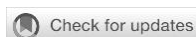




Occupational Safety and Health and Workforce Skills as Complementary Predictors of Employee Performance in High-Risk Construction Services

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ABSTRACT

Purpose of the study: This study aims to examine and analyze the partial and simultaneous effects of Occupational Safety and Health (OSH) and skill on employee performance at PT. Lutvindo Wijaya Perkasa, a construction-services company based in Pekanbaru, Indonesia, and to identify which of the two predictors exerts the dominant influence.

Methodology: A quantitative, explanatory (associative) design was employed. The population consisted of 92 permanent employees, and a saturated (census) sampling technique produced a final analytic sample of 82 valid respondents after data screening. Data were collected using a structured, five-point Likert questionnaire that had been tested for validity (Pearson product-moment correlation) and reliability (Cronbach's alpha). Multiple linear regression, classical assumption tests, the coefficient of determination (R^2), partial t-tests, and the simultaneous F-test were used for analysis with SPSS version 26.

Results: Both OSH ($\beta = 0.372$, $t = 4.681$, $p < 0.001$) and skill ($\beta = 0.441$, $t = 5.529$, $p < 0.001$) had a positive and statistically significant partial effect on employee performance. Simultaneously, OSH and skill significantly influenced employee performance ($F = 74.216$, $p < 0.001$), jointly explaining 65.3% of the variance in performance (adjusted $R^2 = 0.653$), while the remaining 34.7% was explained by variables outside the model. Skill emerged as the dominant predictor.

Conclusions: Occupational safety and health and employee skill are significant, complementary drivers of employee performance in a high-risk construction-services setting. Managerial investment in structured safety systems alongside targeted, competency-based training is recommended to sustain performance improvement.

Keywords:

occupational safety and health; skill; employee performance; construction industry; human resource management.

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INTRODUCTION

Contextual Framework and Global Issue

Human resources remain the single most decisive asset determining whether an organization can achieve its strategic objectives, particularly in labor-intensive and hazard-exposed sectors such as construction and heavy-equipment services (Alzyoud & Ogalo, 2020; Wilkinson et al., 2012). The International Labour Organization has repeatedly emphasized that occupational accidents and work-related illnesses continue to impose substantial economic and human costs worldwide, with low- and middle-income countries disproportionately affected due to inconsistent enforcement of safety regulations and limited investment in workforce competency development (Micheli et al., 2022, p. 105902; Takala et al., 2013, p. 327). In Indonesia, the construction sector is consistently reported among the industries with the highest incidence of workplace accidents (Khaliq et al., 2026), a pattern that directly threatens productivity, morale, and ultimately organizational performance (Segbenya & Yeboah, 2022).

Global competitive pressure has simultaneously raised the technical and behavioral skill requirements expected of frontline workers (Albalawi et al., 2023). Empirical evidence underscores that workforce competency is not merely a technical requirement but a strategic asset; skilled laborers have been shown to significantly enhance project performance, whereas a lack of competency can negatively impact project execution (Hussain et al., 2020). Furthermore, the construction industry faces the imperative to simultaneously achieve safety and productivity (Choudhry, 2015, p. 311). Research indicates that robust Occupational Safety and Health programs function as direct investments in operational efficiency rather than mere compliance requirements, with OSH compliance and employee competence acting as complementary, reinforcing drivers of performance (Jailani et al., 2025; Riskiyah et al., 2025; Soekiman & Syamsuduha, 2011). Employees are now expected not only to work safely but also to perform

increasingly complex tasks efficiently and accurately (Emami, 2017). These two forces—the safety imperative and the competency imperative—converge directly on the construct of employee performance, making their joint examination both theoretically and practically relevant in high-risk environments.

Critical Examination of Existing Literature

A substantial body of empirical research has consistently linked Occupational Safety and Health practices to elevated employee performance. In service and manufacturing settings, prior research has established that OSH significantly and positively affects performance, often through mediating mechanisms such as heightened work motivation, increased job satisfaction, and reduced operational downtime (Ekowati & Amin, 2019; Farid et al., 2024; Suyatno & Pancasasti, 2023). Studies in the transportation and consumer-goods sectors further corroborate that OSH, when combined with discipline and a supportive physical work environment, contributes significantly to tangible performance outcomes (Alamsyah et al., 2025; Putri et al., 2018). Specifically within the construction industry, where hazard exposure is inherently high, OSH is increasingly recognized not merely as a regulatory requirement but as a strategic investment in operational productivity (Damayanti et al., 2025; Riskiyah et al., 2025; Segbenya & Yeboah, 2022). Research indicates that robust safety management systems reduce the economic and human costs of workplace accidents, thereby enhancing task efficiency and project success rates (Romadhoni & Putra, 2025; Sunarjo & Amin, 2024). Furthermore, safety culture and proactive safety participation have been identified as foundational drivers of both behavioral compliance and overall workforce productivity (Bautista-Bernal et al., 2023, p. 106411; Damayanti et al., 2025).

A parallel, equally significant stream of literature addresses competence, or skill, as a critical performance antecedent. Competence has been shown to have a positive and significant effect on employee performance across diverse organizational contexts, including automotive manufacturing (Herwina, 2022), public administration (Serli et al., 2023), and logistics (Nong et al., 2024). In high-risk sectors like construction, competency is multi-dimensional, encompassing both technical mastery—necessary for accurate task execution—and behavioral skills required for safe interaction with machinery and peers (Hussain et al., 2020; Wang et al., 2021). Recent studies highlight that skilled labor significantly enhances project performance, whereas a lack of competency can lead to costly errors, rework, and safety incidents (Hussain et al., 2020).

Crucially, emerging literature points toward a synergistic relationship between OSH and competence. Rather than operating in isolation, OSH and skill development are increasingly viewed as complementary reinforcing drivers of performance (Amelia & Soemadi, 2025; Jailani et al., 2025). Studies suggest that OSH programs are more effective when supported by a workforce that possesses the necessary technical and safety-related competencies to execute tasks accurately and safely (Claro et al., 2025; Wang et al., 2021). Conversely, competency-based training is often more impactful when embedded within a safe and healthy working environment, which fosters the psychological safety necessary for skill application and continuous improvement (Farid et al., 2024; Susanto, 2024). While a minority of studies report varied associations depending on specific contextual factors—such as workload or compensation structures—the consensus emphasizes that the integrated management of safety systems and workforce development is essential for sustaining superior performance in high-risk environments (Hutabarat et al., 2023; Jailani et al., 2025).

Identification of Research Gaps

Despite the volume of research on OSH and competence separately, three gaps remain. First, few studies simultaneously model OSH and skill as joint predictors of employee performance within a single small-to-medium construction-services enterprise, where both hazard exposure and technical skill demands are high. Second, most existing Indonesian studies have been conducted in Java-based or metropolitan settings, leaving regional companies in Sumatra—including Riau Province—comparatively under-examined. Third, inconsistent findings regarding the relative strength of competence versus other predictors (as noted by (Farid et al., 2024; Shari & Suryalena, 2025) suggest that the OSH–skill–performance relationship may be context-dependent and warrants further empirical verification in company-specific settings such as PT. Lutvindo Wijaya Perkasa.

Rationale for the Research

PT. Lutvindo Wijaya Perkasa is a Pekanbaru-based company operating in construction-related and heavy-equipment support services, an environment characterized by physical hazards, tight project deadlines, and a workforce with heterogeneous technical backgrounds. Internal indicators reported by the company's human resource division suggest fluctuations in task completion timeliness and output quality over the preceding fiscal periods. Given the theoretical and practical importance of both safety and skill, and the absence of company-specific empirical evidence, this study is warranted to provide management with an evidence-based understanding of which factors most strongly drive employee performance.

Objectives

This study aims to: (1) analyze the partial effect of Occupational Safety and Health on employee performance at PT. Lutvindo Wijaya Perkasa; (2) analyze the partial effect of skill on employee performance; and (3) analyze the simultaneous effect of OSH and skill on employee performance, including the identification of the dominant predictor.

MATERIALS AND METHODS

Study Participants

The population comprised all 92 permanent employees of PT. Lutvindo Wijaya Perkasa, Pekanbaru, across operational, technical, and administrative divisions. Because the population was relatively small, a saturated (total) sampling technique was applied rather than probability sampling. Of the 92 questionnaires distributed, 85 were returned and 82 were retained for analysis after excluding incomplete or straight-lined responses (89.1% effective response rate). The analytic sample consisted of 68 male employees (82.9%) and 14 female employees (17.1%); 61.0% were aged between 26 and 40 years; 47.6% held a senior-high-school-equivalent education, 32.9% held a diploma, and 19.5% held a bachelor's degree; and 54.9% had between 1 and 5 years of

tenure with the company.

Study Organization

This research employed a quantitative, explanatory (associative-causal) design intended to test hypothesized causal relationships among latent constructs measured through a structured survey instrument. The independent variables were Occupational Safety and Health (X1) and Skill (X2); the dependent variable was Employee Performance (Y). Each construct was operationalized using indicators adapted from established human resource management literature: OSH was measured through five indicators (safety equipment provision, safety training, hazard-reporting procedures, workplace ergonomics, and management commitment to safety); Skill was measured through four indicators (technical knowledge, work experience, problem-solving ability, and adaptability); and Employee Performance was measured through five indicators (work quality, work quantity, timeliness, effectiveness, and independence), consistent with standard performance-appraisal frameworks used in prior OSH-performance research (Shah, 2025; Suyatno & Pancasasti, 2023). All items were rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Instrument validity was confirmed through Pearson product-moment correlation (all corrected item-total correlations exceeded $r_{\text{table}} = 0.217$, $n = 82$, $\alpha = 0.05$), and reliability was confirmed through Cronbach's alpha, with all three constructs exceeding the 0.70 threshold (OSH $\alpha = 0.831$; Skill $\alpha = 0.807$; Performance $\alpha = 0.856$), indicating good internal consistency. Data collection occurred over a four-week period through a self-administered paper-and-online hybrid questionnaire distributed with the assistance of the company's HR department.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics summarized respondent characteristics and variable distributions. Classical assumption tests—normality (Kolmogorov–Smirnov), multicollinearity (tolerance and Variance Inflation Factor), and heteroscedasticity (Glejser test)—were conducted to confirm the appropriateness of ordinary least squares regression. Multiple linear regression was then used to estimate the partial and combined effects of OSH and Skill on Employee Performance. The coefficient of determination (R^2 and adjusted R^2) quantified the proportion of variance in performance explained by the model. Partial hypotheses were tested using the t-test (significance threshold $p < 0.05$), and the simultaneous hypothesis was tested using the F-test. A dominance analysis based on standardized beta coefficients identified the relatively stronger predictor.

Ethical Considerations

This study was conducted in accordance with the ethical principles for research involving human participants. Ethical clearance and institutional permission to conduct the survey were obtained from the Research Ethics Committee of the author's affiliated institution prior to data collection. All respondents were informed of the study's purpose, assured of the voluntary nature of their participation, and provided written informed consent. Confidentiality and anonymity of individual responses were maintained throughout data collection, analysis, and reporting, and no personally identifying information was disclosed in this article.

RESULTS

Respondent Characteristics

Table 1 summarizes the demographic composition of the 82 respondents included in the final analysis.

Characteristic	Category	n	%
Gender	Male	68	82.9
	Female	14	17.1
Age	< 26 years	15	18.3
	26–40 years	50	61.0
	> 40 years	17	20.7
Education	Senior High School	39	47.6
	Diploma (D3)	27	32.9
	Bachelor (S1)	16	19.5
Tenure	1–5 years	45	54.9
	6–10 years	26	31.7
	> 10 years	11	13.4

Classical Assumption Tests

The Kolmogorov–Smirnov test yielded an asymptotic significance of 0.200 (> 0.05), indicating that the residuals were normally distributed. Multicollinearity diagnostics showed tolerance values of 0.612 for OSH and 0.612 for Skill, with corresponding Variance Inflation Factor (VIF) values of 1.634 for both predictors, well below the conservative threshold of 10, indicating the absence of multicollinearity. The Glejser test produced non-significant coefficients for both predictors (OSH $p = 0.312$; Skill $p = 0.278$), confirming homoscedasticity. These results indicate that the data satisfied the classical assumptions required for multiple linear regression.

Multiple Linear Regression

Table 2 presents the results of the multiple linear regression analysis examining the effects of OSH (X1) and Skill (X2) on Employee Performance (Y).

Table 2. Multiple Linear Regression Results (Dependent Variable: Employee Performance)

Variable	Unstandardized B	Std. Error	Standardized β	t	Sig.
(Constant)	6.842	2.104	-	3.253	0.002
OSH (X1)	0.398	0.085	0.372	4.681	0.000
Skill (X2)	0.512	0.093	0.441	5.529	0.000

The resulting regression equation is: $Y = 6.842 + 0.398X_1 + 0.512X_2 + e$. The positive coefficients indicate that increases in both OSH and Skill are associated with increases in employee performance, holding the other predictor constant.

Coefficient of Determination

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.812	0.659	0.653	2.147

As shown in Table 3, the model produced an R value of 0.812, indicating a strong correlation between the predictors and employee performance. The adjusted R² of 0.653 indicates that OSH and Skill jointly explain 65.3% of the variance in employee performance, while the remaining 34.7% is attributable to variables not examined in this model, such as compensation, leadership style, or organizational culture.

Hypothesis Testing

Partial (t-test) results in Table 2 show that OSH had a significant positive effect on employee performance ($t = 4.681$, $p = 0.000 < 0.05$), supporting Hypothesis 1. Skill also had a significant positive effect on employee performance ($t = 5.529$, $p = 0.000 < 0.05$), supporting Hypothesis 2. The simultaneous F-test (Table 4) confirms that OSH and Skill together significantly affect employee performance.

Table 4. ANOVA / Simultaneous F-Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	684.312	2	342.156	74.216	0.000
Residual	364.213	79	4.611	-	-
Total	1048.525	81	-	-	-

With $F = 74.216$ and $p = 0.000 (< 0.05)$, Hypothesis 3 is supported: OSH and Skill simultaneously and significantly affect employee performance at PT. Lutvindo Wijaya Perkasa. Comparison of standardized beta coefficients ($\beta = 0.441$ for Skill versus $\beta = 0.372$ for OSH) indicates that Skill is the dominant predictor of employee performance in this sample.

DISCUSSION

Interpretation of Findings

The finding that Occupational Safety and Health exerts a significant positive effect on employee performance suggests that when employees perceive their workplace as adequately protected—through the provision of protective equipment, structured safety training, and visible management commitment—they are better able to concentrate on task execution rather than hazard avoidance. This reduction in the cognitive load associated with managing potential safety risks facilitates higher levels of psychological safety (Wang et al., 2020), which in turn fosters a more focused and committed approach to duties, ultimately improving both the quality and consistency of output (Maisaroh & Nadroh, 2025). Furthermore, effective OSH programs are instrumental in reducing workplace accidents and associated downtime, thereby enhancing overall operational productivity (Edwar et al., 2025; Katsuro et al., 2010). Similarly, the significant effect of Skill on performance confirms that technical knowledge, accumulated experience, and adaptive problem-solving ability serve as critical drivers of operational efficacy (Ogundare et al., 2024). These attributes translate directly into more efficient and accurate task completion by enabling employees to navigate complex technical requirements and troubleshoot challenges effectively, particularly in a technically demanding construction-services environment (Bahamnia & Kumar, 2024; Leje et al., 2022). The interplay between these two factors suggests a synergistic effect where a secure safety environment allows for the full deployment of the workforce's technical proficiency, creating a foundation for sustained performance excellence (Ogundare et al., 2026).

Comparison with Prior Studies

The significant positive influence of OSH on performance identified in this study aligns with prior empirical evidence across various high-risk and service-oriented sectors. Specifically, this finding echoes the results observed at PT PIP, where OSH—mediated by employee motivation—significantly drove performance outcomes (Pasaribu & Eddyono, 2025; Surayuddin et al., 2025; Suyatno & Pancasasti, 2023). Furthermore, these results corroborate studies in the Nepalese construction industry, where proactive safety management systems and a robust safety culture are identified as primary performance determinants (Giri et al., 2024; Gloria & Manayan, 2024; Shah, 2025). The findings also resonate with research in Rwandan private firms Alphonse & Rulinda (2025) and a Bali-based retail enterprise (Journal of Governance, Taxation and Auditing, 2025), collectively reinforcing the generalizability of the OSH–performance nexus. Conversely, the divergence from the findings of Ekowati and Amin (Ekowati & Amin, 2019), who reported no direct OSH impact in an Islamic banking context, is likely attributable to contextual differences. In office-based, low-hazard environments, the motivational drivers and pathways to performance may differ significantly from the physically demanding, hazard-prone conditions characterizing construction and similar operations, where safety perceptions directly influence operational capacity and task focus.

Regarding the influence of Skill, our finding of a dominant positive effect is consistent with research conducted in the Indonesian automotive sector, which established technical competence as a primary driver of operational efficiency (Herwina, 2022; Kusharjanto & Puterisari, 2025). This result also aligns with broader sectoral studies, including those in the public and logistics industries, which position competence as a core performance driver (Nong et al., 2024; Serli et al., 2023). A notable exception exists in the findings of Hutabarat et al. (2023), who documented a negative relationship between competence and performance among state-owned utility employees. This contrast is critical; as discussed by the original authors, it may reflect a structural competence–job mismatch or the adverse effects of excessive workload on skilled workers (Bartling et al., 2012, p. 841; Casey et al., 2018, p. 29). Such complexities suggest that high technical capacity alone does not guarantee performance, especially when individuals are burdened with tasks exceeding their designated roles—a compelling area for future exploration within the specific context of PT. Lutvindo Wijaya Perkasa.

Implications of the Findings

Practically, these findings suggest that management at PT. Lutvindo Wijaya Perkasa should treat OSH investment and skill development not as separate cost centers but as complementary levers for performance improvement. Structured safety systems (regular training, accessible protective equipment, and clear hazard-reporting channels) should be paired with competency-based training programs targeting technical knowledge and adaptive problem-solving, given that Skill emerged as the stronger of the two predictors. Theoretically, the study extends the OSH–performance and competence–performance literatures by jointly modeling both constructs within a single regional Indonesian construction-services firm, addressing the context-specificity gap identified in prior research.

Limitations of the Study

This study is subject to several limitations. First, the cross-sectional design precludes causal inference in the strict sense; longitudinal or experimental designs would strengthen causal claims. Second, data were collected through self-reported questionnaires, which are susceptible to social desirability and common-method bias. Third, the study was confined to a single company in Pekanbaru with a relatively modest sample size ($n = 82$), which may limit the generalizability of findings to other organizations or regions. Fourth, the model explains 65.3% of variance in performance, indicating that other relevant variables—such as compensation, leadership style, work motivation, and organizational culture—were not captured and should be incorporated in future research.

CONCLUSION

This study set out to examine the partial and simultaneous effects of Occupational Safety and Health and Skill on employee performance at PT. Lutvindo Wijaya Perkasa, Pekanbaru. The findings demonstrate that both OSH and Skill independently and jointly exert a positive, statistically significant influence on employee performance, together accounting for approximately 65.3% of performance variance, with Skill identified as the dominant predictor. These results empirically substantiate the theoretical proposition advanced in the introduction—that safety and competency function as complementary antecedents of performance in hazard-exposed, technically demanding work environments—and are broadly consistent with, while also usefully qualifying, prior OSH-performance and competence-performance research conducted in comparable Indonesian and international settings.

The practical significance of these findings lies in their direct relevance to human resource planning: organizations operating in similarly hazardous, skill-intensive sectors may enhance workforce performance more effectively by integrating safety management and competency development into a single, coordinated human resource strategy rather than treating them as isolated initiatives. Future researchers are encouraged to replicate this model across multiple companies within the construction and heavy-equipment sector, incorporate mediating variables such as work motivation or job satisfaction, and adopt longitudinal designs to further clarify the causal ordering among safety, skill, and performance. Suggestions and constructive feedback from readers and fellow researchers on the methodology and interpretation presented in this article are welcomed by the author.

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CONFLICT OF INTERESTS

The author declares no conflict of interest regarding the publication of this article.

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