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Evaluating OSH Work Environment Implementation at PLN Offices: Impact of Safety Climate and Behavior

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ABSTRACT

This study evaluates the implementation of Occupational Safety and Health (OSH) practices at PT. PLN (Persero) UP3 Padang. The electricity sector faces significant OSH challenges, and while research has explored OSH in various settings, a gap remains in the evaluation of OSH practices within Indonesian office environments. This study aims to address this gap by evaluating OSH work environment implementation at PT. PLN (Persero) UP3 Padang based on the Indonesian Ministry of Manpower Regulation/ Pemenaker No. 5 of 2018. The research employs a primarily quantitative approach, utilizing a descriptive survey design. Data, gathered through questionnaires, assessed OSH implementation (based on Permenaker No. 5 of 2018), safety climate, and employee safety behavior. The results indicate that PT. PLN (Persero) UP3 Padang has demonstrated a strong commitment to OSH, achieving a generally high level of compliance with Permenaker No. 5 of 2018. Employees reported a positive safety climate, with high average scores for management commitment (approximately 3.55). Employee adherence to safe work practices was also high, although hazard reporting behavior received a lower average score of 3.56. Furthermore, the reporting and communication culture dimension within the safety climate was the lowest at 3.28. A strong positive correlation was found between safety climate and OSH implementation ($\rho = 0.7218$; $p < 0.001$). The study concludes that while OSH implementation is generally effective, there are areas for improvement, including controls for specific hazards and hazard reporting. Continuous improvement and targeted interventions are crucial for enhancing OSH performance within the organization and similar office settings.

Keywords *: OSH; Work Environment; Safety Climate; Safety Behavior; PLN*

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INTRODUCTION

Occupational Safety and Health (OSH) is a fundamental imperative for all contemporary workplaces. The electricity sector presents unique and substantial OSH challenges, stemming from inherent hazards such as electricity, work at height, and the operation of heavy machinery (1,2) The International Labour Organization (ILO) estimates that the electricity supply industry has a fatality rate of 4.2 per 100,000 workers, significantly higher than the average across all sectors (3). In Indonesia, data from the Ministry of Manpower (Kemnaker) indicates that the electricity, gas, and water supply sector consistently recorded high accident rates with a rising trend from 2020 to 2024. Kemnaker's "Satu Data" records consistently rank this sector among the top five categories with the highest frequency of incidents, underscoring a persistent systemic challenge in managing occupational risks (4). Consequently, effective OSH practices are a necessity for cultivating safe environments and preventing workplace illnesses.

While OSH research has extensively explored hazard identification and safety leadership in high-risk industries (5–8), scholarly attention to OSH within office settings, particularly in the Indonesian electricity sector, remains limited (9). Study by Bayram (2019) highlighted the positive impact of comprehensive OSH training programs on enhancing employee adherence to safety protocols (10). This disparity highlights the continued need for comprehensive approaches to ensure workplace safety across all work environments (11,12).

Despite the breadth of existing OSH research, a notable gap exists concerning the specific context of PT. PLN (Persero) UP3 Padang. While the company is a key player in Indonesia's national electricity infrastructure, the specific OSH challenges within its operational framework, especially within the Padang area, warrant detailed examination. Internal data from PT. PLN (Persero) UP3 Padang reveals a significant occurrence of workplace accidents

over the past five years, with office environments contributing substantially to these incidents. Although often less severe than field-related accidents, these office incidents have resulted in lost workdays and increased healthcare expenditures. Moreover, a recent internal survey indicated that only 60% of employees at PT. PLN (Persero) UP3 Padang perceive their office environment as entirely safe.

Consequently, there is a clear need for a study that rigorously evaluates the effectiveness of current OSH practices at PT. PLN (Persero) UP3 Padang. In the context of this study, OSH implementation is specifically evaluated through the lens of workplace environmental safety and health requirements, as regulated by the Indonesian Ministry of Manpower Regulation (Permenaker) No. 5 of 2018. While a comprehensive OSH Management System (OSHMS) encompasses broader administrative elements, this research focuses on the physical, chemical, biological, ergonomic, and psychological factors that directly constitute the daily work environment in an office setting. This targeted approach allows for a granular assessment of how the immediate work environment interacts with safety climate and employee behavior. This research aims to evaluate the implementation of OSH work environment practices at PT. PLN (Persero) UP3 Padang by identifying the level of compliance with Permenaker No. 5 of 2018, analyzing the factors that influence implementation, and assessing the impact on employee awareness and behavior.

METHODS

This study employed a primarily quantitative approach with a cross-sectional analytic design to evaluate OSH work environment implementation and its influence on safety climate and employee behavior at PT. PLN (Persero) UP3 Padang from April to May 2025. Conducted within an office environment in Padang, West Sumatra, the study utilized a census of 106 office employees for the quantitative phase. Data were gathered using two

primary instruments: an observation checklist and a structured questionnaire. OSH implementation was assessed using a binary scoring system (Yes/No) based on Permenaker No. 5 of 2018 (13), focusing on ten consolidated environmental dimensions where a "Compliant" status required 100% documented evidence. The questionnaire, adapted from Johnson (2007) (14)and Sorensen et al. (2018) (15), measured Safety Climate across six dimensions (22 items, 5-point Likert scale) and Employee Safety Behavior across four domains (12 items, 5-point frequency scale). Prior to distribution, the instruments underwent pilot testing with 10 employees to ensure content validity ($r > 0.3$) and internal consistency via Cronbach's alpha.

The research protocols adhered to the Declaration of Helsinki, ensuring participant protection through informed consent, guaranteed anonymity, and secure data storage. Ethical and administrative clearances were formally obtained from Universitas Andalas and PT. PLN (Persero) UP3 Padang. The data analysis plan followed three stages: assessing scale reliability, summarizing descriptive statistics, and performing Spearman's rank correlation (Spearman's rho) to examine relationships between ordinal variables that did not meet normality assumptions. Correlation strengths were interpreted using Evans' (1996) criteria. Finally, the quantitative findings were validated through a Focus Group Discussion (FGD) with five key stakeholders, including the Assistant Manager of OSH and Environment and OSH supervisors. This qualitative process ensured that the results were interpreted within the practical context of the office's operational framework without altering the original statistical scores.

RESULTS

The demographic profile of the 106 participants is summarized in Table 1. The majority of respondents were male (62.3%), with a significant portion (45.3%) having a tenure of more than 10 years at PT. PLN (Persero) UP3 Padang. In terms of age, the largest group was

between 31–40 years old (38.7%). The distribution across departments was relatively balanced, with the largest representation coming from the Network and Distribution unit. These characteristics provide a critical context for interpreting safety climate perceptions and self-reported behaviors.

Table 1. Distribution of Respondent Characteristics

Characteristic	Category	Frequency (n)	Percentage (%)
Sex	Male	66	62.3
	Female	40	37.7
Age (Years)	20 – 30	25	23.6
	31 – 40	41	38.7
	> 40	40	37.7
Tenure	< 5 years	30	28.3
	5 – 10 years	28	26.4
	> 10 years	48	45.3

Source : Primary Data, 2025

Prior to the main data analysis, the reliability of the research instruments was evaluated. The Cronbach's alpha values for the Safety Climate and Employee Safety Behavior scales were 0.892 and 0.815, respectively, indicating high internal consistency. The reliability for each dimension also exceeded the acceptable threshold of 0.70. Furthermore, all items in the questionnaire demonstrated valid item-total correlation coefficients ($r > 0.361$ for $n=30$ in the broader pilot phase), confirming the construct validity of the instrument. The distribution of items and their respective alpha values are summarized in Table 2.

Table 2. Reliability Statistics for Safety Climate and Behavior Scales

Variable/Dimension	No. of Items	Cronbach's Alpha	Interpretation
Safety Climate (Overall)	22	0.892	Reliable
Management Commitment	5	0.875	Reliable
Reporting & Comm. Culture	3	0.798	Reliable
Safety Behavior (Overall)	12	0.815	Reliable
Safe work procedures	3	0.802	Reliable
Hazard reporting	3	0.785	Reliable

Source : Primary Data, 2025

The evaluation of Occupational Safety and Health (OSH) implementation at PT. PLN (Persero) UP3 Padang, as summarized in Table 3, demonstrates a high level of compliance with the Indonesian Ministry of Manpower Regulation No. 5 of 2018. Out of the 10 consolidated OSH dimensions assessed, the company has successfully fulfilled 9 categories, reflecting a strong institutional commitment to maintaining a safe and healthy work environment.

Consistent compliance was observed in fundamental areas such as hygiene and sanitation facilities (Articles 3 & 33), the availability of certified OSH personnel (Articles 3 & 45), and systematic environmental monitoring (Articles 6, 21, & 69). The company has also established robust hazard control mechanisms and hazardous material (Hazmat) management (Articles 7 & 44), supported by various Standard Operating Procedures (SOPs), including PR-SMK3-34 and PR-SMK3-12. Furthermore, essential physical, biological, ergonomic, and psychological factors have been proactively managed, evidenced by periodic measurements and medical examination programs for employees.

Table 3. Assessment of OSH Implementation Compliance with Permenaker No. 5 of 2018 at PT. PLN (Persero) UP3 Padang

No	Article(s)	Evaluated OSH Dimensions	Status	Evidence of Compliance
1	3, 33	Hygiene, Sanitation & Facilities	Compliant	Sanitation facility checklist and 2024 maintenance records for toilets, handwashing, and changing rooms
2	3, 45	OSH Personnel & Competency	Compliant	Certificates of OSH Experts and Internal Appointment Decrees
3	6, 21, 69	Environment Monitoring & TLV	Compliant	2024 Hygiene reports & periodic TLV audits
4	7, 44	Hazard Control & Hazmat	Compliant	SOPs for Hazmat (PR-SMK3-34), LOTO

				procedures, and standardized safety labeling
5	9, 10, 15, 16	Physical Factors (Climate, Noise, etc.)	Compliant	Official measurement logs for ambient temperature, noise levels, and lighting intensity
6	11 – 14	Specific Waves (Vibration, UV, Mag.)	Non-Compliant	No monitoring for vibration/radiation
7	22	Biological Factor Control	Compliant	Employee vaccination records and scheduled building disinfection logs
8	23	Ergonomic Factors	Compliant	Ergonomic posture evaluation reports and procurement records for assistive office devices
9	24	Psychological Factors	Compliant	Results of workload assessments and annual employee stress monitoring reports
10	25, 29	Occupational Health & Maintenance	Compliant	Medical examination reports (SOP PR-SMK3-37) and routine health inspection logs

Source : Primary Data, 2025

The identification of non-compliance regarding specific physical waves (Articles 11–14) is based on the absence of regular monitoring for potential exposure sources within the office complex. For instance, ultraviolet (UV) radiation risks are associated with employees performing outdoor duties or exposure to specific lighting systems, while static magnetic fields are potentially present in proximity to electrical transformer rooms and main distribution panels located within the building. Furthermore, vibration hazards may stem from the continuous operation of large-scale HVAC (Heating, Ventilation, and Air

Conditioning) systems and backup power generators. While these risks might be considered lower in an office setting compared to field operations, periodic assessment remains a regulatory requirement to ensure long-term occupational health. These findings suggest that while the overall OSH program is mature, specific monitoring for less visible physical hazards requires further integration into the company's OSH management system.

The results of the safety climate questionnaire are presented in Figure 1, showing the average scores for each dimension. The results of the employee safety behavior questionnaire are presented in Figure 2, showing the average scores for each behavior.

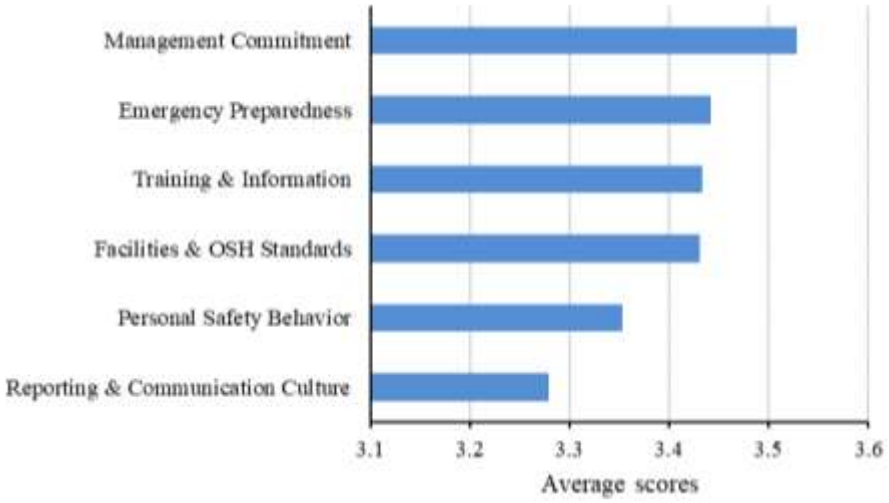

Figure 1. Average Scores for Safety Climate Dimensions

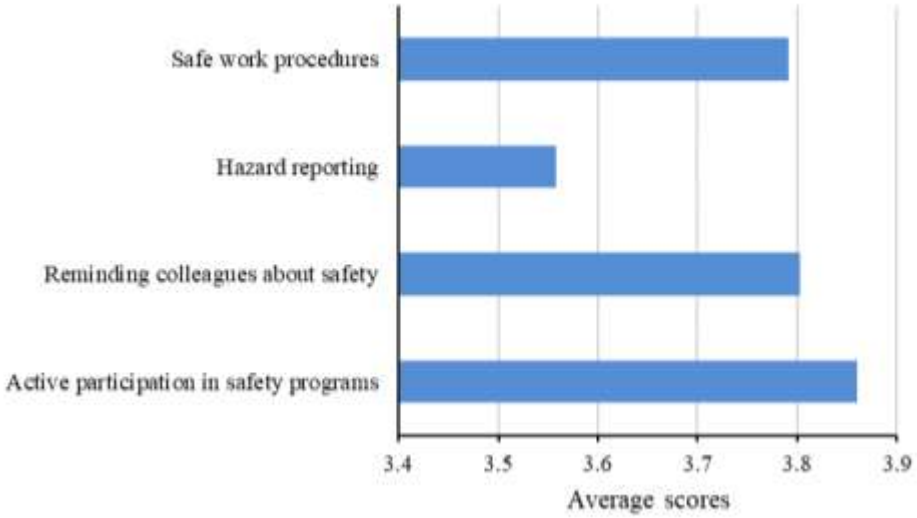

Figure 2. Average Scores for Employee Safety Behavior

Figure 1 illustrates that employees generally reported positive perceptions of the safety climate. Management commitment received the highest average score (3.55 ± 0.45), indicating that employees perceive management as strongly committed to safety. Other dimensions, including emergency preparedness, training and information, and facilities and OSH standards, also received relatively high average scores (3.4 ± 0.52). Figure 1 illustrates that the reporting and communication culture received the lowest average score (3.28 ± 0.61), suggesting that this organizational aspect may need attention.

Figure 2 shows the average scores for employee safety behavior. Employees reported engaging in safe work procedures and actively participating in safety programs at a high frequency (average scores 3.8 ± 0.38). Reminding colleagues about safety also received a high score (3.75 ± 0.42). Meanwhile, Figure 2 shows that hazard reporting behavior—while still positive—also received the lowest score (3.56 ± 0.55) compared to other specific safety behaviors, indicating that this behavior is less consistently practiced compared to other

safety behaviors. Overall, the standard deviations (SD) for all dimensions ranged from 0.38 to 0.61, indicating a relatively low dispersion of responses around the mean.

The results of the Spearman's rank correlation analysis, examining the relationships between safety climate, OSH implementation, and employee safety behavior, are presented in Table 4.

Table 4. Spearman's Rank Correlation Coefficients

No	Correlation between	ρ-value	p-value (2-tailed)	Interpretation
1	Safety climate and OSH implementation	0.7218	< 0.001	Strong Positive
2	Safety behavior and OSH implementation	0.2011	0.039	Weak Positive

Source : Primary Data, 2025

Table 4 reveals a strong positive correlation between safety climate and OSH implementation ($\rho = 0.7218$, $p < 0.001$). This indicates a tendency statistically significant for a more positive safety climate to be associated with higher levels of OSH implementation. However, the correlation between safety behavior and OSH implementation was weak ($\rho = 0.2011$, $p = 0.039$), although it remained statistically significant at the 0.05 level, suggesting a limited relationship between these two variables in this study.

DISCUSSION

The findings of this study indicate that PT. PLN (Persero) UP3 Padang has demonstrated a commendable level of commitment to OSH, as evidenced by the substantial compliance with Permenaker No. 5 of 2018. The comprehensive evaluation reveals that the company has established a range of OSH procedures and programs, encompassing critical areas such as environmental monitoring, workplace inspections, and emergency preparedness. The high level of compliance with Permenaker No. 5 of 2018 (9 out of 10 dimensions) suggests

that the organization has successfully managed its immediate physical and psychological work environment. However, it is important to distinguish that these findings reflect workplace environmental health rather than the entirety of a safety management system like ISO 45001. The identified gaps in monitoring physical agents, such as vibration and electromagnetic fields, necessitate a more nuanced hazard identification process. In integrated office facilities co-existing with electrical infrastructure, the presence of high-voltage equipment and mechanical support systems (e.g., generators and HVAC) creates micro-environments where exposure limits must be verified to prevent long-term health complications. This proactive approach aligns with the established principles of effective OSH management systems, which underscore the fundamental importance of systematic hazard identification, rigorous risk assessment, and the implementation of robust control measures (2,6,16,17). This systematic approach is crucial for preventing workplace incidents and promoting a safe working environment.

The predominantly positive perception of the safety climate among employees further supports these findings. The high average scores observed for management commitment, safety communication, employee involvement, and safety attitudes strongly suggest that PT. PLN (Persero) UP3 Padang has cultivated a safety culture where employees perceive OSH as a core organizational value. This is consistent with previous research that has demonstrated a strong link between a positive safety climate and improved safety outcomes (18–20). A positive safety climate fosters a sense of shared responsibility for safety, encouraging employees to actively engage in safety-related activities, diligently comply with safety regulations, and proactively report potential hazards, thereby contributing to a significant reduction in the likelihood of workplace accidents and injuries (21,23).

Furthermore, the self-reported safety behaviors of employees indicate a generally high level of adherence to safe work practices (24,26). The majority of employees reported consistent use of PPE, adherence to safety proc4,edures, and proactive efforts to remind

colleagues about safe work practices. This finding suggests that the OSH programs and initiatives implemented by PT. PLN (Persero) UP3 Padang have been effective in promoting positive safety behaviors among the workforce. However, the relatively lower scores observed for hazard reporting suggest that there is scope for improvement in fostering a more proactive hazard reporting culture within the organization. In the specific context of the PLN UP3 Padang office, this "low reporting culture" (3.28) and "hazard reporting behavior" (3.56) may stem from a "fear of blame" or the perception that office-based hazards are trivial compared to high-risk field operations. The current reporting system might be perceived as cumbersome or lacks a clear feedback loop, leading employees to feel that reporting minor office issues—such as ergonomic discomfort or frayed cabling—will not result in meaningful change. This highlights the need for targeted interventions to strengthen hazard reporting mechanisms.

The study's use of Spearman's rank correlation coefficient to analyze the relationships between key variables yielded insightful results. The analysis revealed a strong positive correlation between safety climate and OSH implementation ($\rho = 0.7218$, $p < 0.001$). This finding implies that a more positive perception of the safety climate among employees is associated with a higher degree of compliance and effectiveness in the implementation of OSH practices. This aligns with the well-established understanding that a strong safety culture promotes a proactive and systematic approach to OSH, ultimately leading to enhanced implementation of safety measures (27,29).

However, the analysis did not reveal a statistically significant monotonic relationship between OSH implementation and employee safety behavior ($\rho = 0.2011$). This indicates that, within the context of this study, the level of OSH implementation, as measured by compliance with Permenaker No. 5 of 2018, does not demonstrate a strong linear relationship with employees' self-reported safety behavior. This weak correlation suggests that simply fulfilling regulatory environmental requirements does not automatically

translate into active safety participation among office staff. In an office setting like UP3 Padang, safety behavior may be more heavily influenced by peer norms and supervisor roles rather than the presence of physical facilities alone. For instance, an employee may work in a compliant environment but still hesitate to report a psychological stressor if they perceive that the organizational culture prioritizes administrative output over mental well-being. This seemingly counterintuitive finding warrants careful consideration. It is plausible that employees' self-reports of safety behavior may not perfectly reflect their actual behavior due to factors such as social desirability bias. Additionally, other variables, including individual attitudes, peer influence, and broader organizational factors beyond the direct scope of OSH implementation (30,33), may exert a more substantial influence on shaping safety behavior in this particular setting. Further investigation and potentially more nuanced interventions may be needed to address this.

The findings of this study carry several important implications for OSH management, particularly within the electricity sector. Firstly, the results underscore the fundamental importance of adhering to regulatory standards as a crucial foundation for establishing a safe and healthy work environment. Secondly, they emphatically highlight the critical role of safety climate in influencing employee behavior and promoting overall safety. Organizations should prioritize the cultivation of a positive safety climate, fostering an environment where employees feel empowered to voice safety concerns, actively participate in safety programs, and consistently adhere to safe work practices. Ultimately, the study suggests that a holistic approach, encompassing organizational commitment, effective communication, and genuine employee empowerment, is essential for achieving and sustaining a high level of OSH performance.

It is important to acknowledge the limitations of this study when interpreting its findings. Firstly, the study was conducted at a single site, PT. PLN (Persero) UP3 Padang, which inherently limits the generalizability of the findings to other organizations or

contexts. Future research could enhance generalizability by examining OSH implementation and its relationship with safety climate and behavior across multiple sites or within diverse sectors of the electricity industry. Secondly, the study relied on self-report measures for safety behavior, which are susceptible to social desirability bias, potentially influencing the accuracy of the reported data. This reliance on a single-time questionnaire for both climate and behavior variables may also introduce common method bias, potentially inflating the observed relationships. Furthermore, the relatively high average scores observed across several dimensions may indicate a "ceiling effect," which can limit the variance and make it more difficult to detect stronger correlations.

Thirdly, the cross-sectional design of this study precludes the establishment of causal relationships between OSH implementation, safety climate, and employee safety behavior. Longitudinal research designs would be invaluable in examining how changes in OSH practices over time influence safety climate and behavior, providing deeper insights into the causal dynamics of these relationships. Additionally, the use of Microsoft Excel for data analysis, while sufficient for basic descriptive and correlation testing, presents limitations in terms of advanced statistical modeling, complex audit trails, and the ability to perform more sophisticated mediation or moderation analyses that tools like SPSS or R would allow.

Despite these limitations, this study makes a valuable contribution to the existing body of knowledge by providing empirical evidence on the status of OSH implementation, safety climate, and safety behavior within an electricity company in Indonesia. The findings offer practical insights that can be utilized by PT. PLN (Persero) UP3 Padang and other similar organizations to identify specific areas for improvement within their OSH management systems and to develop targeted interventions aimed at enhancing overall safety performance. Future research endeavors could further explore the pivotal role of leadership in shaping safety climate and promoting safe work behavior within the electricity sector. Furthermore, there is a compelling need for research to investigate the

long-term impact of OSH interventions on employee health, well-being, and organizational productivity. Finally, additional studies could examine the economic costs and benefits associated with investing in OSH, providing a more robust business case for prioritizing and resourcing OSH initiatives.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that PT. PLN (Persero) UP3 Padang has achieved high compliance with Permenaker No. 5 of 2018, supported by a positive safety climate and high adherence to safe practices. However, critical gaps remain in monitoring specific hazards like vibration and UV radiation, alongside a low frequency of hazard reporting. To enhance performance, the company should prioritize engineering and administrative controls for physical hazards in areas adjacent to electrical infrastructure and transition to an accessible, digital multi-channel reporting system. These improvements must be supported by refined training and visible leadership actions to ensure safety remains a deeply institutionalized core organizational value.

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