Construction Safety Management in Construction Project

Umesh Patel[1], Chintan Raichura[2], J. R. Pitroda[3]
[1, 2, 3]Construction Engineering Management, Charutar Vidya Mandal University

Abstract: 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. Safety in construction industry is much more important. This review paper is about to increase safety in the building industry performance. The study's primarily is to define the critical success factors that affect the implementation of construction safety management. This review paper is to recognize and solve major problems in the building sector with various solutions related to work situations that affect project safety performance. Due to lake of knowledge and awareness large number of people's deaths and long-term injuries occurs. Traditional construction safety management has faced challenges As a consequence of the ever-increasing amount of information available, data available. Sensor-based technology is thought to include a new wave of construction safety management techniques because it is an effective way to collect, identify, and process data. The reason behind this review paper is to recognize and assess Construction project safety control in order to reduce and control construction worker health and safety (H&S). The various safety and control measures of accidents in building projects were outlined in this paper in order to mitigate accidents by using sensor-based technology. and discuss the causes of accidents as well as Drone use for construction safety.
Keywords: Accidents, Safety, Construction management, Drone, Civil Engineering.

I. INTRODUCTION

Physical injuries and death caused by workplace accidents cause severe social and economic problems. Every year, 60.000 fatal accidents occur in the field of building around the world, with one worker dying every 10 minutes as a consequence an occupational accident.

Because of its labour-intensive nature and high risks, the construction industry faces significant financial losses as a result of workplace accidents.

In India, construction safety is not taken seriously and is often overlooked. Take steps to humanise your business for proper growth. Workplace and surroundings

Generally speaking, Security laws and regulations consider safety planning to be a key necessity. Before 1970, there were no safety regulations in place, but the US Occupational Health and Safety released and amended safety and health guidelines to protect construction workers. OSHA's safety standards have had a significant positive effect on construction workers' health and safety, as the passage of the The Occupational Safety and Health Act (OSHA) is a federal law that protects workers from has accelerated the rate of improvement in construction safety.

II. LITERATURE REVIEW

The critical literature review based on Construction Project Safety Management

Syed M et al. (2000) Several studies suggested that, many that work on construction sites every day have a unique viewpoint., one-in-300 chance of dying at worked. A safety audit is a method of systematically measuring and evaluating an organization's health and safety programme against a set of unique and attainable standards. The site safety plan is discussed in this paper. In addition, a questionnaire on site safety management will be provided. [17]

D. Manase et al. (2003) concluded that the building industry has one of the worst safety records, every year, the Health and Safety Executive receives reports of 150 deaths and 20,000 injuries. The data available is insufficient to explain the underlying interactive factors in construction site accident causation. These methods are focused on recent developments in 3D Geographical Information Systems (GIS) and Virtual Reality (VR). Stakeholders in the industry will be able to identify risks and areas for successful preventive actions by developing analytical tools to visualise incidents on site using 3D GIS.[4]

C.M. Tam et al (2003) Identified the current state of affairs In the construction industry in China, there is a lack of safety management, investigate risky activities on building sites, and the factors that influence them that affect construction site safety. The findings reveal that contractors' safety management practises, such as the lack of personal protective equipment, regular safety meetings, and safety training, are worrying. [1]

Ripon et al. (2006) described that the looks at the construction industry's safety management system, as well as worker awareness of safety, accident patterns, and productivity requirements. Bangladesh's construction industry is more labour-intensive than that of developed countries. Accidents due to Cave-ins are popular when excavating in deep trenches, concreting without gloves and boots, and using shaky scaffolding, lack of personal protective equipment, long periods of exposure to extreme temperatures, poor housekeeping, and so on. As a result, the strategies for preventing accidents presented in this paper. [14]

Javier et al. (2012) discussed the use of drone technology in the construction industry. It would give safety managers quick access to photos and real-time videos from a variety of sites on the jobsite. Many advancements in information technology will benefit this crucial aspect of construction operations greatly. Innovative application of these tools could lead to safer work environments. The author also demonstrates how to use a drone to demonstrate every part of a construction project. [7]

Chan-Sik et al. (2012) proposed a foundation for a novel safety management and monitoring system, visualisation system (SMVS), that combines BIM, location monitoring, augmented reality (AR), and gaming technologies. Based on a fictitious incident scenario, a prototype system was designed and tested. A A case study was also conducted, with the findings indicating the fact that the SMVS has a lot of potential for improving field safety risk identification, worker risk recognition, and real-time communication between construction managers and employees. [2]

Reece A et al (2013) described that experienced risk managers a high-level overview of some of the specific problems and challenges that come with applying the safety risk management process to unmanned aircraft systems. The safety risk management process entails applying management policies, procedures, and practises to activities such as communicating, consulting, determining the context, and assessing, evaluating, treating, monitoring, and reviewing risk. [16]

K. Mohammed et al.(2015) concluded that a study conducted in order to increase safety in the building industry performance. The authors identified key factors that affect safety management and developed a framework for evaluating it on construction sites. The author also presents the results of a questionnaire survey that he conducted with contractors and clients. [8]

Masoud Gheisari et al. (2016) Researchers have suggested that wireless sensors, radio-frequency identification (RFID), and the global positioning system are examples of various types of technologies (GPS), be used on construction sites to increase safety and minimise the risk of human error. The top three Real-time video contact (video sensor) and high-precision navigation were the top technological features valued by safety managers for using UASs for safety inspection applications outdoor navigation, and sense-and-avoid. These results can assist practitioners in identifying potential applications, technical requirements, and problems for UASs in construction safety practices. [9]

Elyas Jazayeri et al. (2017) Background analyses of emerging safety management systems are presented. This reviewed main contribution to the collected of information is that it sheds light on current safety management systems. Injuries and deaths are common in the construction industry, and the target of zero injuries is still a long way off. The elements of a safety management system are presented by the author. [5]

William Devers et al. (2017) concluded that the give people a better idea of what's going on that a company must go through in order to make good use of drone technology construction projects in this study. Demonstrate how drones can increase a construction project's overall performance. The major contributor has been the new systems that have been developed to accompany drones on their flights. Construction companies can use the data gathered by drones thanks to these technologies. [19]

Dheeraj Benny et.al (2017) concluded that a review of major safety provisions is required, as well as conducted a thorough investigation into safety management procedures on construction sites. Occupational health and safety concerns continue to be a major concern for construction firms. As a result of the company's weak safety control, building industry, the world's culture and economy have lost financial and human losses. The study looked at organizational safety policies, safety training, meetings, inspections, fines, and employees' attitudes toward the construction industry's protection. [3]

Yousif S. et. al (2017) The high injury rates are attributed to a number of factors, including poor construction planning, a lack of design safety, insufficient safety training, worker behaviours, inherent security Construction-related health and safety risks, as well as a lack of understanding of site rules, according to this study. provided a theoretical context on safety management that aided in the development of the questionnaire. The author also discusses the causes of construction accidents, as well as the role of falls in causing accidents and injuries in construction projects. [20]

Ibrahim Mosly (2017) described that the construction industry's ability to expand depends on the adoption of cutting-edge technology. These technologies can help reduce the time it takes to complete assignments, improve work quality, raise safety standards, and cut costs.

On construction sites, unmanned aerial systems (UAS) have a variety of uses. They provided a bird's eye perspective for supervising construction site staff and providing real-time feedback on what's going on.[6]

Sepehr Alizadehsalehi et al. (2018) described that combines BIM and UAVs to allow safety managers to collect and analyse data on construction sites, allowing safety professionals to identify hazards at different stages of development the project and devise appropriate mitigation strategies.

BIM has a variety of benefits that can help to improve construction safety. BIM is beneficial not only during the design phase, but also during construction. Using unmanned aerial vehicles (UAVs) to observe the workplace on a regular basis and gather real-time images and videos will help to improve safety procedures. [18]

Naveed Anwar et al. (2018) concludes that lays the groundwork for the development of a fully automated smart construction monitoring and reporting system based on real-time data from drones and unmanned aerial vehicles (UAVs). Using photogrammetry techniques, data in the form of drone images from various locations and point clouds (from 3D scanning of a construction site) can be used to create a 3D model. The time and effort required for monitoring and reporting techniques used in the building industry has been shown to be significantly reduced by this fully automated system.

M. Samuel et al. (2019) explained how to use sensor-based technology to reduce the risk of accidents in construction projects. defined and evaluated construction project safety management in order to minimize and monitor construction worker health and safety (H&S). The author also depicts a major accident site as well as an outline of basic accident prevention measures. [10]

Nicole S.N et al (2019) described that the The safety management system (SMS) was created in the year 2000 implemented to the risk of accidents in the construction industry accidents and deaths while also reducing material waste. Current industry practices were examined in this study to determine the benefits and challenges of implementing SMS. In addition, a survey was conducted to determine the major the advantages and disadvantages of SMS implementation. [13]

M. Lakshmanan et al (2020) concludes that the essential success factors that influence the implementation of safety management in construction projects.

The results of the questionnaire survey were analysed using SPSS tools. The study's findings found that there are numerous safety issues in the building sector, including a lack of understanding of the importance of having an earth connection for power tools and a lack of understanding of how to protect wires from mechanical damage. [11]

III.PREVENTION OF ACCIDENTS IN SITE

The vast majority of workplace mishaps are caused by caused by employers' and supervisors' lack of expertise and skill. this can be strengthened by conducting safety training camps for all site workers and staff. Safety camps should be run by specially trained staff. When hiring a new employee, make sure they have relevant experience and the fact that they are well-versed in the job. Keep track of all the mishaps that occurred.

A. Everyone can get to work in a safe manner.
B. Double guard rails or other appropriate edge protection are provided on edges where people may fall.
C. To avoid falls, holes are covered with well-defined and fixed covers.
D. Good lighting Construction
E. Fenced off from public
F. All accidents are preventable.
G. Every job will be done safely.
H. Incidents should be dealt with. Everyone is responsible for their own safety.
I. Continuous improvement.
J. Safety as a "way of life" for 24 hours/day
K. Everyone in the workplace has the responsibility and accountability to identify, reduce, or handle workplace risks.
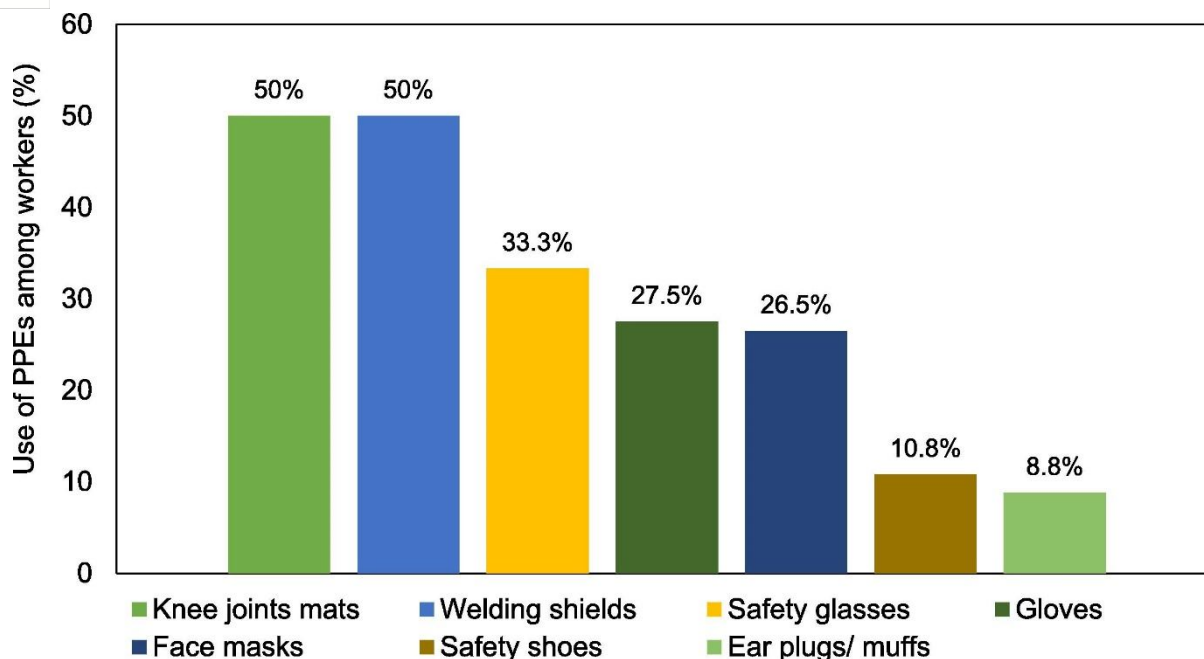L. Personal protective equipment provided by contractors in India

Fig. Use of PPEs among workers in small industries in Jeddah, India.

The self-reported use of PPEs among workers in small industries in Jeddah is shown in Fig. 1. The surveyed workers among selected small industries reported the use of safety glasses (33.3%), earplugs/muffs (8.8%), gloves (27.5%), safety shoes (10.8%), and face masks (26.5%).

The reported usage of welding shields/screens and mats for knee joints protection was 50% and 50% among welders, and mechanics respectively. Nevertheless, the type and quality of mats used were poor and unsatisfactory as the rags, plastic, and paper sheets etc. were used for this purpose at many sites which cannot provide adequate protection.

Research Methodology
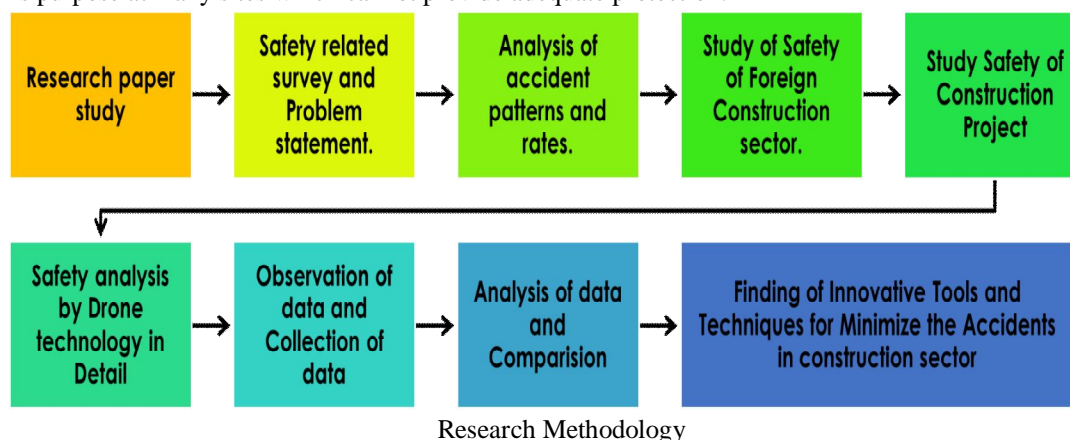
IV. APPLICATION OF DRONE FOR SAFETY

These unmanned vehicles are used in the field of building for site surveying, inspecting under-construction structures, and making promotional videos. Drones are also being used to make construction sites safer by allowing for easy inspections and identification of potential hazards. Drones can be used as well by contractors to monitor workers to ensure that everyone is working safely.

They are also being used to take photos as the construction work progresses in order to create built-in models that will keep every worker informed of the changing work conditions as the project moves forward.

Management of tailings dams. Drones could be used to measure tailings dams, reducing the risk of manual surveying.

Inspection and monitoring Mining is one of the most hazardous professions for workers, particularly those involved in deep underground operations. Workers may be exposed to hazards such as rock falls, extreme humidity, gas leaks, dust explosions, or flooding, among others.

V. CONCLUSIONS

From the literature review, following are the conclusion.

A. The current research project focuses on safety inspections, which is considered one of the main responsibilities of a safety manager.
B. A thorough examination of construction site safety is critical in avoiding accidents. UAVs can identify critical risks, and accident prevention procedures can be implemented right away
C. A significant benefit of drone usage on jobsites occurs before and during the construction.
D. Planners and designers can have a significant impact in avoiding accidents and making construction sites safer for workers. Direct observation on a building site is the essence of safety inspections like excavation trenches, specific location, employees, floors etc.

Umesh I Patel was born in Dadra and Nagar haveli, Silvassa, India in 1997. He received the bachelor's degrees in civil engineering from the Birla Vishwakarma Mahavidyalaya Engineering College (BVM), Vallabh Vidyanagar, Gujarat, India in 2019 and currently pursuing Master's in Construction Engineering and Management from Birla Vishwakarma Mahavidyalaya College, Vallabh Vidyanagar, Gujarat, India from 2019. He has published one literature review paper on Risk Analysis and Mitigation Techniques in High Rise Buildings: A Review.

Prof. Chintan Raichura has completed his bachelor's in Civil Engineering from Noble Group of Institutions, Junagadh in 2013. He has received his Master's degree in Construction Technology from RK University, Rajkot in 2015. He has worked with various project management consultant firm as Civil Engineer and performed various duties such as preparation and publication of tenders and providing assistance to field execution for 2 years. In year 2017 he joined Darshan Institute of Engineering & Technology, Rajkot as Assistant Professor and apart from teaching of Construction Management related subjects he is also handling final year students project work coordination. He has published research papers on Activity Optimization and Delay Management and he is guiding project work of UG students.

Dr. J. R. Pitroda received his Bachelor's Degree in Civil Engineering from Birla Vishwakarma Mahavidyalaya Engineering College, Vallabh Vidyanagar, Gujarat, India in 2000. In 2009, he received his master's degree in Construction Engineering and Management from the same college. In 2015, he received his Doctor of Philosophy (PhD.) Degree in Civil Engineering from Sardar Patel University Vallabh Vidyanagar, Gujarat, India. He has joined Birla Vishwakarma Mahavidyalaya Engineering College as a professor in 2009. At present, he has a total experience of 20 years in the field of Research, Designing, and Education. He has published many papers in National, International Conferences, and Journals. He has published nine Research Books in Civil Engineering, Rural Road Construction, National Highways Construction, Utilization of Industrial Waste, Fly Ash Bricks, Construction Engineering and Management, and Eco-friendly Construction.

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