

ANALYSIS OF COMPLIANCE LEVEL TOWARDS SMK3 AMONG CONSTRUCTION PROJECT WORKERS

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Abstract

The construction industry is experiencing increasing complexity that has an impact on occupational safety risks. Dynamic work environments trigger workers' non-compliance with established safety procedures. Many construction projects experience work accidents due to weak SMK3 implementation systems in the field. Workers often ignore safety instructions due to lack of motivation, weak organizational culture, and low risk understanding. This study aims to analyze the factors that influence compliance with SMK3 among construction project workers. This study uses a qualitative approach based on literature review through a systematic analysis of academic sources published in 2023–2025. This study reveals that organizational culture, intrinsic motivation, risk understanding, and technology utilization have a major contribution to worker compliance. Systems that involve workers in formulating safety policies show higher levels of compliance. Application-based surveillance technology helps improve worker reporting and awareness in the field. Risk-based training that is developed in an applicative manner has proven to be more effective than formal training. This study concludes that compliance with SMK3 is formed through synergy between managerial systems and individual behavior. Companies need to build a safety culture that is applied consistently across all project lines. Project management needs to provide simulation-based training and real-time reporting systems to increase risk awareness. Researchers recommend an integrative strategy involving two-way communication, safety incentives, and the use of adaptive technology to establish sustainable compliance. A safety system that is adapted to field realities will increase the effectiveness of SMK3 implementation in the construction sector.

Keywords: *SMK3 Compliance, Construction Safety Culture, Worker Intrinsic Motivation, Risk-Based Training, Adaptive Surveillance Technology*

Background

The construction industry has had a high rate of work accidents in recent decades. Researchers state that these accidents are often caused by non-compliance with SMK3 standards. According to Zohar (2023), compliance with safety systems is highly dependent on organizational culture. Schein (2023) added that organizational climate determines worker behavior in carrying out safety procedures. Construction workers often ignore work instructions even though procedures have been established. This situation indicates a gap between regulations and implementation in the field. This research is important to explain the dynamics that occur in the compliance process. Therefore, the main focus of this study is the analysis of the level of compliance with SMK3 in construction projects. Researchers observed that various training programs have been implemented by construction companies. However, the results have not been significant in reducing occupational safety violations. According to Deci and Ryan (2024), workers' intrinsic motivation

is the main driver in compliance with safety regulations. Handoko (2023) emphasized that understanding the risks also influences workers' decisions to act. Facts on the ground show that workers often ignore potential hazards due to lack of knowledge. This situation shows that training programs have not touched on the motivational and cognitive aspects as a whole. Therefore, a more integrative approach is needed in encouraging compliance. This study will fill this gap through a strong and systematic theoretical framework. The phenomenon of non-compliance cannot be seen as an individual error alone. Organizational and technological factors also play a major role in shaping worker behavior patterns. Dewi (2024) stated that the use of digital reporting applications can increase awareness of safety. Zhao and Yan (2023) proved that user-friendly technology can encourage deep compliance. However, technology adoption is still limited in the field due to lack of training. Therefore, it is important to evaluate how technology interacts with cultural and psychological aspects. This study will examine this interactive relationship in depth. The goal is to build a holistic understanding that has not been widely studied before. That way, the recommendations produced will be more appropriate and applicable.

The problem of non-compliance can also be traced to the company's weak internal supervision. Bautista-Bernal et al. (2024) stated that the internal control system greatly influences worker safety behavior. Fridan and Maamari (2023) linked organizational performance to a consistently implemented safety culture. If the company does not have managerial commitment, workers will deprioritize safety. In this context, commitment is not just a slogan, but a real action that workers see. This study will evaluate the existence and effectiveness of supervision in the project. The evaluation will be linked to the actual level of compliance in the field. It is hoped that the results of the analysis can help companies design a more adaptive supervision system. The focus will remain on the correlation between supervision and compliance behavior. This study is designed based on a broad and up-to-date theoretical background. The researcher will combine safety culture theory, motivation theory, and technology adoption. Tampubolon (2024) explains that the interaction between psychosocial variables greatly determines the success of the work safety system. Mittal (2024) adds that risk-based training can foster a sense of ownership of safety procedures. With this foundation, this research approach is multidisciplinary. The focus of the analysis will be on the dynamics of the relationship between factors, not just a single variable. This approach was chosen so that the results of the study are not fragmentary. Therefore, the structure of the analysis will be synthetic and contextual. This research is expected to be able to offer a new construction in compliance studies.

This research has high urgency amidst demands for increased productivity and efficiency. Arana-Landín et al. (2023) noted that the application of safety technology can reduce work risks without reducing productivity. Flor-Unda et al. (2023) emphasized the importance of sensors and early warning systems to prevent incidents. However, in practice, the application of technology has not been maximized due to limited infrastructure and human resources. Therefore, researchers will examine the relationship between technological readiness and compliance outcomes. This analysis is important for designing contextual interventions. The ultimate goal of this study is to present data-based and theory-based solutions. This study not only explains the current conditions but also proposes strategic steps. All of this is done so that construction workers can work in safe and healthy conditions. This study raises important questions regarding the factors that shape compliance with SMK3. Zhao and Yan (2023) stated that perceptions of the usefulness of the safety system determine workers' deep compliance. Kunodzia et al. (2024) stated that communication channels and risk control strategies greatly influence the effectiveness of SMK3. Therefore, the main focus of the study is on the dynamic interaction between these factors. This study will present in-depth data and analysis based on a valid literature review. All findings will be discussed in a systematic theoretical framework. Thus, the contribution of this study is not only practical but also academic. The ultimate hope is the creation of an adaptive, inclusive, and sustainable occupational safety system. Therefore, this study is very relevant to answer the needs of the current construction industry.

Research methodology

This study uses a qualitative approach based on literature review as the basic framework for analysis. According to Creswell (2023), this approach is suitable for understanding social phenomena in depth and contextually. Researchers collect sources from journals, scientific articles, and books published in 2023 to 2025. Zohar (2023) emphasizes the importance of understanding safety culture through a qualitative approach to identify behavioral aspects that are difficult to measure quantitatively. Deci and Ryan (2024) state that individual motivation cannot be understood only from statistical data, but through the interpretation of subjective meaning. Therefore, this study is directed at exploring the meaning of compliance in depth. Researchers also adjust the analysis method to align with the context of the construction sector. The ultimate goal of this methodology is to produce a comprehensive understanding of the structure and process of construction project workers' compliance with SMK3.

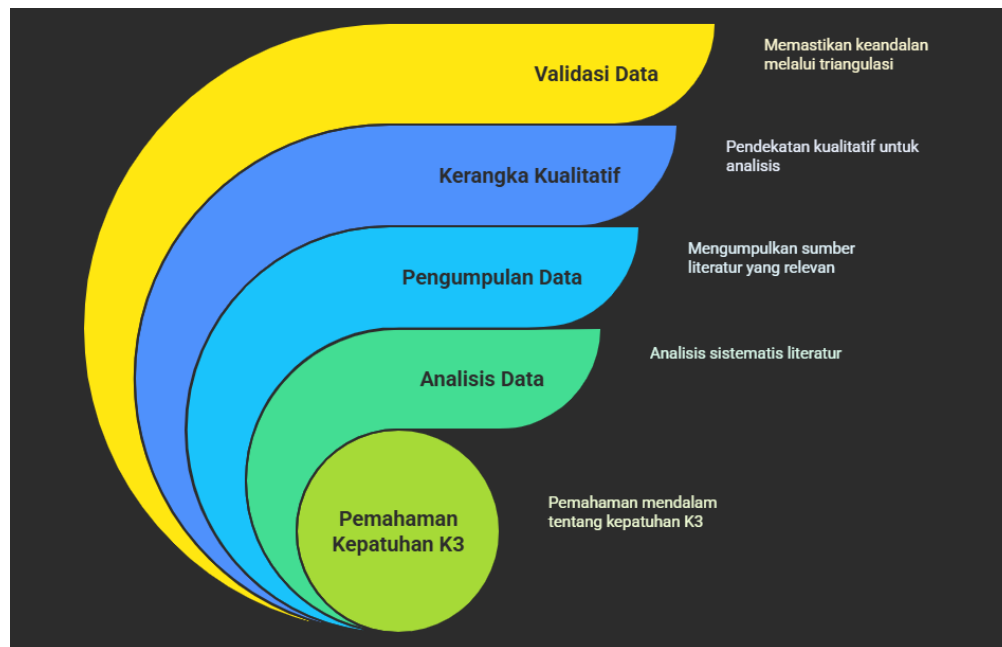


Figure 1. Research Methodology for K3 Compliance

Secondary data collection was carried out by identifying relevant and current literature. Handoko (2023) stated that a structured literature review can accurately reveal the relationship between theory and practice. Researchers choose sources that have a high level of reliability and are relevant to occupational safety practices. Deci and Ryan (2024) remind that motivation theory needs to be adjusted to the characteristics of a particular culture and work sector. Therefore, the sources used do not only come from the field of safety, but also management and organizational psychology. The goal is to build a strong and cross-disciplinary theoretical foundation. The identification process is carried out iteratively to ensure the representation of diverse perspectives. With this method, researchers can formulate consistent categories and patterns. All data are analyzed deductively based on previously formulated theoretical premises.

The analysis technique is carried out by reading, classifying, and interpreting the contents of the literature systematically. According to Creswell (2023), text interpretation in a qualitative approach can reveal the hidden meaning behind explicit data. Researchers classify the literature into four main categories: organizational culture, individual motivation, risk understanding, and technology. These categories are developed based on the theories put forward by Zohar (2023) and Dewi (2024). The analysis was carried out in the stages of open, axial, and selective coding to find relationships between themes. The researcher then developed an analytical narrative from the identified findings. The focus of the analysis is directed at how the literature explains the relationships between factors. The results of this analysis form the basis for an in-depth discussion in the next section. Each statement is supported by theory and empirical findings from current literature.

This study also considers the uniqueness of the construction sector as the object of study. According to Zhao and Yan (2023), the harsh and dynamic working environment in construction projects requires flexible and adaptive safety strategies. Meanwhile, Dewi (2024) shows that the use of technology can answer the need for real-time monitoring at the work site. Therefore, researchers specifically analyze how the dynamics of the work environment affect the effectiveness of SMK3 implementation. The focus of the analysis is also directed at the integration between human and technological aspects. This combination is considered important to improve the effectiveness of overall compliance. Researchers ensure that the field context is not ignored in this literature review. Each conclusion drawn will be linked to a unique sectoral context. It is hoped that the results of this study will have high relevance in field practice.

Data validity is ensured through the process of triangulation of sources and theories. According to Creswell (2023), triangulation helps strengthen the reliability of findings in qualitative research. Researchers compare literature from various disciplines to gain a holistic understanding. Zohar (2023) emphasized that the use of multiple sources enriches the analytical perspective in the study of safety culture. In addition, Dewi (2024) emphasized the importance of using relevant theories so that the interpretation of the results is not speculative. Researchers use cross-validation techniques between theory and empirical data. The goal is to ensure that the conclusions obtained are based on accountable data. This process also involves checking the conformity between data and theoretical constructs. Thus, the results of this study will have a high level of validity and reliability.

Results and Discussion

The results of the analysis show that organizational culture is the main determinant in shaping compliance with SMK3. Zohar (2023) stated that a strong safety culture shapes workers' perceptions of the importance of work procedures. Schein (2023) added that the values and norms instilled by the company will shape compliant behavior automatically. Workers who feel protected tend to avoid violating procedures. Companies that instill a safety culture tend to have lower accident rates. Therefore, the role of project leaders in shaping work culture is very important. A weak organizational culture will create unclear work behavior norms. This study emphasizes that the formation of a safety culture cannot be merely symbolic. Companies need to integrate safety values into the entire managerial system.

Intrinsic motivation has been shown to play a major role in shaping worker compliance with SMK3. Deci and Ryan (2024) stated that workers will be more disciplined if they have a strong internal drive. Iman *et al.* (2023) stated that productivity increases when workers feel they have goals that are aligned with safety values. Companies that only emphasize punishment tend to fail to shape long-term compliance. On the other hand, the reward approach is more effective in fostering positive motivation. Motivation that is formed internally will result in a higher awareness of risk. The compliance resulting from this motivation is deep and sustainable. Therefore, companies need to design a motivating communication strategy. This study emphasizes the importance of understanding the psychological aspects of workers in more depth.

Risk understanding is the main basis for workers' decision-making in the field. Handoko (2023) stated that risk education increases awareness and prevents rash decision-making. Mittal (2024) added that translational training helps workers link risk theory to work practices. Workers who understand potential hazards will be more careful in acting. Companies that provide risk-based training are able to reduce accident rates. However, much training is still formalistic and not applicable. Therefore, companies need to design training programs based on real situations. Risk understanding must be part of the daily work culture. This study reinforces the importance of integration between risk understanding and work decision-making.

Modern technology has been shown to increase the effectiveness of supervision and reporting on construction sites. Dewi (2024) stated that mobile applications can make it easier for workers to report unsafe conditions. Flor-Unda *et al.* (2023) showed that wearable sensors increase workers' awareness of their body and environmental conditions. This system provides direct feedback to workers regarding safety. The implementation of this technology has been shown to increase compliance with SMK3. However, the effectiveness of technology is highly dependent on user acceptance. This study shows that technology cannot replace the role of interpersonal communication. Therefore, technology integration must be accompanied by adequate training. The use of technology must be adjusted to the characteristics of workers in the field.

Workers' perceptions of the usefulness of safety technology affect the type of compliance that is formed. Zhao and Yan (2023) stated that the perception of usefulness increases deep compliance. Liu *et al.* (2023) added that managerial leadership plays a role in shaping this perception. If workers believe that technology is useful, they will use safety equipment voluntarily. However, if negative perceptions are formed, workers only comply superficially. This study found that this perception is influenced by the quality of training and managerial communication. Therefore, technology must be introduced through a participatory approach. Workers need to be involved in the implementation process to form a sense of ownership. This study suggests that training should be carried out in a dialogic and contextual manner.



Figure 2. Understanding the spectrum of safety compliance in construction projects.

A noisy work environment has been shown to reduce the level of compliance with SMK3. Yang et al. (2023) stated that noise interferes with concentration and reduces risk awareness. Kunodzia et al. (2024) added that an uncontrolled work environment weakens the effectiveness of the safety system. This study found that workers make more mistakes in noisy areas. Companies need to design environmental controls systematically. The use of ear protection and work schedule arrangements are initial solutions. However, this solution is not enough without cultural and communication changes. Therefore, a systemic approach is needed in dealing with environmental factors. This study emphasizes the importance of physical risk control in project design.

Worker involvement in the safety policy formulation process increases compliance. Bergman Bruhn et al. (2023) stated that participation creates a sense of ownership of the safety system. Widyanty et al. (2024) added that organizational support for worker involvement affects the quality of work life. This study shows that workers who are involved are more compliant with procedures. Participation also strengthens trust between management and workers. Therefore, policy formulation should not be top-down. Active involvement must be carried out from the project planning stage. With this strategy, companies can build a sustainable safety system. This study recommends worker involvement as a standard in safety management.

Effective communication between managers and workers strengthens safety culture. Schein (2023) stated that communication forms a collective perception of the importance of safety. Tampubolon (2024) emphasized that communication also increases job satisfaction and organizational loyalty. This study shows that workers who receive routine information are more obedient. Two-way communication allows workers to convey obstacles and ideas. Therefore, project managers must actively listen and provide feedback. Open communication creates a work climate that supports safety. This study suggests the use of communication media that are appropriate to the field context. Communication strategies must be adjusted to the educational and cultural background of workers.

Project management commitment greatly determines the direction of worker compliance with SMK3. Zhao and Yan (2023) showed that management support has a direct impact on positive perceptions of the safety system. Arana-Landín et al. (2023) emphasized that leadership involvement in the implementation of safety technology increases efficiency and effectiveness. This study found that actively led projects showed higher compliance. Project managers who are present in the field are able to provide concrete examples. Workers are more motivated if they see leaders directly

involved in implementing safety. Therefore, proactive leadership is an important factor in the implementation strategy. This study suggests safety-based leadership training as part of the project management program.

Consistent and data-based supervision strengthens the overall OHSMS system. Dewi (2024) stated that real-time reporting technology allows early detection of procedural violations. Sorlini *et al.* (2023) stated that a data-based management system can control safety in underground projects efficiently. This study shows that projects with digital supervision systems experience increased reporting. The use of automated systems makes the supervision process independent of individuals. However, this technology is only effective if the data is followed up responsively. Therefore, the supervision system must be equipped with evaluation procedures and corrective actions. This study suggests the implementation of a safety dashboard to improve accountability.

Work-based safety training has been shown to be more effective than formal training. Handoko (2023) emphasized that work-based training creates a deeper understanding. Mittal (2024) stated that translational training increases worker ownership of safety practices. This study shows that risk simulation is preferred by field workers. The training is considered relevant because it touches on the real work context. In addition, this method improves workers' memory of safety procedures. Therefore, companies need to design training modules based on cases and field events. This study recommends an integration between safety theory and work reality.

Safety reward programs encourage workers to voluntarily comply. Deci and Ryan (2024) stated that external recognition can strengthen intrinsic motivation. Bergman Bruhn *et al.* (2023) showed that safety participation-based incentives increase collective awareness. This study found that workers who received appreciation were more consistent in using personal protective equipment. Workers also felt appreciated for their contribution to maintaining team safety. This program must be transparent and fair so as not to cause jealousy. Therefore, companies need to establish measurable safety performance indicators. This study suggests the integration of safety performance evaluation into the employee appraisal system.

The implementation of SMK3 also depends on the readiness of the documentation system and work procedures. Liu *et al.* (2023) stated that a weak OHSMS system makes workers confused in interpreting the rules. Kunodzia *et al.* (2024) emphasized that clarity of procedures is very important in avoiding multiple interpretations in the field. This study found that many projects do not have SOPs that are easy for workers to understand. Documents that are technical and formal in nature are often ignored by field workers. Therefore, companies need to simplify the format and language of documents. Visual materials such as posters and instructional videos are considered more effective. This study suggests designing work documents based on practical field needs.

The mismatch between safety planning and work practices reduces the effectiveness of the OHSMS. Zohar (2023) stated that the gap between policy and actual behavior weakens safety culture. Fridan and Maamari (2023) stated that consistency between organizational values and managerial actions strengthens safety performance. This study shows that many work implementations deviate from the initial planning. The causes are time pressure, weather changes, and production targets. Therefore, the OHSMS system must be flexible but still binding. Adaptation of procedures must be carried out without sacrificing safety principles. This study suggests regular evaluation of safety implementation based on project dynamics. A dynamic OHSMS system will be better able to respond to changing situations in the field.

Integration between cultural factors, motivation, risk, and technology forms a complete compliance system. Creswell (2023) states that a holistic approach in social studies allows for a deep understanding of the interaction of factors. Dewi (2024) states that technology systems must be developed based on cultural and psychological understanding. This study confirms that a partial approach is not enough to build strong compliance. Compliance is only formed if there is synergy between formal systems and individual behavior. Therefore, compliance improvement strategies must be designed multidimensionally. Companies need to conduct a comprehensive evaluation of work systems and behaviors. This study concludes that the success of SMK3 lies in the alignment between organizational structure and culture. This concept is the basis for compiling applicable recommendations.

Conclusion

This study concludes that compliance with SMK3 in construction projects is determined by the interaction between organizational culture, individual motivation, risk understanding, and technology utilization. Zohar (2023) proved that a positive safety culture influences workers' compliant behavior. Deci and Ryan (2024) emphasized that intrinsic motivation increases discipline and safety awareness. Handoko (2023) and Mittal (2024) emphasized the importance of risk education in strengthening safe decision making. Dewi (2024) and Flor-Unda *et al.* (2023) showed that technology can improve the efficiency of supervision and reporting. This study also found that worker involvement

and two-way communication strengthen the occupational safety system. Therefore, an integrative and participatory approach is proven to be more effective than a purely administrative approach. This study presents a new understanding of the importance of balancing formal structures and work behavior dynamics.

Construction companies are advised to build a safety culture based on values and real practices in the field. Schein (2023) and Fridan & Maamari (2023) explain that organizational values that are aligned with managerial actions strengthen worker compliance. Deci and Ryan (2024) and Bergman Bruhn et al. (2023) suggest strengthening motivation through rewards and emotional involvement. Handoko (2023) and Kunodzia et al. (2024) emphasize the importance of risk-based training and clarity of work procedures. Dewi (2024) and Zhao & Yan (2023) recommend the use of digital reporting systems and user-based safety applications. This study recommends collaboration between managers and workers in designing safety policies. Companies also need to implement an evaluation and adaptation system to changing field conditions. With this approach, the level of compliance with SMK3 is expected to increase consistently and sustainably.

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