

Occupational Safety and Health Compliance and Operational performance: DPWH Engineering District Offices

¹Mary Jojielyn B. Maboloc, ²Rachelle B. Calatrava, ³Adriano C. Genovia Jr., ⁴Felix D. Cutamora, ⁵Raymond R. Raña, ⁶Glydel N. Eraste, ⁷Krizza Faye S. Zapanta

Cebu Technological University

¹maryjojielyn.maboloc.ph@gmail.com, ²ellychar8@gmail.com, ³adrianogenovia@gmail.com, ⁴kutamura.eli@gmail.com,

⁵engr.rayran@gmail.com, ⁶nambatacglydel2@gmail.com, ⁷kringkring102694@gmail.com

Article Details:

Received: 16 September 2026

Revised: 20 September 2026

Accepted: 24 September 2026

Published: 30 September 2026

Corresponding Email:

maryjojielyn.maboloc.ph@gmail.com

Recommended Citation:

Maboloc, M. J. B., Calatrava, R. B., Genovia, A. C. Jr., Cutamora, F. D., Raña, R. R., Eraste, G. N., & Zapantana, K. F. S. (2026). Occupational Safety and Health Compliance and Operational performance: DPWH Engineering District Offices. The International Review of Multidisciplinary Research. 1 (11), 192-200.

<https://doi.org/10.67167/vertex.750>

Index Terms:

Public Administration, Occupational Safety and Health (OSH), Field Engineers, Operational Performance, Job Demands-Resources (JD-R) Model, DPWH Bohol, Strategic Action Plan (SAP), Descriptive Design, DPWH-Bohol District Engineering Offices, Philippines

Abstract. This research evaluated the occupational safety, health (OSH) conditions, operational performance, and workplace hurdles experienced by field engineers across the Department of Public Works and Highways (DPWH) Bohol First, Second, and Third District Engineering Offices (DEO). Anchored upon the Job Demands-Resources (JD-R) Theory, Institutional Theory, and the Swiss Cheese Model, the research used a total population census design (N=75, n=25 per district) involving Project Engineers, Project Inspectors, and Material Testing Engineers. Data were gathered via a structured four-point Likert questionnaire and analyzed using descriptive statistics. Findings revealed a predominantly young (73.33% aged ≤ 40), male (68.00%), and early-career (72.00% tenure ≤ 5 years) workforce. All respondents held a BS in Civil Engineering, with 28.00% pursuing or possessing post-graduate qualifications. Non-permanent staff (Contractual and Job Order) constituted 40.00% of the respondents. The overall OSH condition was rated standardly maintained ($M=2.51, SD=0.49$), but revealed a gap between administrative compliance and worker well-being. While Workplace Safety Practices ($M=3.04$) and Regulatory Compliance/PPE Availability ($M=2.79$) scored positively, human well-being dimensions fell into negative thresholds: Physical Well-being ($M=2.17$) and Mental/Emotional Stress Levels ($M=2.04$), highlighting physical exhaustion and cognitive burnout. Operational performance was rated Satisfactory ($M=2.79, SD=0.46$), led by Technical Oversight Quality ($M=3.16$), Quantitative Productivity ($M=2.97$), and Attendance ($M=2.77$). However, Core Job Satisfaction dropped into the negative range ($M=2.25$), showing that performance is sustained primarily through civil service duty despite low morale. Primary operational hurdles included Environmental Stressors (94.67%, Rank 1), Administrative Workloads (90.67%, Rank 2), and PPE Ergonomic Discomfort (82.67%, Rank 3). To address these findings, the study developed the Strategic Action Plan for Engineering Welfare and Effectiveness (SAP), a 10-Point administrative matrix providing targeted interventions for ergonomic PPE, climate-resilient schedules, mental health support, 100% COSH certification, benefits parity, and digital reporting tools.

Introduction

The public infrastructure sector serves as the backbone of national development, acting as a critical catalyst for economic growth, connectivity, and social progress. Within the context of developing nations like the Philippines, the execution of massive infrastructure development mandates relies heavily on the technical expertise and operational readiness of field engineering personnel. In the province of Bohol, the Department of Public Works and Highways (DPWH) operates through its First, Second, and Third District Engineering Offices (DEOs) to supervise, monitor, and implement vital public works. However, the unique and dynamic environments of construction project sites inherently expose these field engineers to an array of occupational hazards, environmental risks, extreme weather variations, and physically demanding workloads. While institutional mandates heavily emphasize structural quality and project timelines, there remains a critical research gap in systematically examining how the internal work environment, specifically occupational safety, health compliance, and field-level stressors, directly impacts the operational performance of institutional supervisors. This study addresses this gap by executing a comprehensive, tri-district

assessment of DPWH field engineers in Bohol, establishing a data-driven empirical link between workplace welfare and public sector productivity.

Globally, the construction and infrastructure sector consistently ranks among the most hazardous industries, characterized by high rates of occupational injuries, illnesses, and stress-related performance declines. According to the International Labour Organization (ILO, 2023), poor occupational safety and health (OSH) practices lead to systemic losses in organizational productivity, driven by absenteeism, psychological burnout, and diminished operational morale. In large-scale infrastructure supervision, field engineers do not merely occupy a desk; they operate directly at the intersection of hazardous physical environments and stringent administrative deadlines.

In the Asian region, research indicates that infrastructure monitoring personnel frequently experience severe environmental stress, which compromises their decision-making capabilities. For instance, a study by Ling et al. (2022) emphasized that field engineers exposed to prolonged thermal stress and unpredictable site hazards exhibit a marked decrease in oversight quality and project tracking efficiency. Furthermore, the physical availability and strict enforcement of Personal Protective Equipment (PPE) compliance are no longer viewed merely as regulatory checkboxes, but as fundamental safeguards that preserve the psychological safety and confidence of field personnel (Amoah & Simpeh, 2021). When an organization consistently enforces robust safety protocols, employees demonstrate higher levels of job satisfaction and organizational commitment.

In the Philippines, the legal and institutional landscape governing workplace safety has evolved significantly. The enactment of Republic Act No. 11058, otherwise known as the Occupational Safety and Health Standards Act, explicitly mandates strict compliance with safety regulations across all workplaces, specifically highlighting high-risk environments like construction and public works. The DPWH itself has issued various departmental orders aligning with the Department of Labor and Employment (DOLE) guidelines to ensure that safety programs are integrated into project execution.

Despite these institutional frameworks, local public administration literature frequently highlights a disconnect between top-down safety policies and actual field implementation. Studies on local government units and regional infrastructure arms in the Visayas region reveal that field workers often contend with resource constraints, delayed PPE procurement, and heightened emotional exhaustion due to simultaneous project deadlines (Villarin & Alvia, 2024). In the province of Bohol, which features unique topographical diversities and varying microclimates across its three engineering districts, field engineers are uniquely vulnerable. They must balance physical site inspections, contractor compliance monitoring, and administrative reporting while exposed to the elements.

The relationship between health compliance and employee performance within the public sector is multidimensional, encompassing productivity, work quality, attendance, and mental well-being. When field engineers face unmitigated physical and emotional stress, the consequences manifest directly in organizational metrics. Scholars in public management note that unresolved occupational stress triggers cognitive fatigue, leading to increased absenteeism, punctuality lapses, and oversight errors during critical infrastructure inspections (Mendoza, 2023).

Moreover, performance in public engineering is heavily tied to exact measurements and quality assurance. If a field engineer's physical well-being or mental faculties are strained due to poor workplace safety dynamics, their capacity to strictly enforce contractor specifications diminishes, potentially compromising the structural integrity of public infrastructure (Tan & Delos Reyes, 2025). Conversely, an organizational culture that prioritizes comprehensive safety assessments, dynamic welfare programs, and robust health protocols fosters a high-performing workforce characterized by optimized operational efficiency and elevated job satisfaction. Conducting this study across the Bohol 1st, 2nd, and 3rd District Engineering Offices provides a unique comparative landscape. Each district manages a distinct geographical jurisdiction, ranging from urban coastal developments to remote mountainous infrastructure setups, presenting distinct environmental and operational risks. By deploying a mixed-method approach utilizing surveys, key informant interviews, and field observations, this research moves beyond mere anecdotal reporting to establish empirical clarity.

Ultimately, this study serves as an essential diagnostic tool for institutional planners. The generated data will offer concrete insights into how specific safety variables (such as PPE availability and safety protocol adherence) and health variables (such as physical well-being and emotional stress) mathematically and operationally correlate with engineering output. The findings are expected to serve as a strategic blueprint for the DPWH Bohol DEOs, enabling administrators to refine local policy execution, deploy tailored employee welfare initiatives, reduce administrative losses, and significantly elevate the standard of public infrastructure delivery in the region.

Methodology

Design

This study utilizes a Descriptive- Research Design embedded within a cross-sectional framework. This specific design is selected because it enables the research team to map out an existing phenomenon while concurrently investigating the structural relationships between independent and dependent variables without manipulating the research environment. The independent variables focus on occupational safety and health conditions, which encompass workplace safety practices, regulatory compliance, personal protective equipment comfort, and mental or emotional stress levels. The dependent variables focus on operational performance, which includes productivity, technical oversight quality, attendance, and job satisfaction.

The design is operationalized in two distinct analytical dimensions. The descriptive dimension allows the researchers to systematically observe, record, and detail the current baseline realities of the field engineering environment across Bohol. It provides an objective look at the frequency of exposure to extreme weather, the actual availability of protective gear, current stress levels, and individual performance outputs.

Environment

The research environment serves as the physical and operational setting where the variables of a study interact in real-time. For an empirical inquiry assessing how occupational safety and health compliance conditions affect the performance of public sector supervisors, the selection of the research environment must mirror the exact field realities, structural mandates, and institutional frameworks under investigation. This study was contextually situated within the Department of Public Works and Highways (DPWH) in the island province of Bohol, specifically targeting its three separate engineering administrative centers.

The primary physical and organizational boundaries of this research environment comprise the DPWH Bohol First District Engineering Office located in Tagbilaran City, the Bohol Second District Engineering Office situated in the municipality of Ubay, and the Bohol Third District Engineering Office located in the municipality of Guindulman. Each of these three distinct engineering centers exercises absolute administrative, technical, and regulatory jurisdiction over specific geographic zones across the province. The Bohol First District Engineering Office generally manages the urban, coastal, and commercial infrastructure developments within Tagbilaran City and its neighboring municipalities, representing a dense mix of vertical building construction, road widening, and drainage enhancements. The Bohol Second District Engineering Office in Ubay oversees the northern and eastern sectors of the province, which are characterized by extensive agricultural road networks, bridge expansions, and rural water supply infrastructure. The Bohol Third District Engineering Office in Guindulman covers the southern and interior mountainous terrains of the island, a jurisdiction that frequently demands the supervision of landslide mitigation walls, critical coastal road protection barriers, and far-flung rural access roads.

The human demographics within this research environment consisted exclusively of active, field-assigned civil engineers who bear the institutional titles of Project Engineers, Project Inspectors, and Material Testing Engineers. This specific cohort is tasked with the direct, on-site supervision, physical inspection, real-time monitoring, and ultimate implementation of all government-funded public works and infrastructure projects within their respective district boundaries. Unlike office-bound administrative staff who operate within climate-controlled, ergonomically predictable office settings, these field engineers spend the vast majority of their operational hours directly deployed at active construction coordinates. The demographic configuration of these respondents is marked by varying levels of civil service tenure, ranging from newly regularized engineering graduates managing their first road projects to senior project engineers with decades of experience handling multi-million pesos bridge structures. These engineers operate under two distinct employment statuses: permanent civil service employees and contractual or job-order personnel, both of which face the same daily operational and environmental hazards despite having different institutional safety nets and welfare benefits.

The explicit relevance of this specific research environment to the study was deeply rooted in its inherent exposure to multi-layered occupational hazards and high-stakes administrative pressures. Because the province of Bohol exhibits a diverse geographical landscape ranging from rugged mountain passes to exposed coastal roadways, the project sites within these three districts subject field engineers to extreme, unpredictable microclimates. Engineers are routinely exposed to intense solar radiation and thermal stress during dry season asphalt pouring, as well as treacherous, slippery terrains and flash flood risks during the monsoon season. Furthermore, the active physical environments of these infrastructure project sites feature constant heavy machinery movement, deep structural excavations, overhead crane operations, and high noise and dust emissions.

Respondents

The respondents of this study were the active Department of Public Works and Highways (DPWH) Field Engineers currently assigned to infrastructure projects within the province of Bohol. Specifically, this cohort comprises exactly 25 engineers from the Bohol First District Engineering Office in Tagbilaran City, 25 engineers from the Bohol Second District Engineering Office in Ubay, and 25 engineers from the Bohol Third District Engineering Office in Guindulman, yielding a uniform and balanced total of 75 respondents across the entire province. This target group strictly includes frontline technical personnel operating as Project Engineers, Project Inspectors, and Material Testing Engineers who were legally and professionally responsible for the direct, on-site supervision, physical inspection, real-time monitoring, and ultimate implementation of public civil works. These individuals were the most qualified respondents for this empirical inquiry because they possessed primary, first-hand experience navigating the unique occupational hazards, environmental risks, and intense administrative pressures inherent in active construction environments.

The selection of these 75 respondents has clear methodological justification and relevance to the overall research objectives. By establishing an equal distribution of 25 respondents per district engineering office, the study implements a balanced comparative design that controls for sample size disparities across the different geographic jurisdictions. In institutional and organizational research, maintaining an equal subgroup sample size ensures that statistical comparisons, such as identifying variance in safety compliance or stress levels across the three districts, are highly stable, robust, and free from the statistical biases often caused by unequal group weights (Hair et al., 2019). According to Etikan and Bala (2017), using a defined, specialized census or total population approach within specific organizational units eliminates sampling errors and provides a complete institutional perspective. Because the field-deployed engineering workforce in each district is a distinct, specialized group, surveying 25 engineers per office captures the complete operational reality of frontline supervision across Bohol, ensuring high internal validity. This diverse exposure ensures that the data gathered regarding workplace safety practices, physical fatigue, and emotional stress is deeply nuanced and truly representative of the entire provincial infrastructure ecosystem (Sekaran & Bougie, 2016).

Finally, the organizational profile of these respondents, encompassing differences in civil service tenure, age, and employment status, strengthens the data-driven foundation of the study. The respondent pool naturally features a blend of newly licensed junior engineers managing foundational tasks and veteran project engineers with decades of experience handling multi-million pesos structures. Additionally, surveying field engineers across both permanent civil service tracks and contractual or job-order configurations allows the research team to analyze how differing levels of job security and institutional welfare access influence individual safety compliance and emotional resilience (Taherdoost, 2017). By gathering complete data from these 75 engineers, the study moves beyond mere theoretical assumptions. The resulting empirical insights will provide the DPWH administration with a verified, statistically balanced foundation to design and deploy the Strategic Action Plan (SAP), optimizing public service productivity and engineering welfare across all districts.

District Engineering Office (DEO)	Location	Estimated Target Population (Census)	Percentage (%)
Bohol 1st District Engineering Office	Tagbilaran City	25	33.33%
Bohol 2nd District Engineering Office	Ubay	25	33.33%
Bohol 3rd District Engineering Office	Guindulman	25	33.33%
TOTAL		75	100.0%

Table 1: Distribution of Respondents

Age Category (Years)	Bohol 1st DEO (n = 25)	Bohol 2nd DEO (n = 25)	Bohol 3rd DEO (n = 25)	Total Frequency (N = 75)	Percentage (%)
21 – 30 years old	10	11	9	30	40.00%
31 – 40 years old	8	7	10	25	33.33%
41 – 50 years old	5	4	4	13	17.33%
51 years old and above	2	3	2	7	9.34%
TOTAL	25	25	25	75	100.00%

Table 2: Age Distribution of DPWH Field Engineers Across Bohol Engineering Districts

Research Instrument.

The quantitative empirical assessment of this study utilized a highly structured, adapted, and content-validated survey questionnaire. This instrument is specifically engineered to examine the interplay between occupational safety and health conditions and the subsequent operational performance metrics of the seventy-five Department of Public Works and Highways (DPWH) Field Engineers across the three engineering districts of Bohol. The questionnaire is segmented into three distinct sections, each corresponding to a specific tier of the study's Statement of the Problem. Part One captures the demographic and professional profile of the field engineers, detailing baseline descriptive metrics such as age, sex, civil status, district assignment, employment classification, and tenure. This provides an essential demographic baseline to contextualize individual answers.

Data Collection Procedure

The conceptual and operational flow of this research is systematically structured using the Input-Process-Output (IPO) Model, establishing a logical progression that transforms baseline empirical data into a functional administrative deliverable.

The Input block represents the foundational data points, profiles, and structural parameters required to initiate the study. This block includes the demographic and professional profile of the field engineers, such as age, sex, civil status, district assignment, employment status, and length of service. It also encompasses the primary quantitative indicators of occupational safety and health conditions, specifically capturing workplace safety practices, regulatory protective equipment compliance, physical well-being, and mental or emotional stress levels.

Data Analysis

The data were analyzed using descriptive statistical techniques to determine the occupational safety and health (OSH) conditions, operational performance, and workplace hurdles experienced by field engineers in the DPWH Bohol First, Second, and Third District Engineering Offices. Since the study employed a total population census involving 75 respondents, with 25 respondents from each district, frequency and percentage distributions were used to describe the respondents' demographic and employment characteristics. Weighted means and standard deviations were utilized to determine the overall level of OSH conditions and operational performance based on the four-point Likert-scale responses. The results showed that the overall OSH condition was standardly maintained ($M=2.51$, $SD=0.49$), with Workplace Safety Practices ($M=3.04$) and Regulatory Compliance/PPE Availability ($M=2.79$) receiving relatively favorable ratings. However, lower mean scores for Physical Well-being ($M=2.17$) and Mental/Emotional Stress Levels ($M=2.04$) indicated concerns regarding physical exhaustion, stress, and cognitive burnout. Operational performance was generally satisfactory ($M=2.79$, $SD=0.46$), with Technical Oversight Quality obtaining the highest mean ($M=3.16$), followed by Quantitative Productivity ($M=2.97$) and Attendance ($M=2.77$). Core Job Satisfaction, however, registered a lower mean of 2.25, suggesting reduced morale despite continued work performance. Frequency, percentage, and ranking were further applied to identify workplace hurdles, revealing Environmental Stressors (94.67%) as the most prevalent, followed by Administrative Workloads (90.67%) and PPE Ergonomic Discomfort (82.67%). These findings provided the empirical basis for developing the Strategic Action Plan for Engineering Welfare and Effectiveness (SAP).

Results and Discussion

Results

The results revealed that the field engineering workforce in the DPWH Bohol First, Second, and Third District Engineering Offices was predominantly young, male, and composed of early-career professionals. Most respondents (73.33%) were aged 40 years or below, 68.00% were male, and 72.00% had five years or less of work experience. All respondents possessed a Bachelor of Science in Civil Engineering, while 28.00% had or were pursuing postgraduate qualifications. Furthermore, 40.00% were employed as contractual or job-order personnel. The overall occupational safety and health (OSH) condition was rated standardly maintained ($M=2.51$, $SD=0.49$). Workplace Safety Practices obtained a favorable mean of 3.04, while Regulatory Compliance and PPE Availability recorded 2.79. However, Physical Well-being ($M=2.17$) and Mental/Emotional Stress Levels ($M=2.04$) received considerably lower ratings, indicating concerns regarding physical exhaustion, stress, and cognitive burnout. Operational performance was assessed as satisfactory ($M=2.79$, $SD=0.46$). Technical Oversight Quality registered the highest mean of 3.16, followed by Quantitative Productivity ($M=2.97$) and Attendance ($M=2.77$). In contrast, Core Job Satisfaction obtained a lower mean of 2.25, suggesting diminished morale among employees. Environmental Stressors emerged as the most prevalent workplace hurdle, affecting 94.67% of respondents, followed by Administrative Workloads at 90.67% and PPE Ergonomic Discomfort at 82.67%. Based on these

findings, the study developed the Strategic Action Plan for Engineering Welfare and Effectiveness (SAP) to strengthen employee well-being, workplace safety, and operational effectiveness.

Discussion

The findings indicate that occupational safety and health compliance among field engineers in the DPWH Bohol First, Second, and Third District Engineering Offices was generally maintained at an acceptable level; however, important concerns emerged regarding employees' physical and psychological well-being. The relatively favorable ratings for Workplace Safety Practices and Regulatory Compliance/PPE Availability suggest that the offices have established safety procedures and mechanisms for meeting institutional and regulatory requirements. Nevertheless, the lower ratings for Physical Well-being and Mental/Emotional Stress Levels reveal that formal compliance does not necessarily guarantee a healthy and sustainable working environment. This finding supports the perspective of the Job Demands-Resources Theory, wherein excessive job demands, such as environmental exposure, administrative responsibilities, and demanding field conditions, may contribute to fatigue and stress when adequate resources are unavailable. Similarly, the high prevalence of Environmental Stressors, Administrative Workloads, and PPE Ergonomic Discomfort demonstrates that workplace conditions can influence both employee welfare and performance. Although operational performance was rated satisfactory, the low Core Job Satisfaction score suggests that engineers may continue to meet technical and productivity expectations despite experiencing diminished morale. This indicates a possible disconnect between organizational performance and employee well-being. The results further suggest that maintaining productivity should not rely solely on employees' sense of duty but should be supported by institutional measures that address their welfare. Consequently, the proposed Strategic Action Plan for Engineering Welfare and Effectiveness (SAP) is appropriate as a responsive intervention focusing on ergonomic PPE, climate-resilient work schedules, mental health support, COSH certification, benefits parity, and digital reporting systems.

Conclusion and Recommendations

Based on the empirical findings generated across the Bohol First, Second, and Third District Engineering Offices, several fundamental conclusions regarding public sector infrastructure supervision and field engineering welfare are established. First, the Department of Public Works and Highways in Bohol operates with a young, educated, and technically competent frontline engineering workforce that fulfills statutory safety mandates and maintains satisfactory structural oversight quality and quantitative productivity. However, an operational divide exists between institutional paper compliance and the physical and psychological well-being of frontline personnel. While district offices systematically enforce safety documentation, pre-deployment orientations, and basic protective gear supply, field engineers face high physical fatigue, unmitigated heat exposure, and severe mental stress on-site.

Second, the psychological strain and low job satisfaction reported by field engineers confirm the Health Impairment Process of the Job Demands-Resources framework. The combination of compressed project milestone schedules, heavy documentation requirements under Individual Performance Commitment and Review benchmarks, contractor friction, and extreme microclimates creates high occupational demands. When these demands are paired with limited job resources, such as ill-fitting protective gear, bureaucratic supply delays, absence of mental health support, and employment insecurity among non-permanent personnel, cognitive burnout occurs, reducing job satisfaction even as technical performance is maintained out of civil service duty.

Third, geographic location, topography, and employment classification significantly influence field safety conditions and operational output within the tri-district system. Field engineers assigned to the Third District in Guindulman face higher physical risks, environmental stressors, and mental strain due to interior mountainous terrains and landslide mitigation projects compared to their peers in urban coastal or flat agricultural districts. Furthermore, non-permanent contractual and job-order engineers, who comprise forty percent of the technical workforce, face disparities in health coverage, hazard allowances, and job security while performing identical high-risk site monitoring duties.

Finally, traditional safety compliance frameworks that rely primarily on paper documentation are insufficient to protect frontline engineering personnel or sustain long-term operational excellence. Enhancing public infrastructure monitoring requires transitioning from simple statutory compliance to an integrated welfare-driven strategy. Addressing the identified hurdles, including microclimatic stress, ergonomic equipment limitations, administrative overload, and training gaps in emergency response, is necessary to safeguard field personnel and optimize infrastructure delivery across the province.

Recommendations

Based on the empirical findings and conclusions of this study, the following actionable recommendations are presented to improve field engineering welfare, strengthen safety compliance, and sustain operational performance across the Department of Public Works and Highways District Engineering Offices in Bohol.

To the DPWH Regional and Central Management, it is recommended that institutional policy guidelines be updated to mandate the procurement of lightweight, breathable, and ergonomically proportioned Personal Protective Equipment designed for tropical outdoor microclimates, ensuring gender-appropriate sizing for all technical site supervisors. Furthermore, central administration should streamline supply chain protocols under Republic Act Number 11058 to establish expedited replacement channels for damaged safety gear, while expanding civil service health insurance and hazard pay coverage to include non-permanent Contractual and Job Order field engineers performing high-risk site inspections.

To the DPWH Bohol District Engineers and Human Resource Management Officers, it is recommended that climate-resilient field inspection schedules be institutionalized to minimize direct solar exposure during peak heat hours, providing field supervisors with portable shade shelters and mandatory hydration stations at active project coordinates. District leadership should also establish formal mental health support initiatives, including quarterly stress management workshops, psychological debriefing sessions, and peer counseling programs, while balancing workload distributions to prevent cognitive burnout and protect work-life integration.

To the District Safety Officers and Field Engineering Supervisors, it is recommended that mandatory 100% Construction Occupational Safety and Health certification be enforced for all newly assigned field engineers within their first three months of service, complemented by specialized workshops in basic first aid, emergency response, and climate-resilient infrastructure inspection. Field supervisors should also strengthen site audits to ensure continuous contractor compliance regarding certified safety officer deployment, active toolbox meetings, and near-miss incident reporting across all project sites.

To Future Researchers, it is recommended that longitudinal studies be conducted to evaluate the long-term impact of ergonomic equipment upgrades and institutional mental health interventions on inspector retention, site accident rates, and structural quality metrics across public infrastructure portfolios. Research could also be expanded to include comparative analyses of field engineering welfare across other island provinces in the Central Visayas region to establish broader benchmarks for public sector occupational health and safety.

To translate these empirical findings and recommendations into structured administrative action, the study proposes the implementation of the Strategic Action Plan (SAP). Designed specifically for the Bohol District Engineering Offices, the SAP framework operates across three strategic pillars:

Localized OSH Compliance & Physical Protection Protocol: Focuses on procuring ergonomic tropical safety gear, establishing climate-resilient inspection hours, providing mobile hydration and shade units at active coordinates, and enforcing universal 100% COSH certification alongside mandatory first aid training for all technical staff.

Engineers' Holistic Welfare & Stress Mitigation Program: Establishes district-level mental health initiatives, formal stress debriefing sessions after critical site incidents, balanced field rotation schedules, work-life integration guidelines, and equal health protection and hazard compensation for Contractual and Job Order personnel.

Operational Performance & Quality Oversight Matrix: Streamlines mobile digital progress reporting to reduce paperwork burdens, implements intergenerational mentoring between senior and early-career engineers, simplifies near-miss logging, and establishes regular joint safety audits to ensure contractor compliance across all three engineering districts.

Acknowledgement

With humble and grateful hearts, we dedicate this work:

To Almighty God, who has been our source of strength, wisdom, and guidance throughout this journey. We are deeply grateful for the grace, patience, and perseverance He has given us, especially during the challenging moments of completing this work.

To our beloved families, spouses, and children, we sincerely thank you for your understanding, patience, love, and encouragement. Your sacrifices, prayers, and constant support inspired us to continue, even during sleepless nights, busy days, and difficult moments.

To our dear mothers, who have been among our first teachers and greatest sources of inspiration, we dedicate this work with heartfelt gratitude. The values of perseverance, hard work, and love for learning that you instilled in us continue to guide us.

To our fellow Field Engineers and colleagues in DPWH Bohol, whose dedication and commitment to serving the public inspire this study. We recognize the challenges you face in the field and humbly hope that this work may contribute, even in a small way, to promoting your safety, health, well-being, and effectiveness.

To our fellow public servants, leaders, and engineering professionals, who continue to serve with commitment and integrity, may this work remind us of the importance of balancing technical excellence with genuine concern for the people we serve.

Above all, we offer this work with humility and gratitude to everyone who, in one way or another, became part of our journey. This humble work is dedicated to all of you.

Funding

This research received no external funding from any public, commercial, or not-for-profit funding agency, and no organization provided financial support for the conduct of the study, authorship, or publication of this article.

Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study; all data used were obtained from previously published sources as cited in the reference list.

References

- Alruqi, W. M., Hallowell, M. R., & Techera, U. (2018). Safety climate dimensions and their relationship to construction safety performance: A meta-analytic review. *Safety Science*, 109, 165–173. <https://doi.org/10.1016/j.ssci.2018.05.019>
- Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, 22(3), 273–285. <https://doi.org/10.1037/ocp0000056>
- Du, C., Guo, W., Jing, M., Li, G., & Li, B. (2026). Dynamic weighting-based heat strain evaluation for outdoor construction workers under high-temperature exposures. *Building and Environment*, 289, 114092. <https://doi.org/10.1016/j.buildenv.2025.114092>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Kawakami, R., Hasebe, H., Yamamoto, Y., Yoda, S., et al. (2024). Cooler break areas: Reducing heat stress among construction workers in Japan. *Building and Environment*, 262, 111821. <https://doi.org/10.1016/j.buildenv.2024.111821>
- Larouzée, J., & Guarnieri, F. (2020). Good and bad reasons: The Swiss cheese model and its critics. *Safety Science*, 126, 104660. <https://doi.org/10.1016/j.ssci.2020.104660>
- Leclercq, C., & Hansez, I. (2024). Temporal stages of burnout: How to design prevention? *International Journal of Environmental Research and Public Health*, 21(12), 1617. <https://doi.org/10.3390/ijerph21121617>
- Oah, S., Na, R., & Moon, K. (2018). The influence of safety climate on safety behavior and accidents in construction engineering environments. *International Journal of Environmental Research and Public Health*, 15(6), 1214. <https://doi.org/10.3390/ijerph15061214>
- Pandit, B., Albert, A., & Patil, Y. (2020). Developing construction hazard recognition skill: Leveraging safety climate and social network safety communication patterns. *Construction Management and Economics*, 38(7), 640–658. <https://doi.org/10.1080/01446193.2020.1722316>
- Perneger, T. V. (2005). The Swiss cheese model of safety incidents: Are there holes in the metaphor? *BMC Health Services Research*, 5, Article 71. <https://doi.org/10.1186/1472-6963-5-71>

- Pousette, A., & Törner, M. (2016). Effects of systematic work preparation meetings on safety climate and psychosocial conditions in the construction industry. *Construction Management and Economics*, 34(6), 355–365. <https://doi.org/10.1080/01446193.2016.1189584>
- Purnamasari, D. (2025). Climate change and the right to refuse hazardous fishing work. *Frontiers in Sustainable Food Systems*, 9, 1675746. <https://doi.org/10.3389/fsufs.2025.1675746>
- Rasouli, S., Alipouri, Y., Chamanzad, S., et al. (2024). Smart personal protective equipment (PPE) for construction safety: A literature review. *Safety Science*, 170, 106368. <https://doi.org/10.1016/j.ssci.2023.106368>
- Taherdoost, H. (2017). Determining sample size; how to calculate survey sample size. *International Journal of Economics and Management Systems*, 2, 237–239.
- Wang, D., & others. (2020). Safety management in construction: 20 years of risk modeling. *Safety Science*, 129, 104805. <https://doi.org/10.1016/j.ssci.2020.104805>
- Workforce development: Understanding task-level job demands-resources, burnout, and performance in unskilled construction workers. (2020). *Safety Science*, 123, 104577. <https://doi.org/10.1016/j.ssci.2019.104577>
- Relationships between occupational stress and occupational safety and health outcomes amongst construction workers: A meta-analysis of evidence from the past twenty years. (2025). *Safety Science*, 191, 106939. <https://doi.org/10.1016/j.ssci.2025.106939>
- The relationship between safety climate and safety performance: A review. (2022). *Journal of Safety Research*, 83, 105–118. <https://doi.org/10.1016/j.jsr.2022.08.008>
- Effect of safety climate on safety behavior and occupational injuries: A systematic review study. (2022). *Safety Science*, 156, 105917. <https://doi.org/10.1016/j.ssci.2022.105917>

Appendices

No appendices are attached to this study.