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Influence of Leadership Behavior on Safety Culture Integration at PT Cipta Kridatama Site PT Borneo Indobara

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ABSTRACT

This study analyzes the interconnections among transformational leadership, safety culture, and safety behavior at PT Cipta Kridatama Site PT Borneo Indobara, a high-risk mining operation. The research, framed by theoretical views like the Theory of Planned Behavior and Hudson's Safety Culture Maturity Model, underscores the pivotal role of leadership in cultivating a proactive safety culture and impacting safety behavior. This research aims to assess the direct and indirect impacts of transformational safety leadership on safety behavior, with safety culture serving as a mediating variable. The research used Structural Equation Modeling (SEM) to examine quantitative data obtained from employee surveys, assessing leadership techniques, cultural characteristics, and behavioral results. The results indicate that transformational safety leadership exerts a substantial and robust impact on safety culture, evidenced by a coefficient of 0.923, a t-statistic of 72.438, and an effect size of 5.765. The safety culture markedly affects safety behavior, evidenced by a coefficient of 0.495, a t-statistic of 5.920, and an effect size of 0.180. Transformational safety leadership has a moderate direct influence on safety behavior (coefficient: 0.417, t-statistic: 4.977, effect size: 0.127) in comparison to its effect on safety culture. Moreover, safety culture mediates the connection between transformational leadership and safety behavior, evidenced by a mediation coefficient of 0.457, a t-statistic of 5.863, and an impact size of 0.180, underscoring its crucial function in converting leadership into behavioral results. The research emphasizes the necessity of combining transformational leadership methods with initiatives to foster a strong safety culture. Recommendations involve augmenting leadership training to integrate safety-oriented practices and executing cultural alignment techniques to maintain proactive safety habits. These insights enhance safety management techniques in high-risk sectors, foster safer workplaces, and improve overall operational outcomes.

Keywords: Transformational leadership, Safety Culture, Safety Behaviour

INTRODUCTION

Workplace safety, especially in high-risk sectors like mining and construction, is a critical issue that transcends basic regulatory compliance (Groves & Bunch, 2018; Mutegi et al., 2023). Effective safety management necessitates the development of a strong safety culture in which safety practices are routinely implemented and supported by leadership across all tiers. Safety leadership, grounded on transformational leadership theory, underscores the responsibility of leaders to inspire, motivate, and direct people to prioritize safety in every facet of their job. The efficacy of safety leadership is frequently indicated by the sophistication of the organization's safety culture, which includes collective values, attitudes, and behaviors pertaining to safety (Groves & Bunch, 2018; Mutegi et al., 2023).

The intricacies of developing and sustaining a robust safety culture are more obvious in environments characterized by frequent organizational change (Gilbert et al., 2018; Tear et al., 2020). A relevant instance is the contractor transition by PT Borneo Indobara (BIB), motivated by the primary objective of attaining 'zero damage.' The firm substituted its mining services contractor with PT Cipta Kridatama (CK), a contractor known for a history of recurrent accidents and an underdeveloped safety culture. The amalgamation of safety protocols among many firms with differing safety backgrounds has distinct problems, particularly in instilling rigorous safety standards among a subsidiary workforce that may exhibit resistance to change. In these contexts, establishing a unified safety culture that fosters consistent safety practices is essential for the enduring effectiveness of safety efforts.

Safety behavior is profoundly influenced by the organization's safety culture, which underpins the encouragement of proactive safety behaviors among employees. Schein (2010) defines safety culture as the collective attitudes, beliefs, and conventions inside an organization that compel personnel to prioritize safety in their everyday practices (Schein, 2010). A strong safety culture is essential in businesses experiencing substantial changes, such as contractor transitions, where harmonizing the safety standards of all stakeholders is vital. In this situation, safety leadership is paramount.

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Transformational leadership in safety, as articulated by Bass and Avolio (1994), emphasizes leaders who inspire and encourage people to embrace safe practices by establishing safety as a fundamental corporate priority. Effective safety leadership cultivates a culture that transcends basic compliance with safety requirements and promotes behaviors that exceed baseline standards, thus decreasing accidents and injuries (Bass & Riggio, 2006). The Theory of Planned Behavior corroborates this concept, indicating that safety behavior is affected by attitudes, perceived norms, and perceived behavioral control. Thus, cultivating a robust safety culture influenced by transformational safety leadership is crucial for developing and maintaining the safety behaviors required to safeguard employees and improve overall safety performance .

Subsequent to the contractor transition, PT Borneo Indobara sought to harmonize its rigorous safety protocols with PT Cipta Kridatama, emphasizing leadership skills including the provision of explicit safety guidance, fostering dedication to safety, and exemplifying safe practices. This alignment seeks to guarantee that executives from both organizations, who act as exemplars, regularly exhibit these abilities. The problem is to reconcile strategic corporate objectives with ensuring the health and safety of all individuals engaged in mining activities.This study article seeks to examine the impact of transformational safety leadership on safety culture and its effect on safety behavior at PT Cipta Kridatama and PT Borneo Indobara. The study aims to evaluate the direct and indirect linkages among transformational safety leadership, safety culture, and safety behavior to elucidate how successful leadership practices may foster a cohesive and resilient safety culture in high-risk industrial settings.

Literature Review

Safety Behavior

Safety behavior includes the acts and behaviors individuals undertake to guarantee their own safety and that of others in the workplace. It is a pivotal element in occupational safety, directly influencing the incidence of accidents and injuries (Nguyen et al., 2023). Heinrich's Domino Theory (1931) is one of the initial frameworks for comprehending safety behavior, positing that accidents arise from a chain of events initiated by risky activities or situations. In this context, safety behavior denotes proactive measures undertaken by individuals to avert accidents by disrupting this sequence of events (Creutzig et al., 2019; Yorio & Moore, 2018). Another significant model is Reason's Swiss Cheese Model (1990), which delineates safety behavior as the maintenance of several barriers to avert mishaps. Every layer of defense, including compliance with safety protocols and utilization of protective gear, mitigates the risk of accidents by diminishing the likelihood of mistakes (Larouzée & Guarnieri, 2015).

The Theory of Planned Behavior (TPB), formulated by Ajzen (1991), provides a robust framework for elucidating safety behavior. TPB posits that safety behavior is shaped by attitudes, subjective norms, and perceived behavioral control. Employees are predisposed to engage in safety behaviors when they possess a favorable attitude towards safety, recognize social endorsement for such behaviors, and believe in their capability to execute them (Ajzen, 1991). The TPB underscores the interplay of psychological factors and social influences in determining an individual's safety practices. In conclusion, safety behavior is affected by both individual and organizational elements, encompassing proactive measures and compliance with established protocols. Grasping these dimensions of safety behavior is essential for devising effective interventions that foster a safer workplace environment.

Safety Culture

Safety culture denotes the collective values, beliefs, attitudes, and practices that define an organization's dedication to safety at all levels. It demonstrates the prioritization and integration of safety into daily operations, directly affecting employee conduct and organizational safety results. Prominent theories enhance the comprehension of safety culture, including Heinrich's Domino Theory, which underscores management's influence on safety practices (Yorio & Moore, 2018), and Reason's Swiss Cheese Model, which depicts safety culture as the coordination of various defensive layers to avert accidents (Larouzée & Guarnieri, 2015). Zohar's Safety environment Theory posits that a favorable safety environment, influenced by managerial behaviors and employee perceptions, signifies a robust safety culture (Zohar, 2002).

The evaluation of safety culture may be conducted through many dimensions. Cooper's Safety Culture Framework classifies these into psychological (attitudes and beliefs), behavioral (safety practices), and situational (organizational environment) dimensions (Cooper, 2018). Hudson's Safety Culture Maturity Model delineates a developmental framework, classifying culture into stages: Pathological, Reactive, Calculative, Proactive, and Generative—spanning from little regard for safety to profoundly ingrained safety principles (Tappura et al., 2023). Assessing safety culture necessitates the evaluation of employee attitudes, observable safety behaviors, and the corporate environment, enabling a thorough comprehension that underpins targeted enhancements.

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Transformational Safety Leadership

Transformational safety leadership denotes the actions and methodologies employed by leaders to inspire and encourage people to regard safety as a fundamental corporate value rather than merely a compliance obligation. Effective safety leadership is directing workers to adopt safety measures, comply with rules, and participate in safe work practices, so cultivating a proactive safety culture. Transformational leadership has four essential elements: idealized influence, inspiring motivation, intellectual stimulation, and customized concern (Bass & Avolio, 1994). Idealized influence entails leaders serving as exemplars of safety, demonstrating appropriate behavior via their behaviors, so garnering trust and respect from their subordinates. Inspirational motivation involves leaders articulating a compelling vision of safety, so encouraging employees to recognize their responsibility in fostering a secure workplace (Spigener et al., 2022). Intellectual stimulation promotes critical thinking and innovation among personnel to tackle safety concerns, hence enhancing safety procedures. Individualized consideration entails acknowledging the distinct requirements of each individual, offering customized assistance and guidance, therefore augmenting their dedication to safety (Nguyen & Vu, 2023).

These elements assess transformational safety leadership via distinct dimensions: the leader's capacity to exemplify positive behavior (idealized influence), their proficiency in articulating a safety vision (inspirational motivation), the encouragement of innovative thought for safety enhancements (intellectual stimulation), and tailored support for each employee (individualized consideration). Transformational safety leadership is especially successful in fostering a safety culture, since it beyond mere compliance enforcement; it seeks to instill safety as a collective corporate value, hence improving safety behaviors and decreasing workplace accidents.

METHOD

Research Design

This research follows a structured, sequential approach to systematically address the business issue of safety management at PT Cipta Kridatama Site PT Borneo Indobara. The research design begins with identifying the business issue, focusing on the effectiveness of safety leadership, the maturity of safety culture, and the consistency of safety behavior (Hair et al., 2021). Following this, research questions and objectives are formulated to explore how transformational leadership affects safety culture and behavior within the organization. The study then moves to the data collection phase, primarily utilizing surveys to gather quantitative insights from employees and management. This is followed by data analysis to identify relationships between the key variables, providing empirical evidence to understand their interconnectedness. The final step, findings, involves summarizing the results, drawing conclusions, and offering recommendations for improving safety practices and leadership strategies to foster continuous safety performance improvement.

Data Collection

The primary method of data collection is a questionnaire, designed to gather quantitative data on employee and management perceptions regarding safety leadership, culture, and behavior. The target population comprises all employees at PT Cipta Kridatama Site PT Borneo Indobara, across various roles and levels. A random sampling method is used, and the appropriate sample size is calculated using Slovin's formula to ensure representativeness. Given a total population of 1,000 employees and a margin of error of 5%, the resulting sample size is approximately 286 participants. The questionnaire will be distributed electronically to ensure broad participation, with reminders sent to maximize response rates. The survey items are designed to measure the key variables based on established theories like Transformational Leadership (Bass & Riggio, 2006), Hudson's Safety Culture Maturity Model (Parker et al., 2006), and Ajzen's Theory of Planned Behavior (Bosnjak et al., 2020). This structured approach helps obtain reliable insights into the relationships among safety leadership, culture, and behavior.

Data Analysis

The data will be analyzed using Structural Equation Modeling (SEM) to examine the complex relationships between the variables (Dash & Paul, 2021; Hair et al., 2019). The SEM analysis begins with the outer model (measurement model) to assess the reliability and validity of the constructs—ensuring that the questionnaire items accurately represent safety leadership, culture, and behavior. Reliability will be tested using Cronbach's alpha, while validity will be assessed through convergent and discriminant validity. Once validated, the inner model (structural model) will be used to evaluate the relationships between the variables, focusing on the hypotheses regarding the impact of safety leadership on culture and behavior. The model fit will be assessed using indices like CFI, TLI, and RMSEA. The study also includes mediation analysis to explore whether safety culture mediates the effect of safety leadership on safety behavior, highlighting critical pathways through which transformational leadership can improve safety outcomes. The overall model fit and interpretation will be used to confirm the effectiveness of transformational leadership in promoting a strong safety culture and positive safety behaviors within the organization. These results will inform practical recommendations for enhancing safety leadership and safety practices at PT Cipta Kridatama Site PT Borneo Indobara.

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RESEARCH RESULTS AND DISCUSSION

Result

Respondent Characteristics

There are more than 2000 employees in PT Cipta Kridatama Site PT Borneo Indobara, therefore sampling is choosen to give the insight of the population. The respondent or sampling is primarily male, indicative of the physically strenuous requirements of mining activities. Male personnel represent around 85-90% of the workforce, predominantly engaged in heavy equipment operation and maintenance, whereas female employees comprise 10-15%, generally working administrative, support, or managerial roles with reduced physical demands.

The workforce exhibits a broad age distribution. Employees under 30 constitute 40-50% of the entire workforce, predominantly in operational positions such as machine operators and field laborers. Employees aged 30 to 45 constitute 35 to 45%, typically occupying managerial or senior operational roles that integrate experience with physical capability. Individuals over 45 years constitute around 10-15%, typically holding management, technical, or advising positions that need experience and strategic decision-making.

Educational qualifications differ based on the specific roles. High school graduates constitute 50-60% of the workforce, mostly engaged in operational positions such as equipment operators and field technicians. Graduates of vocational or technical schools constitute 20-30%, occupying specialized positions such as mechanics or electricians. Individuals possessing university degrees (Diploma or Bachelor's) constitute 10-20% of the workforce, generally employed in roles such as supervisors, engineers, or managers.

Employees with fewer than 5 years of experience constitute 30-40% of the workforce, holding entry-level positions. Individuals with 5-10 years of experience comprise 40-50%, occupying mid-level positions such as supervisors or technicians. Employees possessing over 10 years of experience represent 10-20%, predominantly occupying senior, management, or specialty positions.The personnel is distributed across many departments. The Operations Department constitutes the biggest segment, employing 60-70% of personnel engaged in heavy equipment operations, hauling, and field supervision. The Maintenance and Engineering Department constitutes 15-20%, concentrating on positions such as mechanics and engineers. Administration and Support, encompassing HR, safety officers, and administrative positions, constitutes 10-15%, whilst Management, comprising department heads and strategic leadership, accounts for 5-10%.

Owing to the continuous nature of mining activities, 80% of personnel are engaged in rotational shifts, including both diurnal and nocturnal schedules. The remaining 20% work regular hours, predominantly in administrative and management roles. This framework guarantees uninterrupted operations and administrative assistance for the mining activities. The workforce attributes demonstrate an optimization for the physical and technological requirements of mining, highlighting operational efficiency, technical proficiency, and organizational assistance.

SEM Pls Analysis

a. Outer Model

The analysis of the outer model confirms the reliability and validity of the constructs utilized in the study, specifically focusing on Transformational Leadership, Safety Culture, and Safety Behavior. All factor loadings exceeded the recommended threshold of 0.70, indicating strong and reliable associations between each construct and its indicators. For Transformational Leadership, indicators showed exceptionally high loading values, ranging from 0.908 to 0.950, demonstrating that these items are effective representations of the latent construct. Similarly, Safety Culture indicators had loadings between 0.891 and 0.922, and Safety Behavior indicators exhibited loadings from 0.853 to 0.880, which underscores that the indicators robustly reflect their respective latent constructs.

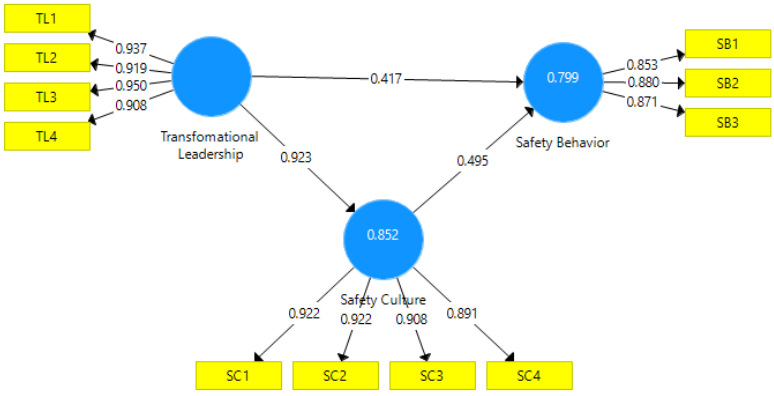

Figure 1. Outer Model Result

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These high loading values confirm the convergent validity of all constructs, meaning that the indicators effectively represent their theoretical dimensions. Each latent construct was found to capture a substantial portion of variance in its indicators, fulfilling the requirements for Average Variance Extracted (AVE), which was greater than the acceptable threshold of 0.50 for all variables. This means that each construct effectively explains the variance in its indicators, thereby minimizing the influence of measurement error. Furthermore, discriminant validity was also confirmed, as the loadings of each indicator on its respective latent construct were consistently higher than any cross-loadings, establishing that each construct was distinct from the others in the model.

Finally, the composite reliability values for all three constructs (Safety Behavior, Safety Culture, and Transformational Leadership) were well above the recommended threshold of 0.70, indicating high internal consistency among the indicators. This demonstrates that the items within each construct are consistent in measuring their intended latent variable. Overall, the reliability and validity analysis of the outer model provides strong evidence that the constructs are measured robustly, which ensures the accuracy of the subsequent structural analysis of the relationships between Transformational Leadership, Safety Culture, and Safety Behavior in this study.

b. Inner Model

The inner model analysis evaluates the structural relationships between the latent variables—Transformational Leadership, Safety Culture, and Safety Behavior—in this study. The R-Square Adjusted value is used to assess how much variance in the dependent variables (Safety Culture and Safety Behavior) can be explained by the independent variables (such as Transformational Leadership). The criteria for categorizing R-Square values are as follows: values greater than or equal to 0.75 are considered strong, values around 0.50 are moderate, and values near 0.25 are weak.

In this study, the R-Square Adjusted value for Safety Behavior is 0.797, indicating that approximately 79.7% of the variance in Safety Behavior is explained by its predictors—Transformational Leadership and Safety Culture. This suggests a substantial influence of these predictors on Safety Behavior, providing a robust model for explaining this construct. Similarly, the R-Square Adjusted value for Safety Culture is 0.851, meaning that 85.1% of the variance in Safety Culture is explained by Transformational Leadership. This very high value highlights the significant impact of Transformational Leadership on Safety Culture, underlining its critical role in shaping safety-related practices and attitudes.

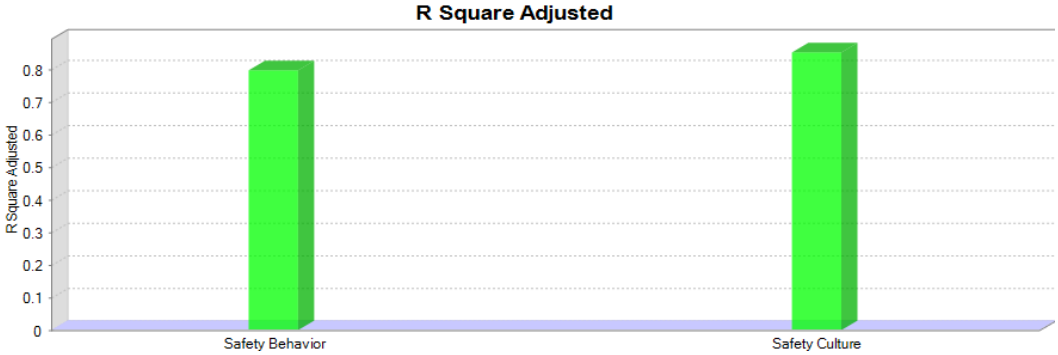

Figure 2. R^2 Adjusted Score

In conclusion, both R-Square values for Safety Behavior (0.797) and Safety Culture (0.851) fall within the "strong" category, demonstrating that the inner model is highly robust. The predictors in this study have substantial and meaningful influence on the dependent variables, validating the theoretical framework and highlighting the importance of these modeled relationships.

Bootstrapping is used in this study as a resampling technique to validate the significance and reliability of the structural relationships (path coefficients) and the indicator loadings within the model. T-statistics are calculated to assess whether these relationships are significant. High t-statistics indicate robust relationships and contribute to validating both the measurement model (outer model) and the structural model (inner model). The bootstrapping results show that the indicators for Transformational Leadership (TL1, TL2, TL3, TL4) have t-statistics of 103.080, 77.444, 129.881, and 65.214, respectively, all of which are highly significant. For Safety Culture (SC1, SC2, SC3, SC4), the t-statistics are 67.199, 88.004, 77.147, and 47.562, confirming the reliability of these indicators in measuring the construct. Similarly, for Safety Behavior (SB1, SB2, SB3), t-statistics of 37.264, 49.083, and 44.176 demonstrate that these indicators significantly represent the latent variable.

In terms of structural relationships, the path from Transformational Leadership to Safety Culture has a t-statistic of 72.438, indicating a highly significant relationship. The path from Safety Culture to Safety Behavior has a t-statistic of 5.920, while the path from Transformational Leadership to Safety Behavior has a t-statistic of 4.977, both confirming significant impacts.

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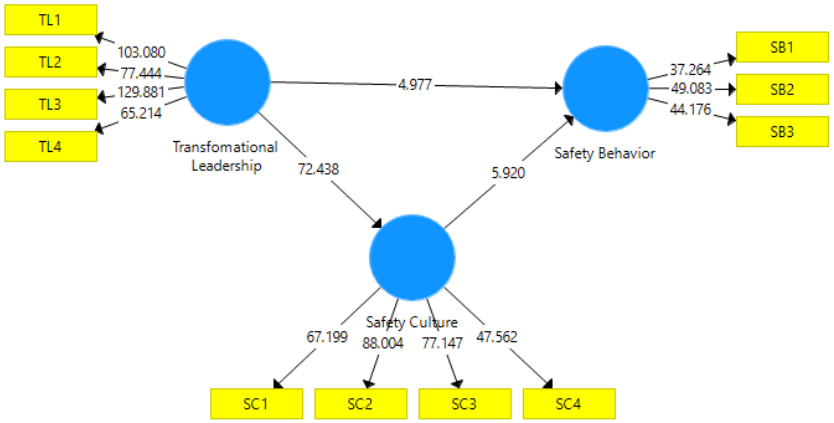

Figure 3. Bootstrapping Results

Overall, the bootstrapping results provide robust evidence for the reliability and significance of the model. High t-statistics for all indicator loadings confirm the strength of the measurement model, while significant t-statistics for structural paths validate the relationships between Transformational Leadership, Safety Culture, and Safety Behavior. These findings underscore the robustness of the SEM model used in this study, supporting its suitability for explaining the proposed theoretical framework.

Hypothesis

The hypothesis testing results in this study evaluate the direct effects between the latent variables using Structural Equation Modeling (SEM). A significance level of $p < 0.05$ is used to determine whether the relationships between variables are statistically significant. The relationship between Safety Culture and Safety Behavior has an original sample coefficient of 0.495, indicating a moderate positive influence. The corresponding t-statistic is 5.920, and the p-value is 0.000, confirming that the effect is statistically significant. This result indicates that improvements in Safety Culture have a positive impact on Safety Behavior, emphasizing the role of a strong safety culture in promoting safe workplace practices. The direct relationship between Transformational Leadership and Safety Behavior is also significant, with an original sample coefficient of 0.417 and a t-statistic of 4.977. The p-value of 0.000 suggests a meaningful positive influence of Transformational Leadership on Safety Behavior. This finding underscores the importance of leadership in directly encouraging safe practices among employees. The influence of Transformational Leadership on Safety Culture demonstrates the strongest relationship in the model, with an original sample coefficient of 0.923 and a t-statistic of 72.438. The p-value of 0.000 indicates high significance, showing that Transformational Leadership is a critical determinant of Safety Culture. The strength of the coefficient highlights that effective leadership is essential for creating and maintaining a strong safety culture.

Table 1 Diret Effect

The influence between variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Safety Culture -> Safety Behavior	0.495	0.483	0.084	5.920	0.000
Transfomational Leadership -> Safety Behavior	0.417	0.427	0.084	4.977	0.000
Transfomational Leadership -> Safety Culture	0.923	0.921	0.013	72.438	0.000

Table 2 Indirect Effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Transfomational _Leadership -> Safety Culture -> Safety Behavior	0.457	0.445	0.078	5.863	0.000

The hypothesis testing results confirm that all three direct relationships—between Transformational Leadership, Safety Culture, and Safety Behavior—are statistically significant, with p-values below 0.05. Transformational Leadership

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significantly influences both Safety Culture and Safety Behavior, while Safety Culture has a positive impact on Safety Behavior. These findings validate the theoretical framework, illustrating that leadership plays a critical role in shaping a strong safety culture, which subsequently improves safety behavior. Additionally, the analysis of the indirect effect examines the mediating role of Safety Culture in the relationship between Transformational Leadership and Safety Behavior. The original sample coefficient for the indirect effect is 0.457, indicating a moderately strong positive impact of Transformational Leadership on Safety Behavior when mediated by Safety Culture. The t-statistic is 5.863, and the p-value is 0.000, confirming the significance of the indirect effect.

These findings underscore that Safety Culture substantially influences the association between Transformational Leadership and Safety Behavior. The mediating function of Safety Culture amplifies the effect of Transformational Leadership, indicating that cultivating a robust safety culture is essential for enhancing the beneficial effects of leadership on safety-related behaviors. This affirms the interrelation of leadership, culture, and behavior in attaining safety results, emphasizing the significance of leadership-driven cultural efforts for fostering a safe and productive workplace environment.

Effect Size

The effect size analysis assesses the extent of the impact that each independent variable exerts on the dependent variables in the model. The impact size is classified as high (≥ 0.35), moderate (≥ 0.15), and weak (≤ 0.02). This analysis elucidates the relative relevance of each link and assists in assessing the practical implications of the structural model's routes. The impact size for the association between Safety Culture and Safety Behavior is 0.180, categorizing it as moderate. This indicates that Safety Culture somewhat affects Safety Behavior, highlighting the necessity of fostering a robust safety culture to enhance safety behaviors inside the firm.

The effect size for the correlation between Transformational Leadership and Safety Culture is 5.765, indicating a remarkably high and robust association. This illustrates that Transformational Leadership has a pivotal influence on Safety Culture, emphasizing the substantial impact of leadership in molding and supporting corporate safety standards, attitudes, and practices.

The impact size for the correlation between Transformational Leadership and Safety Behavior is 0.127, categorizing it as weak. The direct impact of Transformational Leadership on Safety Behavior is statistically significant; however, the lesser effect size suggests that this influence is more effectively mediated by Safety Culture. This discovery underscores the intermediary function of Safety Culture in connecting leadership practices with safety-related behaviors.

Table 3. Efect Size

The influence between variables	Safety Behavior	Safety Culture	Transfomational _Leadership
Safety Behavior			
Safety Culture	0.180		
Transfomational Leadership	0.127	5.765	

In conclusion, the effect size analysis reveals that while Transformational Leadership has a very strong impact on Safety Culture, its direct effect on Safety Behavior is comparatively weaker. Safety Culture, however, has a moderate impact on Safety Behavior, which underscores its role as a mediator that enhances the influence of leadership. These findings reinforce the interconnectedness of the constructs and validate the theoretical framework, emphasizing that Safety Culture plays a vital role in amplifying the effectiveness of Transformational Leadership in promoting safety-related behaviors.

Discussion

Transformational Safety Leadership Influence Safety Culture at PT Cipta Kridatama Site PT Borneo Indobara

Transformational safety leadership significantly influences the safety culture at PT Cipta Kridatama Site PT Borneo Indobara, as evidenced by a direct effect coefficient of 0.923, a t-statistic of 72.438, and a p-value of 0.000. These results demonstrate the robust positive relationship between transformational leadership and safety culture, supported by an effect size of 5.765, emphasizing the substantial impact of leaders who inspire employees, prioritize safety values, and foster proactive safety behaviors. Hudson's Safety Culture Maturity Model suggests that such leadership moves the organization towards higher stages of cultural maturity, beyond compliance-driven stages to proactive and generative levels, where safety is a deeply ingrained core value. Additionally, the Theory of Planned Behavior (TPB) explains how leadership shapes employees' attitudes, subjective norms, and perceived behavioral control, thus translating leadership values into actionable safety behaviors. The feedback loop framework also highlights how transformational leadership creates a self-sustaining cycle of improvement by fostering a strong safety culture that reinforces positive safety behaviors. Overall, these findings affirm the pivotal role of transformational safety leadership in cultivating an embedded safety culture at

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PT Cipta Kridatama, while also underscoring the importance of trust, equity, and technology integration in sustaining its effectiveness.

Safety Culture Influence Safety Behavior at PT Cipta Kridatama Site PT Borneo Indobara

Safety culture plays a significant role in influencing safety behavior at PT Cipta Kridatama Site PT Borneo Indobara, with a moderate positive relationship indicated by an original sample coefficient of 0.495, a t-statistic of 5.920, and an effect size of 0.180. These results suggest that fostering a well-established safety culture is essential for enhancing employee adherence to safe practices. According to Hudson's Safety Culture Maturity Model, the findings imply that the organization has progressed beyond a calculative safety culture stage towards a proactive or generative level, where safety is deeply integrated into daily operations. The Theory of Planned Behavior (TPB) further supports this by illustrating how a strong safety culture positively shapes employees' attitudes, subjective norms, and perceived behavioral control, thereby reinforcing safety behaviors. The feedback loop framework also demonstrates the cyclical reinforcement of culture and behavior, where consistent adherence to safety protocols strengthens the safety culture and contributes to its continuous evolution. These insights emphasize the need for a strong safety culture to create a sustained positive impact on safety behavior, complemented by effective leadership, organizational dynamics, and trust-building efforts.

Transformational Safety Leadership Directly Influence Safety Behavior at PT Cipta Kridatama Site PT Borneo Indobara

Transformational safety leadership has a direct but moderate influence on safety behavior at PT Cipta Kridatama Site PT Borneo Indobara, indicated by a coefficient of 0.417, a t-statistic of 4.977, and a weak effect size of 0.127. These results suggest that while transformational leadership significantly impacts safety behavior, its direct influence is less pronounced compared to its effect on safety culture. Transformational leaders inspire positive attitudes, establish strong subjective norms, and enhance perceived behavioral control, which contributes to safe behaviors, as explained by the Theory of Planned Behavior (TPB). However, the relatively weak effect size highlights the need for leadership to be complemented by a supportive cultural environment for maximum effectiveness. The feedback loop framework illustrates that transformational leadership achieves its full potential in promoting safety behaviors when integrated with a robust safety culture, which acts as a reinforcing mechanism that ensures safety behaviors are internalized rather than externally enforced. Thus, these findings indicate that leadership alone may establish a foundation for safe practices, but a strong safety culture is necessary to sustain and amplify the influence on safety behavior.

Safety Culture Mediates the Relationship Between Transformational Safety Leadership and Safety Behavior at PT Cipta Kridatama Site PT Borneo Indobara

Safety culture plays a critical mediating role in the relationship between transformational safety leadership and safety behavior at PT Cipta Kridatama Site PT Borneo Indobara, as demonstrated by an indirect effect coefficient of 0.457, a t-statistic of 5.863, and a moderate effect size of 0.180. These results indicate that transformational leadership's impact on safety behavior is significantly enhanced when mediated by safety culture. The mediating role of safety culture aligns with Hudson's model, where transformational leadership helps the organization progress towards proactive or generative cultural stages, thereby embedding safety values that naturally promote safety behaviors. The Theory of Planned Behavior (TPB) also supports this, showing how a strong safety culture shapes attitudes, subjective norms, and perceived behavioral control, ensuring that leadership-driven values translate into actionable safety behaviors. The feedback loop framework further highlights the dynamic interplay between leadership, culture, and behavior, emphasizing the long-term sustainability of safety initiatives through a strong cultural foundation. Overall, the findings underscore that while transformational leadership has a moderate direct effect on safety behavior, its true potential is realized when safety culture mediates this relationship, amplifying the positive influence of leadership on safety-related behaviors.

CONCLUSIONS

The study confirms that transformational safety leadership plays a significant and strong role in fostering safety culture at PT Cipta Kridatama Site PT Borneo Indobara. The results indicate that leadership, characterized by inspirational motivation and proactive safety practices, significantly enhances safety culture, ensuring that safety values become embedded within the organization. Additionally, the study highlights that safety culture has a moderate positive impact on safety behavior, creating an environment that supports adherence to safety protocols. Transformational leadership also directly influences safety behavior, though the effect is moderate, suggesting that its impact is more pronounced when combined with cultural initiatives. Furthermore, the findings demonstrate that safety culture mediates the relationship between transformational leadership and safety behavior, emphasizing the interconnectedness of leadership, culture, and behavior in achieving improved safety outcomes.

To build upon the findings, several actions are recommended for implementation. Leadership training programs should be tailored to different employee education levels to enhance safety culture integration, while experienced

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employees should be promoted into leadership roles to leverage their operational knowledge. Safety programs should focus on high-risk departments, and safety committees led by experienced staff can provide practical safety improvements. Aligning leadership practices with cultural initiatives through regular safety discussions will help embed safety values. Foundational and advanced safety training should be provided, trust-building sessions should be held regularly, and a mobile app should be implemented to enhance safety communication. Virtual reality technology can offer hands-on training for high-risk roles, and workshops should emphasize the mediating role of safety culture in linking leadership to behavior. Finally, experienced employees should be encouraged to lead cultural maturity initiatives to advance departmental safety culture. For future research, studies should consider the moderating effects of organizational trust, resources, and psychological safety on the relationship between leadership, culture, and behavior. Comparative studies across industries could provide insights into industry-specific challenges, while the role of digital transformation in enhancing leadership should be further explored. Future research should also consider how employee characteristics influence safety outcomes and conduct long-term studies to assess the evolution of leadership and safety culture over time.

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