

DOMINANT FACTORS CAUSING FATAL WORK ACCIDENTS IN HIGH-RISE BUILDING CONSTRUCTION PROJECTS

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Abstrak

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High-rise building construction projects are high-risk work environments for both construction workers and the public. Fatal work accidents on high-rise construction projects remain a serious issue in the construction industry in Indonesia. This research aims to identify the dominant factors that are the main causes of fatal work accidents through a systematic literature review approach. The method used is PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), by reviewing scientific articles published from 2019 to 2024 from various academic databases such as Google Scholar, Scopus, and DOAJ. The review results show that there are four main groups of factors that contribute to fatal accidents, namely: (1) human factors, such as work fatigue, negligence, and lack of occupational health and safety training; (2) managerial factors, such as weak supervision and minimal safety culture; (3) technical factors, such as the unfit condition of equipment; and (4) environmental factors, such as extreme weather and working conditions at heights. This study concludes that fatal workplace accidents result from a complex interaction of various factors, thus requiring comprehensive preventive efforts, including enhanced training, strict supervision, and strengthening the occupational safety management systems comprehensively.

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INTRODUCTION

High-rise construction projects are high-risk work environments, both for construction workers and the public (Prasetyono & Dani, 2022:45). The risks faced include exposure to hazardous chemicals, potential infections in unhealthy workplaces, physical injuries due to heavy workloads and hazardous environments, and



psychological stress due to tight deadlines and stressful working conditions (Amanda, 2024:25) . Therefore, it is important for construction companies to implement very strict occupational safety standards. One effort that can be made is to provide routine and comprehensive occupational safety training. This training not only increases awareness of the importance of safety, but can also encourage improved worker performance and project efficiency.

Occupational safety and health (OHS) training at construction sites has been shown to increase construction workers' motivation and awareness of the importance of occupational safety (Juliana et al., 2023:29592) . Studies show that after participating in quality OHS training, workers show an increase in discipline in following safety procedures, awareness of specific accident risks such as falling from a height, and more effective implementation of emergency procedures (conceptual comparison, not directly from the original source) (Tiurma Elita Saragi, 2019:72) . In addition, consistent implementation of OHS training also contributes to a decrease in the number of work accidents, including fatal accidents, on construction projects. Regular and quality training ensures that workers continue to update their knowledge of the latest safety technology, appropriate personal protective equipment, and effective safety procedures, thereby creating a safer and healthier work environment.

Specific research in the construction industry shows that the lack of adequate OHS training has a significant relationship with the high incidence of fatal accidents. Workers who do not receive adequate training tend to have a poor perception of the specific risks present in high-rise building sites, which in turn can increase the potential for fatal accidents (Zahira et al., 2025:131) .

Thus, the lack of emphasis and implementation of quality occupational safety training is one of the dominant factors causing fatal occupational accidents in high-rise construction projects. This lack of training not only reduces the competence and performance of workers in facing risks, but also contributes to an increase in the risk of fatal accidents for workers and other potential negative impacts on the project. Strategic investment in comprehensive and sustainable OHS training is essential to improve the quality of human resources, reduce the number of fatal accidents, and ensure the smooth running of construction projects.

RESEARCH METHODS

This study uses a systematic literature study approach to review the dominant factors that cause fatal work accidents in high-rise construction projects. Systematic literature studies allow researchers to comprehensively review the results of previous studies that are relevant and of high quality in the construction industry (Nardiansyah, 2024:470) .

Article searches were conducted through several academic databases such as Google Scholar, PubMed, Scopus, and DOAJ, using keywords such as "fatal work accidents", "risk factors", "high-rise construction", and "occupational safety and health (K3) in the construction industry". Inclusion criteria included articles published in the period 2019-2024, written in Indonesian or English, and discussing the main factors contributing to fatal work accidents in the context of high-rise construction projects (Dewi & Lestari, 2022:195) .

Article selection was carried out following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) principle which includes four stages:

identification, screening, eligibility assessment, and inclusion. Ineligible articles were excluded based on topic and methodology suitability. The screening stage resulted in a number of articles that were then reviewed thoroughly (Amalia et al., 2025:32).

Data analysis was conducted using a qualitative descriptive approach, where information from each article was categorized into themes such as human factors (e.g., worker error, lack of training), environmental factors (e.g., weather conditions, project design), managerial factors (e.g., lack of supervision, time pressure), and the impact of non-compliance with safety standards and personal protective equipment (Arring & Winarti, 2024 :658). This approach allows researchers to identify common patterns, critical risk factors, and research gaps that can be used as references for further research and the development of more effective prevention strategies (Hoshmand & Ratnawati, 2023:681).

RESULTS AND DISCUSSION

Literature Review Results

Fatal work accidents in high-rise construction projects are caused by various dominant interrelated factors. Research by (Aliyah Rofdha & Susilawati, 2024:25) in the Mining development project in Medan revealed that human factors such as fatigue, negligence, and lack of safety training are the main causes of fatal accidents. This finding shows that low worker awareness of risks and neglect of personal protective equipment (PPE) have a significant impact on the level of work accidents.

Study (Ulya & Wahyuningsih, 2023:155) in the case study of Work Accidents at PT. Pijar Sukma Jepara stated that weak safety supervision and the unavailability of standard operating procedures (SOPs) were the main triggers for serious accidents. They noted that project management tends to put safety aspects second in order to meet time targets, which has an impact on increasing fatal work incidents.

Meanwhile, the results of the study Arifuddin et al., (2023:8) who studied fatal incidents in Nurses at Dr. Tajuddin Chalid Hospital, Makassar, showed that the condition of work equipment and temporary installations that were not suitable for use such as scaffolding and freight lifts were critical risk factors. This study emphasizes the importance of periodic technical inspections to prevent accidents due to damage or non-standard installation.

Findings from Prasetyo et al., (2024:156) at the Operator at PT. Pelabuhan Indonesia (PERSERO) Kendari Container Terminal highlighted the influence of environmental factors, such as strong winds and extreme weather, which increase the potential for accidents, especially when work is carried out at heights without adequate security. They suggested that project management take weather risks into account as part of work safety planning.

The latest research by Anggraeni et al., (2023:720) in the Operations and Planning Division of Hsse Pt Pelindo identified that the lack of safety culture at the organizational level is the root of systemic problems. They found that even though training had been provided, without managerial commitment and strict supervision, K3 practices were often ignored in the field.

Overall, the results of the literature review indicate that fatal work accidents in high-rise construction projects are not only caused by a single factor, but are an accumulation of weaknesses in human, managerial, technical, and environmental aspects. Identification of these dominant factors is important as a basis for

comprehensive and sustainable improvement of work safety systems in the high-risk construction sector.

Discussion

Based on the results of the literature review, fatal work accidents in high-rise construction projects are the consequences of complex interactions between various interrelated factors. Human, managerial, technical, and environmental factors are the dominant causes that mutually reinforce the potential risk if not managed properly.

Human factors such as fatigue, negligence, and low awareness of the importance of using personal protective equipment (PPE), as explained by (Aliyah Rifdha & Susilawati, 2024:25) , shows that the behavioral aspect of workers is still a major challenge in creating a safe work environment. Lack of understanding of work hazards and a disregard for safety are the main causes that can trigger serious accidents. This indicates the need for ongoing intervention in the form of training, increased motivation, and supervision of work behavior.

On the other hand, (Ulya & Wahyuningsih, 2023:155) highlighted weaknesses in managerial aspects, such as the absence of clear SOPs and weak supervision in the field. This condition shows that even though workers are aware, without an orderly and procedural work system, the potential for accidents remains high. Project management that is too focused on time targets often sacrifices safety aspects, even though work safety is the main foundation for project sustainability.

Technical factors are also no less important. A study by (Arifuddin et al., 2023:10) shows that unsuitable work equipment, such as damaged scaffolding or goods lifts without safety standards, trigger fatal accidents. The inconsistency of technical standards with field conditions shows that aspects of inspection, maintenance, and certification of work equipment must be a top priority in construction project management.

Besides that, (Prasetyono & Dani, 2022:45) emphasizes the role of environmental factors, especially extreme weather conditions and work at height. Construction projects on high-rise buildings are very vulnerable to weather changes, such as strong winds or heavy rain, which can disrupt the stability of heavy equipment and worker safety. Therefore, the integration of environmental factors into safety planning is essential to anticipate potential uncontrollable natural risks.

No less important is the finding of (Anggraeni et al., 2023:721) which reveals the root of the problem in the form of a weak work safety culture. Although training has been provided, without strong managerial support and supervision, the K3 culture is only a slogan without real implementation. A safety culture cannot be formed instantly, but through a consistent process, starting from leadership commitment, providing examples, to enforcing safety regulations in the field.

Thus, this discussion confirms that efforts to prevent fatal work accidents cannot be done partially. A systemic and comprehensive approach is needed that includes strengthening individual capacity (through training and education), improving the managerial system (through SOPs, supervision, and strict policies), improving the technical quality of work tools and infrastructure, and mitigating environmental risks. Success in reducing the number of fatal accidents depends heavily on active collaboration between companies, workers, project supervisors, and the government in

building a strong, sustainable, and institutionalized safety culture in every stage of construction work.

CONCLUSION

Fatal work accidents in high-rise construction projects are a crucial problem that reflects the weakness of the overall safety management system. Based on the results of the literature review, the dominant factors causing these accidents include worker negligence, lack of safety training, weak supervision and K3 culture, inadequate equipment conditions, and the influence of the work environment such as extreme weather. The complexity of these factors shows that preventing fatal accidents is not enough through a technical approach alone, but requires a systemic and multi-layered strategy. To reduce fatal work incidents, strategic steps are needed such as strengthening regulations and work safety standards in the construction sector, increasing worker capacity and awareness through continuous training, improving the supervision system in the field, and integrating risk management into every stage of the project. Close collaboration between the government, construction companies, project supervisors, and workers is key to creating a strong safety culture. If this strategy is implemented consistently and measurably, the potential for fatal accidents can be minimized, thereby creating a safer, more professional, and more sustainable construction work environment.

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