THE INFLUENCE OF SAFETY KNOWLEDGE, SAFETY CLIMATE, SAFETY MOTIVATION ON SAFETY PERFORMANCE WITH SAFETY BEHAVIOR AS A MEDIATION VARIABLE

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Abstract

The ILO estimates that around 2.3 million people die every year due to work accidents or illnesses. In Indonesia, claims for Work Accident Insurance and Death Benefits increased from 2019 to November 2023, especially in the construction services industry on national strategic projects. During the Lombok Power Plant FTP 2 construction project throughout 2023, near misses, property damage, first aid, and fire were found. Safety performance is a general method for determining the effectiveness and adequacy of work management safety systems. This research aims to analyze the relationship between safety performance and several variables that have been studied previously, including safety knowledge, safety climate, safety motivation, and safety behavior in the Lombok Steam Power Plant FTP 2 construction workers. This research uses a quantitative research approach that emphasizes data in the form of numbers and processing it using the Structural Equation Modeling (SEM) method. The population in this study was 278 Lombok Power Plant FTP 2 Construction workers for the March 2024 period with a sample of 165 workers. The research results show that (1) safety knowledge has a significant effect on safety behavior, (2) safety knowledge has a significant effect on safety performance, (3) safety climate has a significant effect on safety behavior, (4) safety climate has an insignificant effect on safety performance, (5) safety motivation has a significant effect on safety behavior, (6) safety motivation has a significant effect on safety performance, and (7) safety behavior has a significant effect on safety performance**.**

Keywords: Safety Knowledge, Safety Climate, Safety Motivation, Safety Behavior, Safety Performance

INTRODUCTION

In an article published on the ILO (International Labour Organization) website (ilo.org), entitled "The enormous burden of poor working conditions," the organization estimates that approximately 2.3 million women and men worldwide die from occupational accidents or diseases annually. This equates to over 6,000 deaths per day. Globally, approximately 340 million workplace accidents and 160 million victims of occupational diseases occur annually. A principal finding of the ILO's most recent data on occupational accidents and diseases is that the construction industry exhibits a markedly elevated accident rate.

In Indonesia, the number of claims for Work Accident Insurance (JKK) and Death Insurance (JKM) from the social employment program has continued to increase, according to data from BPJS Ketenagakerjaan. These figures are for the period from 2019 to November 2023. In 2019, there were 182,835 claims for Work Accident Insurance (JKK) and Death Insurance (JKM) from the social employment program. By 2022, this figure had risen to 297,725 claims. A significant proportion of work accident cases are concentrated within the construction service industry, particularly in the context of national strategic projects, including toll road infrastructure, and steel and power plants.

The enactment of Law No. 1 of 1970 on Occupational Health and Safety (OHS) regulations represents a significant milestone in the Indonesian government's efforts to prevent occupational accidents. The legislation encourages the development of robust safety systems in the workplace, with a primary focus on the protection of employees from the hazards and risks associated with their work. The OHS Law establishes rigorous safety standards, which organizations are obliged to adhere to. These include the use of personal protective equipment, employee training, and the provision of adequate supervision of the work environment. Compliance with these laws allows companies to markedly enhance their safety performance, reducing the probability of accidents and worker injuries. This, in turn, contributes to the creation of a safer and more productive work environment.

Safety performance represents one of the most common methods for evaluating the effectiveness and adequacy of safety management systems (Arto Kuusisto, 2000:19). Safety

performance can be quantified by lagging and leading indicators about the incidence of accidents, injuries, and near misses (Evan A Nadhim et al., 2018). Lagging indicators are associated with the consequences of a work accident, whereas lead indicators are related to preventive actions and the improvement of performance. The improvement of lead indicators related to safety can, in turn, lead to an improvement in overall safety performance (Nevhage & Lindahl, 2008: 11).

Previous studies, including research by Dewi Syarifah and Rosatyani Puspita Adiati (2018), have demonstrated that safety knowledge has a significant positive effect on safety performance. Individuals with greater knowledge and motivation to engage in safe behavior tend to demonstrate higher levels of compliance, as evidenced by their adherence to safe work procedures. (Kuo-Yang Kao et al., 2019) demonstrate that there is a significant positive correlation between workers' safety knowledge and their safety attitudes. It can be argued that safety knowledge is the underlying factor that shapes workers' attitudes toward safety behavior.

The term 'safety climate' is frequently employed in academic literature to denote the character of an organization’s policies and the attitudes of its employees about safety matters (Intan Suraya Noor Arzahan et al., 2022). Some previous research findings, including those of several researchers. (Evan A Nadhim et.al, 2018) found that safety climate has a significant effect on safety performance. There is a strong relationship between safety climate and safety performance, as indicated by the level of compliance and increased worker participation. (Jiemin Zhang et.al, 2022) demonstrate that there is a significant positive correlation between safety climate and safety behavior (compliance and participation). It can be inferred that the stronger the safety climate, the greater the likelihood of construction workers complying with safety rules and regulations, and thus exhibiting positive safety behavior.

In a study conducted by Phil Hughes and Ed Farrett in 2007, it was found that: Safety motivation can be defined as the level of encouragement or desire exhibited by individuals to engage in safe behaviors and adhere to established safety procedures. Some previous research findings, including those of several previous researchers. (Syazwan Syah Zulkifly et. al., 2021) demonstrates that an individual's perception of safety motivation has a

significant impact on their safety performance, attention to safety, and adherence to safety policies. Furthermore, it increases employee safety motivation, which in turn has a considerable influence on the company's safety performance. (Mehmet Peker, 2022) presents evidence that safety motivation is significantly and positively correlated with safety behavior (compliance and participation). When workers are motivated by their concern for work safety factors, this has a positive impact on their behavior in work safety.

In light of the above, further research is required to gain a deeper understanding of the factors influencing project safety performance. It is imperative that previous research influenced by factors such as safety knowledge, safety climate, and safety motivation, including safety behavior, receive special attention. This is because such factors have an impact on safety performance, which in turn affects the level of productivity, quality of work, and, most importantly, the safety of workers. It can be argued that nothing is more important than the human soul and returning home in one piece (complete, healthy, and safe for the family at home).

In light of the aforementioned description, this research was conducted to investigate the relationship between safety knowledge, safety climate, safety motivation, and safety performance, with safety behavior as the mediating factor, within the context of the Lombok Power Plant FTP 2 construction project on Lombok Island, West Nusa Tenggara Province, Indonesia.

REVIEW OF LITERATURE

Human Resource Management

Newman and Hudgetts (1998:4) define human resource management as a process undertaken by an organization or company to ensure the effective utilization of existing human resources in pursuit of organizational and individual goals. Dessler (1997:2) posits that human resource management entails the formulation of policies and the undertaking of actions by a manager to organize or implement the human resource aspects of a management task. As Cherrington (1995:11) notes, the functions of human resources can be broadly

defined as follows: The aforementioned functions of human resource management include staffing and employment, performance evaluation, compensation, training and development, employee relations, safety and health, and personnel research (Angga et al, 2023; Surahman & Andriyani, 2024).

Safety and Health

It is a legal obligation for all companies to have and implement a safety program to reduce the incidence of unwanted events and create healthy working conditions. The workforce must be consistently reminded of the significance of occupational safety. An efficacious safety program has the potential to diminish the occurrence of accidents and enhance the collective well-being of the workforce. The human resources department bears the primary responsibility for conducting safety training, identifying and correcting conditions that endanger the workforce, and reporting accidents (Cherrington, 1995:11).

Safety Management System

The concept of safety management is employed to develop a framework for implementing the Safety Life Cycle Management (SLCM) approach to Safety Instrument System (SIS) that oversees the safety of installations and comprehends the behavior of human-equipment interactions in diverse work systems (J. Maiti, Pradip Kumar, 2018: v). The majority of research efforts in safety management have concentrated on analyzing and investigating accidents that have occurred in the past. However, there is now a shift in focus towards the implementation of proactive measures designed to protect employees and enhance the safety culture (Sheehan et al., 2016; J. Maiti & Pradip Kumar, 2018, p. 54). (Arto Kuusisto, 2000: 14) defines safety management as 'the systematic control of worker performance, machine performance, and the physical environment'. Such control encompasses the prevention and rectification of unsafe conditions and circumstances. The framework of the safety management system is essential for the continuous improvement of accident prevention policies and programs (Gautam et al., 2017; J. Maiti & Pradip Kumar, 2018, p. 66).

Safety Performance

As posited by Sharifah N.N. Syed-Yahya et al. (2022), the term 'safety performance' denotes the efficacy of an organizational entity in terms of its safety standards. While safety-related events, such as incidents and injuries, or safety behaviors, such as safety compliance and safety participation, can be used to represent safety performance, poor safety performance will have a detrimental impact on the organization. The consistent demonstration of behaviors and attitudes that align with established safety procedures can serve as an effective preventive measure against the occurrence of work-related accidents and injuries (Arto Kuusisto, 2000). In the view of Fatma Lestari et al. (2023), the most practical approach to safety performance is to use lagging and lead indicators.

Safety Knowledge

As posited by Machado and Davim (2021: 51-52), knowledge can be defined as the understanding or awareness that an individual gains through experience, learning, or critical thinking. An increase in safety knowledge should increase safety behavior, due to an increase in awareness and understanding of the reality of safety at work and the workplace. Consequently, the risk of injury is lower (Kuo-Yang Kao et al., 2019). As posited by Gias Oktaruly Sinaga and Clariza Vioito Sinaga (2021), an individual's safety knowledge is likely to impact the overall performance of an organization. If an individual's safety practices align with the established standards set forth by the company, the organization is likely to demonstrate favorable performance outcomes. The term "safety knowledge indicator," as defined by Bunner, Prem, and Korunka (2018), pertains to an individual's comprehension of the requisite procedures and activities for ensuring personal safety.

Safety knowledge identifies the underlying attitudes of workers that inform their safety behavior (Kuo-Yang Kao et al., 2019). If safety knowledge can be enhanced through seminars or training, it will have an impact on both the understanding of safety procedures and the subsequent safety behavior (Bemby Andrian Rahmadhan, 2021). (Fariz Septian and Budhi Haryanto, 2023) It can be posited that an increase in safety knowledge, which encompasses knowledge of safety procedures, practices, and workplace hazards, will result in an improvement in safety behavior. Safety knowledge affects both routine safety behavior

and proactive contributions to safety-related work (participation) (Chandrakantan Subramaniam et al., 2023).

Knowledge serves as the foundation for action at work, fostering awareness of potential hazards, compliance with safety procedures, and rational decision-making (Gias Oktaruly Sinaga & Clariza Vioito Sinaga, 2021). (Ummu Kamila et. al., 2021) The implementation of effective safety management practices has been observed to enhance workers' knowledge, which subsequently contributes to the improvement of safety performance. Individuals with greater knowledge and motivation to engage in safe behaviors demonstrate higher levels of compliance, manifested in their adherence to safe work procedures (Dewi Syarifah & Rosatyani Puspita Adiati, 2018). In light of the aforementioned findings, it can be posited that there is a correlation between workers' safety knowledge and their subsequent safety behavior and performance:

Hypothesis 1: Safety knowledge has a significant effect on the safety behavior of Lombok Power Plant FTP-2 construction workers.

Hypothesis 2: Safety knowledge has a significant effect on the safety performance of Lombok Power Plant FTP-2 construction workers.

Hypothesis 8: Safety behavior mediates the relationship between safety knowledge and safety performance of Lombok Power Plant FTP-2 construction workers.

Safety Climate

Safety Climate is the fulfillment and participation of individuals in safeguard activities in the workplace (Griffin and Neal, 2000); (Benny Agus Setiono, 2019). Safety climate increases workers' commitment to health and safety, emphasizing that deviation from company safety goals, at any level, is unacceptable, (Evan A Nadhim et.al, 2018). The definition of safety climate according to (Darius Tandiabang et.al, 2023) relates to shared perceptions related to the priority of safety policies, procedures, practices, and the extent to which safety compliance or improved behavior is supported and valued in the work environment. Schneider (2009): "Occupational safety climate is defined as the perception of employee concerns about practices, procedures and similar behaviors that are provided,

supported and expected in a setting". The concept of safety climate was first introduced by Zohar in 1980. Safety climate refers to workers' perceptions of safety and affects workers' motivation to behave safely. Safety climate depends on time and place and reflects the current organizational situation; therefore, it is relatively unstable and changes based on the organizational situation, (Hamed Aghaei, 2020). Safety climate is defined as how individuals perceive safety rules, procedures, and practices in the workplace. There is currently no consensus regarding the dimensions of the safety climate, (Intan Suraya Noor Arzahan et.al, 2022). Safety climate indicators according to Griffin and Neal (2006) consist of five which include: value management, safety communication, safety practice, safety training, and safety equipment.

(Jiemin Zhang et.al, 2022) shows that a positive safety climate can stimulate individual safety behavior, this is evidenced through empirical research that safety climate can encourage safety behavior indirectly through two variables, namely safety knowledge and motivation. Research conducted by (Muhammad Rafique et.al 2021), revealed that safety climate has a positive relationship with safety behavior (compliance & participation). (Darius Tandiabang et.al, 2023), safety climate can affect workers' safety behavior through safety motivation. (Ahmed Jalil Al-Bayati, 2021), safety climate as a mediating variable has a statistically insignificant impact compared to the impact of safety culture, thus emphasizing the important role and contribution of top-level management and safety personnel.

Research conducted by (Beni Agus Setiono et.al, 2018), revealed that safety climate has a positive and significant influence on employee performance at PT Pelindo III East Java Province. Evan A. Nadhim et.al, (2018), proved to retrofit workers that there is a strong relationship between safety climate and safety performance as indicated by the level of compliance and increased worker participation. (Hamed Aghaei et.al, 2020), safety climate and safety performance are closely correlated, an increase in safety climate can lead to an increase in nurse safety performance. Research findings from (Fatma Lestari et.al, 2023) confirm that safety climate has a positive influence on safety performance at 129 petrol stations in Indonesia. Therefore, the findings of previous studies provide reasons that explain why and how workers' safety climate is related to safety behavior and safety performance, so we hypothesize as follows:

Hypothesis 3: Safety climate has a significant effect on the safety behavior of Lombok Power Plant FTP-2 construction workers.

Hypothesis 4: Safety climate has a significant effect on the safety performance of Lombok Power Plant FTP-2 construction workers

Hypothesis 9: Safety behavior mediates the relationship between safety climate and safety performance of Lombok Power Plant FTP-2 construction workers.

Safety Motivation

The primary objective of safety motivation is to ascertain the relationship between collective exertion and the strength of motivation to work safely and the subsequent safety outcomes (Darius Tandiabang et al., 2023). Safety motivation can be defined as the motivation to engage in safety-related activities and adhere to established work practices to foster a safe working environment (Griffin & Curcurato, 2016). Safety motivation is associated with the inclination of individuals to engage in safety-related behaviors and activities (Fariz Septian & Budhi Haryanto, 2023). The perception of risk in the workplace exerts a significant influence on safety motivation, prompting individuals to take action in a manner that ensures their safety and further encourages the adoption of safe behaviors (Vinodkumar and Bhasi, 2010). The indicators of safety motivation, as outlined by Bunner et al. (2018), encompass the motivation to comply with safety regulations, the motivation to minimize accidents, the motivation to create safe situations, and the motivation to implement safety programs.

(Mehmet Peker et.al, 2022) argue that safety motivation affects safety behavior (compliance and participation). They suggest that workers who are motivated by their concern for work safety factors will display positive behavior about work safety in the manufacturing industry. The research conducted by Ariska Nurul Heryati et al. (2019) indicates that safety motivation encourages employees to engage in safety-related behaviors to prevent work-related accidents. Safety motivation is a significant factor in the prevention of accidents, the maintenance of a safe work environment, and the encouragement of healthy and safe behavior (Kwang-Seup Byun and Jin-woo Jung, 2023). (Abdulrahman M. Bashel, 2021) states that the high level of performance in safety behaviors (compliance and

participation) is directly related to the high level of individual safety motivation and safety knowledge.

Safety motivation provides a combined impact of employee and employer obligations towards safety, thereby indicating the existence of a psychological safety contract. Furthermore, it increases existing knowledge about organizational social interactions that affect safety performance (Sanaz Vatankhah, 2021). The findings of the study conducted by Syazwan Syah Zulkifly et al. (2021) also indicated that safety motivation exerts a significant influence on the safety performance of manufacturing SMEs in Selangor, Malaysia. In light of the findings of previous research, which provide reasons that explain why and how worker safety motivation is related to safety behavior and safety performance, we put forward the following hypothesis:

Hypothesis 5: Safety motivation has a significant effect on the safety behavior of Lombok Power Plant FTP-2 construction workers.

Hypothesis 6: Safety motivation has a significant effect on the safety performance of Lombok Power Plant FTP-2 construction workers.

Hypothesis 10: Safety behavior mediates the relationship between safety motivation and safety performance of Lombok Power Plant FTP-2 construction workers.

Safety Behavior

In their 2022 study, Cintya Dyah Atikasari and colleagues define safety behavior as "individual actions taken for self-protection, such as safety regulations to avoid danger." The operational definition of safety behavior is defined in terms of two key dimensions: compliance and safety participation. The measurement of safety behavior is conducted through two dimensions, as developed by Neal et al. (2000: 99-109), namely safety compliance and safety participation. Safety behavior, as defined by Sainan Lyu et al. (2018), refers to the actual behavior of individuals in the workplace. In accordance with the typology of work performance (Borman & Motowidlo, 1997: 99-109), safety behavior is distinguished as comprising safety participation and safety compliance.

The nature of values, norms, and attitudes related to safety will be associated with safety behavior in the workplace, which in turn will affect safety performance (Cintia Dyah Atikasari et al., 2022). (Sainan Lyu et al., 2018) posit that positive safety behavior will have a negative relationship with safety performance, as indicated by a reduction in the number of near misses and injuries in the employee's work environment. (Li Jiang et al., 2010) posit that organizations must take numerous actions to encourage employee safety behavior, to improve employee health and safety. (Pungki Sukmana Putra, 2022) posits that safety behavior can act as a mediator between the relationship between safety knowledge, workplace safety climate, and safety performance. Those who possess adequate safety knowledge and are supported by a positive workplace safety climate will be able to comprehend the ramifications of a work-related accident, both for themselves and for others. In light of the findings of previous research, which provide reasons that explain why and how workers' safety behavior relates to their safety performance, we put forward the following hypothesis:

Hypothesis 7: Safety behavior has a significant effect on the safety performance of Lombok Power Plant FTP-2 construction workers.

RESEARCH METHOD

This research employs a quantitative methodology, which is a research approach that prioritizes the analysis of numerical data and the testing of relationships between variables. The research proposed here is explanatory. As outlined by Sugiyono (2017: 6), explanatory research is a method of inquiry that seeks to elucidate the position of the variables under study and the influence exerted by one variable upon another.

Population and Sample

The population under investigation comprised all construction workers engaged in the Lombok Power Plant FTP-2 development project up until the March 2024 period, with a total of 278 workers. The sampling technique employed in this study is proportionate random sampling. This is a form of random sampling whereby the proportion or percentage of each

subpopulation in the population is proportionally represented in the sample taken. The sample size was determined using the Slovin formula (1960), resulting in a total of 165 respondents.

Research Instruments

A Likert scale was employed, with scores ranging from 1 (indicating strong disagreement) to 5 (indicating strong agreement). The data employed in this study are both primary and quantitative. Primary data is defined as data obtained or collected directly in the field by researchers from the person concerned. The data were collected using a questionnaire distributed to respondents via Google Forms.

Data Analysis

Descriptive analysis is employed to elucidate respondents' responses to research variables, with quantitative techniques utilizing the SEM (Structural Equation Modelling) model via the AMOS version 29 program. SEM enables the modeling of intricate relationships between variables within a unified framework, the measurement of latent variables that are not directly observable, and the simultaneous testing of hypotheses regarding causal relationships. This approach enhances the accuracy and reliability of the analysis. AMOS offers users a user-friendly interface, the capacity to visualize path diagrams, and advanced statistical analysis capabilities, including multigroup, mediation, and moderation analysis. The extensive use of AMOS in previous research provides a substantial body of literature and technical support for users.

RESULTS AND DISCUSSION

Respondent Characteristics

The majority of respondents were male (91.5%), with an age distribution that was concentrated in the 31-40 years age bracket (55.8%). The majority of respondents indicated that they are employed by subcontractors, representing 70.3% of the total sample. Additionally, the highest level of education attained by the respondents was at the secondary level, with 50.3% of the sample having completed secondary education. The majority of respondents have between five and ten years of experience in their field (33.9%), although

the experience of between 11 and 15 years is also not significantly different (32.7%). It can thus be concluded that the profile of workers is predominantly male, with a level of education that remains at the intermediate level but with sufficient work experience of between five and fifteen years, and a productive age range of between twenty and forty years.

Measurement Model Analysis

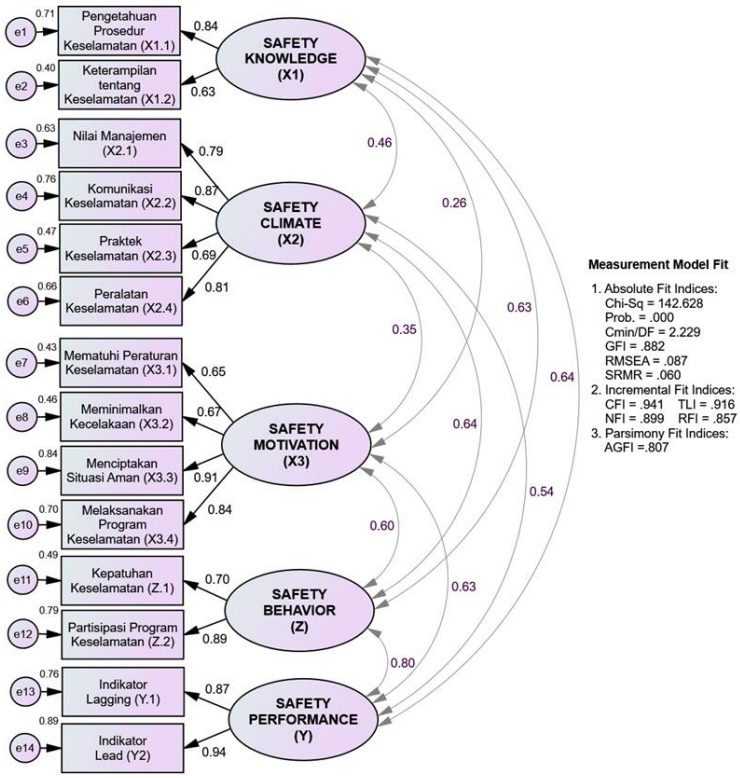

Figure 1.
Measurement Model Estimation Results

The objective of measurement model analysis is to assess the appropriateness of construct measurement and to ascertain the validity and reliability of indicators in reflecting the construct. Measurement model analysis is also referred to as a Confirmatory Factor Analysis (CFA) test, which is conducted in three stages: firstly, the measurement model fit is tested; secondly, construct validity is evaluated; and thirdly, construct reliability is assessed.

Table 1.
Fit Measure on Measurement Model

Fit Measure		Critical Value	Measurement Model	
			Index value	Remark
Absolute Fit Indices	Prob. χ^2	> 0,05	0,000	Even a good fit
	Cmin/df	≤ 3,00	2,229	Good fit
	GFI	≥ 0,90	0,882	Marginal fit
	RMSEA	≤ 0,08	0,087	Marginal fit
	SRMR	≤ 0,08	0,060	Good fit
Incremental Fit Indices	CFI	≥ 0,95	0,941	Marginal fit
	TLI	≥ 0,95	0,916	Marginal fit
	NFI	≥ 0,90	0,899	Marginal fit
	RFI	≥ 0,90	0,857	Marginal fit
Parsimony Fit Indices	AGFI	≥ 0,90	0,807	Marginal fit

Note:
GFI, CFI, TLI, NFI, RFI, & AGFI: result ≥ 0,80 marginal fit; result < 0,80 poor fit.
RMSEA: result 0,08-0,12 marginal fit; result >0,12 poor fit.

Structural Model Analysis

The objective of structural model analysis in SEM is to test the fit model, which assesses the degree of correspondence between the hypothesized structural model and the empirical data. A model that is deemed to be of satisfactory quality will demonstrate satisfactory fit values in accordance with the predetermined criteria. A valid structural model provides robust empirical evidence of the causal relationships between latent constructs, thereby enabling researchers to draw meaningful inferences about the relationships between variables within the context of the conceptual model developed.

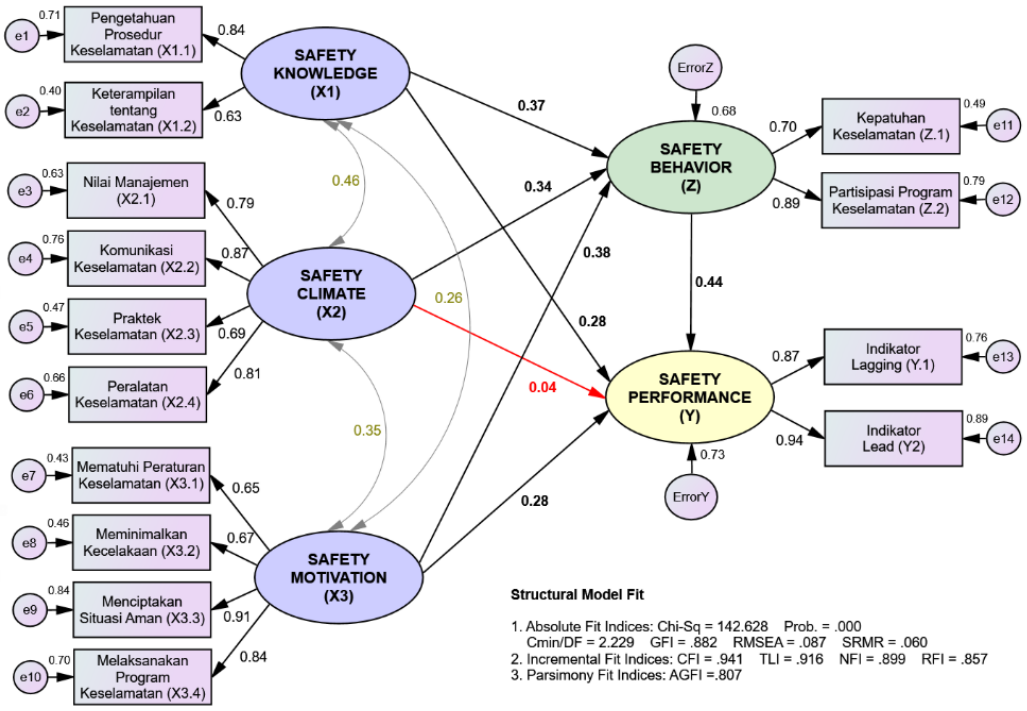

Figure 2.
Structural Model Estimation Results

Direct Effect Analysis

Table 2.
Direct Effect Hypothesis Testing

Direct Effect	Std. Estimate	S.E. Bootstrap	C.R.	P-value	Hypothesis Decisions
X1 → Z	0,371	0,047	3,426	0,013	H_1 Accepted
X1 → Y	0,280	0,072	2,250	0,036	H_2 Accepted
X2 → Z	0,339	0,078	3,295	0,015	H_3 Accepted
X2 → Y	0,035	0,100	0,360	0,525	H_4 Rejected
X3 → Z	0,385	0,091	3,967	0,007	H_5 Accepted
X3 → Y	0,284	0,153	2,340	0,038	H_6 Accepted
Z → Y	0,436	0,114	5,123	0,005	H_7 Accepted

Note:
X1: Safety Knowledge Z: Safety Behavior
X2: Safety Climate Y: Safety Performance
X3: Safety Motivation
SE, CR, & p-values based on bootstrapping bias-corrected percentile method

The relationship between safety knowledge and safety behavior is a topic of considerable interest within the field of occupational health and safety. The notable correlation between safety knowledge and safety behavior, as indicated by the CR 3.426 value exceeding 1.96 and the p-value of 0.013 falling below 0.05, suggests that an elevated level of safety knowledge among workers is associated with enhanced safety behavior. The positive effect coefficient of 0.371 indicates a positive relationship between safety knowledge and safety behavior, thereby supporting the hypothesis that there is a positive relationship between the two variables. The relationship between safety knowledge and safety performance is as follows: The significant effect with CR 2.250 and p-value 0.036 indicates that elevated levels of safety knowledge are associated with enhanced safety performance. The positive effect coefficient of 0.280 indicates a positive relationship, thereby supporting the hypothesis that H2 is valid.

The relationship between safety climate and safety behavior is as follows: The significant effect with CR 3.295 and p-value 0.015 indicates that a positive safety climate is associated with enhanced safety behavior among workers. The positive effect coefficient of 0.339 indicates a positive relationship, thereby supporting the hypothesis that a positive relationship exists between the two variables. The relationship between safety climate and safety performance is examined. The insignificant effect (CR 0.360, p-value 0.525) indicates that a good safety climate does not necessarily lead to improved safety performance. The effect coefficient of 0.035 indicates a very small impact, which leads to the rejection of hypothesis H4. This discrepancy may be attributed to inconsistencies in the implementation of safety policies in the field.

The relationship between safety motivation and safety behavior is as follows: The significant effect with CR 3.967 and p-value 0.007 indicates that high safety motivation is associated with increased safety behavior. The positive influence coefficient of 0.385 indicates a positive relationship, thereby supporting the hypothesis that H5 is correct. The relationship between safety motivation and safety performance is as follows: The notable effect, with a CR of 2.340 and a p-value of 0.038, suggests that elevated levels of safety motivation are associated with enhanced safety performance. The positive influence

coefficient of 0.284 indicates a positive relationship, thereby supporting the acceptance of hypothesis H6.

The relationship between safety behavior and safety performance is as follows: The significant effect with a CR of 5.123 and a p-value of 0.005 indicates that positive safety behavior is associated with enhanced safety performance. The positive influence coefficient of 0.436 indicates a positive relationship, thereby supporting the acceptance of hypothesis H7.

Indirect Effect Analysis

Table 3.
Indirect Effect Hypothesis Testing

No	Indirect effect	Specific Indirect Efect (Bias-Corrected Percentile Method)			
		Estimate	C.R.	P-value	Types of Mediation
1	X1 → Z → Y	0,162	2,043	0,023	p.m
2	X2 → Z → Y	0,148	2,000	0,027	f.m
3	X3 → Z → Y	0,168	2,198	0,020	p.m

Note:
X1: Safety Knowledge Z: Safety Behavior
X2: Safety Climate Y: Safety Performance
X3: Safety Motivation
p.m.: partially mediation f.m.: fully mediation n.m.: no mediation

The relationship between safety knowledge, safety behavior, and safety performance can be described as follows: The results demonstrate a statistically significant effect, with a coefficient of 0.162, CR 2.043, and a p-value of 0.023. The effect of safety knowledge on safety performance is partially mediated by safety behavior. Thus, while increasing safety knowledge alone can improve safety performance, improving safety behavior will increase the effect.

The relationship between safety climate and safety behavior is a significant predictor of safety performance. The results demonstrate a statistically significant effect, with a

coefficient of 0.148, a CR of 2.000, and a p-value of 0.027. The results demonstrate that safety behavior fully mediates the effect of safety climate on safety performance. This implies that enhancing safety performance cannot be achieved by solely improving safety climate; rather, it necessitates the simultaneous enhancement of safety behavior.

Safety motivation exerts a significant influence on safety behavior, which in turn affects safety performance. The results demonstrate a statistically significant effect, with a coefficient of 0.168, CR 2.198, and a p-value of 0.020. The results indicate that safety behavior plays a partial mediating role in the relationship between safety motivation and safety performance. This implies that while increasing safety motivation can enhance safety performance, the effect may be amplified through the improvement of safety behavior.

Discussion

The results of this study corroborate the hypothesis put forth by Machado and Davim (2021), namely that an increase in safety knowledge among workers leads to enhanced awareness and comprehension of safety risks and procedures. This, in turn, fosters a culture of safety in the workplace. The results of the study align with those of previous research conducted by Bemby Andrian Rahmadhan (2021), Kuo-Yang Kao et al. (2019), Chandrakantan Subramaniam et al. (2023), and Fariz Septian and Budhi Haryanto (2023). A high level of safety knowledge serves as a crucial foundation for the development of safe and compliant work behavior within the workplace. A robust comprehension of safety protocols facilitates greater compliance with safety regulations, enabling the identification of potential hazards and the implementation of requisite precautions.

The findings indicate that safety knowledge has a considerable impact on the safety performance of workers in the Lombok Power Plant FTP 2 construction project. These findings corroborate the hypothesis put forth by Machado and Davim (2021) that safety knowledge serves as the foundation for action at work, fostering awareness of potential hazards, compliance with safety procedures, and rational decision-making. The results of the study align with those previously reported by Gias Oktaruly Sinaga and Clariza Vioito Sinaga (2021), Ummu Kamila et al. (2021), and Dewi Syarifah and Rosatyani Puspita Adiati (2018). A high level of safety knowledge enables workers to identify and avoid potential hazards,

thereby reducing the likelihood of accidents. A comprehensive understanding of safety procedures enables workers to perform their duties safely and efficiently, thereby directly improving safety performance.

This result corroborates the theory put forth by Zohar (2003), which posits that a positive safety climate fosters a work environment that espouses and reinforces safety values, thereby enhancing workers' perceptions of the significance of safety practices and their inclination to adhere to safety protocols in the workplace. The same research results were also reported by Jiemin Zhang et al. (2022) and Muhammad Rafique et al. (2021). A positive safety climate is indicative of management's commitment to safety, the presence of clear safety policies and procedures, and the provision of effective support and communication regarding safety. When workers perceive safety as a priority and receive sufficient support from management, they are more likely to engage in safety-related behaviors.

This result does not corroborate the theory put forth by Zohar (2003), which posits that a positive safety climate fosters a work environment that encourages commitment, concern, and safety practices among workers, thereby markedly enhancing their safety performance through a reduction in accidents and work-related incidents. The findings of this study diverge from those of previous research conducted by Evan A. Nadhim et al. (2018), Hamed Aghaei et al. (2020), Beni Agus Setiono et al. (2018), and Fatma Lestari et al. (2023). Despite the presence of a favorable safety climate, the implementation and application of safety policies frequently exhibit inconsistencies in practice. The efficacy of safety policies is contingent upon the support of management and the consistent implementation by workers. In the absence of these conditions, the impact on safety performance is likely to be minimal. The communication of safety information was rated the lowest in terms of the safety climate, indicating that workers perceive deficiencies in the manner in which management conveys such information. The two items that were rated lowest by respondents were management's accuracy in delivering messages and management's ability to deliver information in a pleasant atmosphere. The age of the workers, the majority of whom are entering the productive age range of 20-40 years (millennials and Z generation), with 5-15 years of work experience, is considered to require a more engaging and innovative approach to communication.

The level of motivation concerning safety has a considerable impact on the behavior of workers engaged in the Lombok Power Plant FTP 2 construction project. These findings corroborate the hypothesis proposed by Phil Hughes and Ed Farrett (2007), which posits that motivation fosters compliance with safety procedures and safe behavior among workers, as they perceive greater responsibility and motivation to avoid risks. The results of the study align with those previously reported by Kwang-Seup Byun and Jin-woo Jung (2023), Ariska Nurul Heryati et al. (2019), and Mehmet Peker et al. (2022). A high level of safety motivation engenders a greater sense of passion and commitment among workers to ensure the safety of themselves and their colleagues. When workers are motivated to avoid accidents and to create a safe work environment, they will demonstrate superior safety behavior.

The findings of this study corroborate the hypothesis proposed by Phil Hughes & Ed Farrett (2007), namely that elevated levels of safety motivation prompt workers to adhere consistently to safety procedures and engage in safe practices (thereby reducing the incidence of accidents and injuries), thereby enhancing overall safety performance in the workplace. The results of the study align with those previously reported by Sanaz Vatankhah (2021) and Syazwan Syah Zulkifly et al. (2021). The presence of high safety motivation will encourage workers to engage more actively in safety programs and adhere more closely to safety procedures, which in turn will lead to an improvement in safety performance. Those with high levels of motivation are more likely to exercise caution and take a proactive approach to maintaining a safe working environment, which can ultimately lead to a reduction in the number of accidents and incidents that occur.

The findings of this study corroborate the hypothesis proposed by Arto Kuusisto (2000), which posits that consistent adherence to safety procedures can serve as a preventive measure against occupational accidents and injuries. The findings of this study align with those of previous research conducted by Cintya Dyah Atikasari et al. (2022), Sainan Lyu et al. (2018), Li Jiang et al. (2010), and Pungki Sukmana Putra (2022). Furthermore, the relationship between safety behavior and safety performance is partially mediated by safety knowledge and motivation, while the relationship with safety climate is fully mediated. This implies that improving safety performance necessitates not only enhancing safety climate but also fostering positive safety behavior.

The implementation of safe practices, such as adherence to safety protocols and engagement in safety initiatives, directly contributes to enhanced safety performance. When workers consistently demonstrate safe behavior, the likelihood of accidents and incidents is reduced, thereby enhancing overall safety performance.

CONCLUSION

The findings of this study indicate that safety knowledge, safety climate, and safety motivation have a significant effect on safety behavior among workers engaged in the Lombok Power Plant FTP 2 construction project. A comprehensive understanding of safety rules and procedures, coupled with management commitment and workers' motivation regarding the significance of safety in the workplace, fosters compliance and concern for safety among workers. Safety knowledge, safety motivation, and safety behavior have a significant effect on safety performance among workers on the Lombok Power Plant FTP 2 construction project. The skills of workers in implementing safety procedures, motivation for the importance of safety in the workplace, compliance, and participation of workers in safety programs have a positive effect on the prevention of workplace accidents. The influence of safety climate on safety performance among workers in the Lombok Power Plant FTP 2 construction project is found to be insignificant. In the absence of effective communication and consistent implementation of safety policies, the impact on safety performance is likely to be minimal.

In conclusion, it can be stated that safety behavior acts as a mediator between the influence of safety knowledge, safety climate, and safety motivation on safety performance in the context of the Lombok Power Plant FTP-2 construction project. Safety knowledge and safety motivation exert a partial mediation effect, whereas safety climate exerts a full mediation effect. To achieve optimal improvements in safety performance, project management must prioritize the enhancement of safety knowledge, motivation, and behavior. Training programs and interventions designed to enhance safety knowledge and motivation must be complemented by initiatives aimed at reinforcing safety behavior in the workplace.

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