishnan and Nair (2020)** They used a deep questionnaire survey to gather information from workers who had experienced an accident on a construction site. Their results showed that the survey was an effective tool for gathering detailed information about the incidents and identifying the underlying causes. The study discovered that mishaps in Kerala's construction industry were mainly caused by a lack of safety perception, insufficient safety training, and a weak safety culture.

**Thomas et al., (2019)** investigated the effectiveness of safety management practices in construction sites in Kerala. They hired an elaborate survey to learn information from the workers and discovered that a lack of precautionary culture, poor communication, and inadequate safety training were the main causes of accidents on construction sites.

**Jayanth et al., (2021)** undertook a study to determine the underlying causes of accidents in Kerala's construction industry using a detailed questionnaire survey. Their findings demonstrated that the survey was a viable and trustworthy technique for data gathering and that it offered comprehensive information about the incident's circumstances. The study determined that inadequate safety training, a lack of monitoring, and a poor safety culture were the main causes of accidents on the building sites of Kerala

**Kumar and Nair (2018)** did a research on the causes of accidents in Kerala's construction sector and the efficacy of safety management techniques. To get information from workers who had an accident on a construction site, they employed a detailed questionnaire survey. According to the report, the main causes of accidents in Kerala's construction sector were poor safety culture, inadequate safety training, and a lack of monitoring. The findings also shown how efficient safety management techniques, such as consistent safety

inspections and safety training, may greatly lower the frequency of incidents on construction sites.

**Nair and Kumar (2019)** examined how safety leadership may help Kerala's construction industry avoid accidents. They gathered data from workers using a detailed questionnaire survey and discovered that safety leadership was critical in fostering a culture of safety on construction sites. The study found that encouraging safety leadership in Kerala's construction sector requires consistent safety communication, safety training, and safety inspections.

**Rajeev et al., (2020)** examined how well safety leadership practices reduced accidents on Kerala building sites. In order to learn more about the employees, they conducted a thorough questionnaire study. They discovered that safety leadership practices, such as safety communication, safety training, and safety inspections, were successful in lowering the frequency of accidents on construction sites.

**Shiju et al., (2021)** did a research of Kerala's building industry's occupational safety and health procedures. They performed a detailed questionnaire study to learn more about the employees and discovered that poor safety awareness and inadequate safety training were the main causes of accidents on construction sites. The study also emphasised the value of routine safety audits and inspections in fostering safety at building sites.

**Sivaraman et al., (2021)** studied how safety culture promoted safety on Kerala building sites. They utilised a detailed questionnaire survey to get information from the employees and discovered that encouraging a positive safety culture on construction sites was crucial. This culture should be marked by a strong dedication to safety and open communication. The study found that encouraging a healthy safety culture on construction sites requires good safety communication and training.

**Nair et al., (2020)** the efficiency of safety training initiatives in averting mishaps at Kerala construction sites was examined. Workers who have finished safety education sessions provided information for the study using a detailed questionnaire poll. The findings demonstrated that safety training initiatives were successful in raising public awareness of risks and lowering the frequency of incidents on construction sites.

## III. METHODOLOGY

### **A. Questionnaire preparation**

In order to look at the main reasons behind accidents and injuries on building sites in Kerala, India, this study employed a cross-sectional survey design. A self-administered questionnaire was distributed to construction workers, supervisors, and safety officers working on construction sites across multiple districts in Kerala.

Based on the topic of accident injury analysis in construction sites, a research design would involve selecting a sample of construction sites and collecting data through a questionnaire survey to analyze the incidence, causes, and outcomes of accidents and injuries on those sites.



A longitudinal approach might be used for the research, in which information is gathered from a sample of workers in construction, executives, or other relevant individuals at a single moment in time. As an alternative, a longitudinal research design might be employed to track a group of people across time and gather data at various intervals.

A case-control study design could also be used to compare a group of individuals who have experienced accidents or injuries with a control group of individuals who have not. This would help identify potential risk factors and determine the strength of association between those factors and the outcomes of interest.

## **B. Data Gathering**

A questionnaire that was self-administered that was created was used to gather data. The questionnaire consisted of three sections: demographic information, accident history, and deep questions related to the root causes of accidents and injuries. The deep questions were developed based on the four categories of factors identified in the accident causation model: organizational, environmental, behavioral, and technical. The questionnaires were distributed in person to the selected construction sites, and the participants were given a period of two weeks to complete and return the questionnaire.

### *a.* Quantitative analysis

Quantitative data is numerical data that can be measured or counted. In the context of a study on accident injury analysis in construction sites, quantitative data could include data obtained from the questionnaire survey, such as the number of accidents and injuries that occurred in a given period of time, the severity of the injuries, the types of accidents that occurred, and the safety measures that were in place to prevent accidents and injuries.

Demographic information about the participants, such as their age, gender, education level, and number of years of experience in the field of construction, could also be included in quantitative data. This type of data is typically analyzed using statistical methods to identify patterns and relationships among the variables of interest. To find out if there is a substantial correlation between the kind of safety measure in place and the quantity or seriousness of accidents and injuries, for instance, statistical analysis could be performed.

Quantitative data can be presented in tables, charts, and graphs to help readers better understand the patterns and relationships among the variables. The results of the quantitative analysis would be interpreted and discussed in the results section of the study, and could be used to make recommendations for improving safety and reducing accidents and injuries in construction sites.

### *b.* Qualitative findings

Qualitative findings are non-numerical information that cannot be easily measured or counted. In the context of a study on accident injury analysis in construction sites, qualitative data

could include open-ended responses to the questionnaire survey or data obtained through interviews, focus groups, or site observations.

Qualitative data could include comments from participants about the safety culture on construction sites, their perceptions of the causes of accidents and injuries, and their suggestions for improving safety. Qualitative data could also include observations of safety practices on construction sites, such as the use of personal protective equipment, the adherence to safety protocols, and the effectiveness of safety training programs.

In order to find recurring themes, categories, and patterns in the data, it is often assessed using techniques including content analysis, thematic analysis, and discourse analysis.

## **C. Data Analysis**

Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were used to analyze the data. The deep questions related to the root causes of accidents and injuries were analyzed using content analysis. The responses were categorized based on the four categories of factors identified in the accident causation model.

## **IV. DRAWBACKS**

The fact that this study was restricted to construction sites in Kerala and might not be indicative of other places in India is one of its limitations. The study also used self-reported data, which is vulnerable to response bias. The study's cross-sectional design also prevented it from establishing a causal link between the factors that were discovered and accidents or injuries.

## **V. RESULTS**

The results section of a study on accident injury analysis based on the data collected through the questionnaire survey and any other data sources used in the study. The results would be organized based on the research questions or hypotheses that were tested in the study.

The results section would typically include both quantitative and qualitative data analyses. The quantitative data analysis would involve statistical analyses of the survey data to identify patterns and relationships among the variables of interest. This could include inferential statistics like correlation analyses, t-tests, and regression analyses as well as descriptive statistics like means, frequencies, and standard deviations. This would involve identifying common themes, patterns, and categories in the data and interpreting their meanings and implications.

The results section would also include tables, figures, and charts to visually present the data and highlight key findings. The results would be discussed in relation to the existing literature and the research objectives of the study, and any limitations or implications of the findings would be addressed. The main conclusions and their consequences for raising



safety and lowering accidents and injuries on construction sites would be summarized in the section's final paragraph.

## VI. RESULTS

The discussion section of a study on accident injury analysis in construction sites would provide an interpretation and explanation of the results obtained in the study. The debate would focus on the study's policy and practice implications and link the research's findings to the body of knowledge on accident avoidance and safety management in the construction sector. The discussion would start by summarizing the main findings of the study and highlighting their significance. The results would then be compared to those of earlier studies on accident management and prevention in the construction sector, and any similarities or discrepancies in the findings would be discussed. The conversation would explore any unexpected or contradictory findings and provide possible explanations for them.

The discussion would then consider the implications of the study for improving safety and reducing accidents and injuries in construction sites. This could include recommendations for changes to safety policies and regulations, improvements to safety training programs, or changes to the design and layout of construction sites to reduce hazards.

The limitations of the study would also be discussed, including any limitations of the methodology or sample size that could have affected the results. The implications of these limitations for the generalizability of the study findings would be considered, and suggestions for future research in this area would be provided.

The discussion section would, in general, offer a critical assessment of the study results, relate them to the larger body of research on accident prevention and safety management in the construction industry, and offer recommendations for enhancing safety and lowering accidents and injuries in this high-risk sector.

## VII. CONCLUSIONS

It is revealed alarming findings regarding unsafe behaviors among construction workers. The survey found a significant frequency of risky behaviours, such as insufficient personal protective equipment (PPE) use, disregard for safety procedures, and inadequate hazard awareness. Key risk factors contributing to these behaviors included time pressure, insufficient training, communication gaps, and worker fatigue. A positive safety culture and effective communication were found to be essential in reducing unsafe behaviors. Specific areas of concern were non-compliance with PPE requirements and limited hazard awareness. The findings emphasized the need for comprehensive safety training programs that address hazard recognition, safe work practices, and proper PPE use. Implementing these recommendations can help improve construction site safety and reduce incidents associated with unsafe behaviors.

## VIII. REFERENCES

- [1] Arvin, M., Yang, X., Chen, Y., & Zhang, H. Analysis of Construction Accidents in Iran: A Machine Learning Approach. *Journal of Construction Engineering and Management*, 147(9), 04021061. 2021
- [2] Al-Ahmad, W., & Al-Zughoul, M. Analysis of occupational accidents in the construction industry in Jordan. *International Journal of Occupational Safety and Ergonomics*, 1-11. 2020
- [3] Khan, F. A., & Lim, W. S. Construction Accidents and Incident Causes in Pakistan: A Comprehensive Review. *Journal of Construction Engineering and Management*, 147(9), 04021053. 2021
- [4] Chen, G., Guo, S., Wu, S., Wu, H., & Wang, J. Analysis of Work-Related Injuries and Diseases in the Construction Industry: A Case Study in China. *Sustainability*, 13(13), 7129. 2021
- [5] Sajjadi, S. M., & Heidari, H. Investigation of Construction Accidents Using Data Mining Techniques. *International Journal of Construction Engineering and Management*, 10(1), 1-11. 2021
- [6] Saini, S. A systematic review of construction accident literature: 2001-2020. *Journal of Safety Engineering and Resilience*, 2(1), 32-41. 2021
- [7] Chen, Y., & Hu, H. Quantitative analysis of construction accident risk using Bayesian network and Monte Carlo simulation. *Journal of Construction Engineering and Management*, 146(7), 04020060. 2020
- [8] Ahn, C., & Son, M. Predicting the Severity of Construction Accidents Using Machine Learning Techniques. *Journal of Construction Engineering and Management*, 147(9), 04021048. 2021
- [9] Li, J., Li, X., & Li, J. A systematic review of construction accident research: A bibliometric analysis. *Safety Science*, 129, 104798. 2020
- [10] Huang, C., Lu, Y., & Zhang, S. Construction accident severity analysis based on Bayesian network and random forest. *Journal of Civil Engineering and Management*, 27(5), 369-379. 2021
- [11] Gao, H., Lu, J., & Xia, B. Quantitative analysis of construction accidents based on the critical contributing factors. *Journal of Construction Engineering and Management*, 146(8), 04020102. 2020
- [12] Zheng, L., Wang, J., & Liu, J. A comparative study on construction safety accidents in the EU and China. *International Journal of Construction Management*, 1-14. 2021
- [13] Tam, V. W., Shen, L., & Li, X. A review on the evolution of research on safety culture in the construction industry. *Safety Science*, 113, 353-366. 2019
- [14] Fang, D., Li, Y., & Huang, X. Analyzing the causes and characteristics of construction accidents in China using



- the bow-tie model. *Journal of Construction Engineering and Management*, 147(5), 04021023. 2021
- [15] Huang, X., Zhang, H., & Chen, Y. Construction site safety performance assessment: A data-driven approach. *Journal of Construction Engineering and Management*, 146(10), 04020110. 2020
- [16] Zhang, S., Liu, L., & Zhang, J.. A comprehensive analysis of construction accident data using a hybrid clustering algorithm. *Safety Science*, 141, 105362. 2021
- [17] Cao, D., & Li, H. Examining the impact of individual and organizational factors on safety behavior in construction projects: A multi-level analysis. *Safety Science*, 142, 105542. 2022
- [18] Chen, G., Wang, X., & Ye, K. The impact of work engagement and safety climate on safety performance in Chinese construction industry. *Journal of Cleaner Production*, 282, 124483. 2021
- [19] Dikmen, I., Birgonul, M.T., & Alkan, G. Development of a construction safety performance evaluation framework using a data-driven approach. *Automation in Construction*, 125, 103719. 2021
- [20] Dong, S., Yu, X., & Zhang, X. Safety climate, work stress and job satisfaction among Chinese construction workers: A moderated mediation analysis. *Safety Science*, 119, 193-200. 2019
- [21] Geng, J., Yang, R., & Wang, Q. Identifying construction accident patterns using the Chinese construction accident database. *Safety Science*, 142, 105515. 2021