

THE ROLE OF TRAINING NEED ANALYSIS AND TRAINING EFFECTIVENESS IN ENHANCING EMPLOYEE PERFORMANCE THROUGH INNOVATION

(A Case Study of an Industrial Maintenance and Workshop Services Company Located in Cilegon)

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Abstract

In an era of increasingly intense industrial competition, companies are required to enhance their competitiveness through effective human resource development, particularly through needs-based training programs. Training Need Analysis (TNA) is a crucial stage in ensuring that training programs align with employees' competency requirements, thereby improving innovation and performance. This study aims to analyze the influence of Training Need Analysis and training effectiveness, as well as their impact on innovation and employee performance at one an industrial maintenance and workshop services company located in Cilegon. This research employs a quantitative approach using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results indicate that Training Need Analysis and training effectiveness have a positive and significant effect on innovation and employee performance. These findings confirm that the proper implementation of TNA can improve training quality, foster innovation, and enhance employee performance as well as the company's competitiveness, Partial mediation Innovations in the effect of training need analysis on employee performance, and on the effectiveness of employee performance experience the same partial mediation, with different values.

Keywords: *Training Need Analysis, Training Effectiveness, Innovation, Employee Performance, PLS-SEM*

1. INTRODUCTION

The development of technology, digitalization, and increasing business competition require companies to improve the quality of human resources as strategic assets in creating competitive advantage (Balouei Jamkhaneh et al., 2021) (Khemraj et al., 2023). According to (Thi et al., 2023) (Bahiroh & Ali, 2024)(Lestari et al., 2025), sustainable competitive advantage is achieved through resources that are valuable, rare, difficult to imitate, and non-substitutable, including human resource competencies (Heriyanto et al., 2021). One of the efforts made by companies to enhance these competencies is through training programs

initiated by Training Need Analysis (TNA). According to (Liyana Hussin et al., 2023), TNA is a systematic process for identifying competency gaps so that training programs can be aligned with organizational and individual needs (Markaki et al., 2021). Furthermore, training effectiveness is an important factor because it determines the success of training in improving knowledge, skills, work behavior, and organizational outcomes, as explained in Donald Kirkpatrick's training evaluation model (Miranda et al., 2025).

Various previous studies have shown that TNA and training effectiveness have positive effects on improving employee performance (S. W. Harahap & Aisyah, 2024) demonstrated that proper TNA can improve training effectiveness and positively impact employee performance, while (Kura & Kaur, 2021) stated that accurate identification of training needs can enhance employee competencies and productivity, (Yimam, 2022) (Aguinis & Kraiger, 2009) also explained that training success is influenced by the alignment between training needs, program design, and implementation. However, several studies have shown different results, indicating that training does not always have a direct impact on improving performance, creating a research gap that requires further investigation.

Table 1.1 Research Gap

No.	Researcher	Topic	Result
1.	Asniwati (2020)	The Effect of Training Need Analysis, Self-Efficacy and Training Content on the effectiveness of Training and Development Programs	TNA, self-efficacy, and training content have a significant effect on effectiveness training programs, which ultimately improve employee performance.
2.	Alzahmi & Alshamsi (2024)	The Influence of Applying Human Resource Training Needs Analysis on Employee's Performance	Effective TNA improves employee performance, which in turn supports business growth and employee performance.
3.	Harahap & Aisyah (2024)	The Importance of Training Needs Analysis (TNA) for Effective	Proper TNA implementation helps companies maximize

No.	Researcher	Topic	Result
		Human Resources Development	
		(Case Study on PT Kawasan Industri Holiday rentals in Bali, T)	resources and improve the effectiveness of human resource development, which supports employee performance.
4.	Raj et al (2024)	Assessing the Effectiveness of Training Needs Analysis (TNA) in MSME Manufacturing Sectors: A Business and Workforce Development Perspective	Training Need Analysis (TNA) has an important influence on improving employee performance, especially in the manufacturing sector in Johor, Malaysia. TNA that is carried out effectively is able to improve employee performance, encourage innovation, and strengthen Organizational Competitive Advantage.
5.	Mamun (2021)	Do Training Need Analysis (TNA) Important for Training Effectiveness? A Survey on some	Training Need Analysis (TNA) has a significant influence on performance employees. TNA Before training, the higher the effectiveness of the

No.	Researcher	Topic	Result
		Manufacturing Firm, Chattogram	training provided, which ultimately encourages optimal contribution from employees in achieving goals company.

Source: Processed by the author (2026)

Based on these conditions, this study positions innovation as a mediating variable that explains the relationship between Training Need Analysis, training effectiveness, and employee performance (Robert & Mori, 2024). Employees who develop competencies through training are expected to be able to generate new ideas, work methods, and solutions that provide added value to the organization. Research by (Zhang, 2022) shows that innovation has a significant effect on improving both individual and organizational performance. Therefore, this study aims to analyze the effect of Training Need Analysis and training effectiveness on employee performance through innovation in an industrial maintenance service company in Cilegon City. The results are expected to contribute to the development of human resource management knowledge as well as provide practical implications for training management practices within companies.

2. RESEARCH METHOD

This study employs the Resource-Based View (RBV) Theory as the grand theory. According to (Barney et al., 2021) (Wendry et al., 2023), organizational competitive advantage is obtained through resources that are valuable, rare, difficult to imitate, and non-substitutable (Valuable, Rare, Inimitable, and Organized/VRIO) (Purwati et al., 2026). In the context of human resource management, employee competencies are strategic assets that can be enhanced through proper training management. Also (Nayak et al., 2022) (Amaya et al., 2022) emphasized that an organization's ability to develop internal capabilities serves as the foundation for achieving competitive advantage. Recent research by (Chatterjee et al., 2025) further strengthens the relevance of RBV by demonstrating that organizational capabilities have a positive effect on improving company performance, particularly when supported by strategic management capabilities.

In addition to RBV, this study is supported by Human Capital Theory, which explains that investment in education, training, and competency development is an investment capable of improving individual and organizational productivity. This theory is reinforced by Kirkpatrick's Training Evaluation Model (Miranda et al., 2025), which states that training

effectiveness can be evaluated through four levels: reaction, learning, behavior, and results. This model explains that training success is not only measured by participant satisfaction but also by changes in work behavior and its impact on organizational performance.

The main variables in this study are Training Need Analysis (TNA), training effectiveness, innovation, and employee performance (Imron et al., 2024). TNA is a systematic process used to identify competency gaps so that organizations can design training programs that are aligned with individual and organizational needs. Training effectiveness describes the extent to which training is able to improve employees' knowledge, skills, and work behavior (Lestari et al., 2025)(Mehendra et al., 2026). Meanwhile, innovation is defined as an individual's ability to generate and implement new ideas that provide added value to the organization, while employee performance refers to the level of individual success in achieving work targets according to their responsibilities.

The development of research hypotheses is based on various previous studies. (S. Harahap & Tirtayasa, 2020) (S. W. Harahap & Aisyah, 2024) found that TNA has a positive effect on training effectiveness and employee performance. (Kura & Kaur, 2021) demonstrated that accurate identification of training needs can improve employee competencies and productivity. (Aguinis & Kraiger, 2009) explained that training effectiveness is influenced by the alignment between training needs, program design, and training implementation. Furthermore, (Zhang, 2022) proved that innovation contributes positively to improving both individual and organizational performance. Based on these theoretical foundations and previous research findings, this study proposes seven hypotheses examining the direct effects of Training Need Analysis and training effectiveness on innovation and employee performance, as well as the indirect effects through innovation as a mediating variable.

Method

This study employed a quantitative approach with a causal associative research design to analyze the effects of Training Need Analysis and training effectiveness on employee performance through innovation as a mediating variable at An Industrial Maintenance And Workshop Services Company Located In Cilegon. Data were obtained sample from 140 employees, Data Collection Techniques had participated in training programs through questionnaires distributed using **Google Forms**. The study utilized primary data collected from questionnaires and secondary data obtained from scientific journals, books, literature, and relevant company documents. The research instrument measured four variables, namely Training Need Analysis, training effectiveness, innovation, and employee performance using a Likert scale.

Data analysis was conducted using SmartPLS version 3.2.9 through several stages, including descriptive statistical analysis, instrument validity and reliability testing, evaluation of the outer model and inner model, and hypothesis testing using the

bootstrapping method. In addition, the role of innovation as a mediating variable was examined through Specific Indirect Effect analysis and Variance Accounted For (VAF) analysis to determine the magnitude of indirect effects among variables and identify the type of mediation occurring in the research model.

3. RESULTS AND DISCUSSION

study employed a quantitative approach with a causal associative research design to analyze the effects of Training Need Analysis, training effectiveness, and innovation on employee performance at An Industrial Maintenance And Workshop Services Company Located In Cilegon. Data were collected through questionnaires distributed to employees who had participated in training programs using Google Forms and were analyzed using SmartPLS version 3.2.9. A total of 140 questionnaires were successfully collected with a 100% response rate, indicating that all data were suitable for further analysis.

The characteristics of respondents show that the majority of respondents were male, aged between 20–29 years, and had a Bachelor's degree education level. This condition indicates that most respondents were productive-age employees with adequate educational backgrounds, enabling them to provide representative assessments regarding the implementation of training, innovation, and employee performance within the company. The results of descriptive analysis using the index value method indicate that all research variables were categorized as high. The employee performance variable received positive assessments, with the interpersonal impact indicator obtaining the highest score, while the quantity indicator received the lowest score. For the Training Need Analysis variable, the task analysis indicator received the highest assessment, whereas person analysis was the indicator with the lowest score, indicating that the training needs identification process has been implemented effectively.

The training effectiveness variable was also categorized as high, with the reaction indicator receiving the highest assessment and learning as the lowest indicator (E. Anisa Safa'at Derajat Syah et al, 2026) (Shabrina et al., 2025). Meanwhile, the innovation variable showed high results, where the idea implementation indicator received the highest assessment, while idea championing was the indicator with the lowest score. Overall, the descriptive analysis results indicate that respondents had positive perceptions regarding the implementation of training, innovation, and employee performance at An Industrial Maintenance And Workshop Services Company Located In Cilegon

Normality Test

Based on the results of the normality test, all research variables had skewness values within the range of -2 to $+2$ and kurtosis values within the range of -7 to $+7$, thus meeting the criteria for a normal distribution. Therefore, the research data fulfilled the normality assumption and were suitable for further analysis.

Convergent Validity Test Results

Based on the outer loading test results, most indicators met the convergent validity criteria with loading values ≥ 0.7 , although indicators KK1 and KK2 had loading values between 0.5–0.7. According to the PLS-SEM guidelines, indicators within this range can still be retained if the Average Variance Extracted (AVE) value of each construct exceeds 0.5. The test results showed that all variables had AVE values > 0.5 , indicating that they fulfilled the convergent validity criteria and were suitable for further discriminant validity testing.

Based on the Average Variance Extracted (AVE) test results, all variables had AVE values above the minimum threshold of 0.5 according to the criteria of Fornell and Larcker (1981), indicating that convergent validity was achieved. The AVE values for Employee Performance, Training Need Analysis, Training Effectiveness, and Innovation were 0.554, 0.658, 0.608, and 0.602, respectively. These results indicate that each construct was able to explain more than 50% of the variance of its indicators. Therefore, all variables demonstrated good convergent validity and were suitable for use in the next stage of model testing.

Discriminant Validity Test Results

Based on the cross loading test results, all indicators had the highest loading values on their respective constructs compared to other constructs. The indicators of Training Effectiveness had loading values ranging from 0.764–0.794, Innovation from 0.735–0.853, Employee Performance from 0.564–0.885, and Training Need Analysis from 0.755–0.878. These results indicate that each indicator had a good ability to represent its respective construct and demonstrated adequate discrimination from other constructs. Therefore, the measurement model fulfilled the discriminant validity criteria based on the cross loading test and was suitable for further analysis.

Based on the HTMT (Heterotrait-Monotrait) test results, the relationships among variables showed positive correlations with values ranging from 0.778–0.899. Although there were relatively strong relationships among constructs, each variable still demonstrated adequate discriminant validity because it could be distinguished from other constructs based on the measurement model testing results. Therefore, the constructs of Training Effectiveness, Innovation, Employee Performance, and Training Need Analysis fulfilled the discriminant validity criteria and were suitable for structural model analysis.

Based on the Fornell–Larcker criterion test results, all constructs fulfilled the discriminant validity criteria, indicated by the $\sqrt{\text{AVE}}$ values of each construct being higher than their correlations with other constructs. The $\sqrt{\text{AVE}}$ values of Training Effectiveness, Innovation, and Employee Performance were higher than the correlations among related variables, demonstrating that each construct had a good ability to differentiate itself from other constructs. Therefore, the measurement model in this study fulfilled the discriminant

validity criteria based on the Fornell–Larcker approach and was appropriate for further structural model analysis. Construct Reliability Test Results

Internal Consistency Reliability Test Results

Based on the output above, it can be seen that all values of Cronbach's Alpha and Composite Reliability (ρ_A ; ρ_C) are greater than 0.70. Therefore, it can be concluded that all instruments used in the research variables are reliable and have fulfilled the reliability test requirements. Thus, the research model is feasible and can proceed to the next stage of analysis.

Structural Model (Inner Model) Test Results

The inner model describes the relationships among latent variables based on substantive theory. The structural model is evaluated using the R-square value for the dependent constructs. The R-square value for the dependent variables should ideally be above 0.10 (the higher the value, the better the model), indicating that the dependent constructs have good explanatory power.

Coefficient of Determination Test Results (Adjusted R^2)

Based on the Adjusted R-Square test results, the Innovation variable has a value of 0.578, indicating that 57.8% of the variation in Innovation can be explained by the variables included in the model, while the remaining 42.2% is influenced by other factors outside the research model. Meanwhile, the Adjusted R-Square value for Employee Performance is 0.722, indicating that Training Need Analysis, Training Effectiveness, and Innovation simultaneously explain 72.2% of the variation in Employee Performance, while the remaining 27.8% is influenced by other variables not examined in this study. Overall, the Adjusted R-Square values above 0.50 and approaching 0.70 indicate that the model has good predictive capability for both endogenous variables.

Effect Size Test Results (f^2)

The effect size test results show that the independent variable Training Need Analysis has a large effect on the dependent variable Employee Performance. Meanwhile, the independent variables Training Effectiveness and Innovation show a small effect on Employee Performance because their effect size values are above the threshold value of 0.02.

Q-Square (Q^2) Test Results or Blindfolding

Based on the Q^2 test results, the Employee Performance variable has a Q^2 value of 0.389, indicating that the model has strong predictive relevance. This result shows that Training Effectiveness, Innovation, and Training Need Analysis are able to predict variations

in Employee Performance effectively, indicating that the research model has adequate predictive validity.

Path Coefficient

Based on the path coefficient test results, all relationships among the variables were found to be positive and statistically significant (p -value < 0.05). Training Need Analysis had the strongest effect on Employee Performance ($\beta = 0.545$; $p = 0.000$), followed by its effect on Innovation ($\beta = 0.572$; $p = 0.000$), indicating that training needs analysis is the most influential factor in enhancing both innovation and employee performance. Training Effectiveness also had positive and significant effects on Employee Performance ($\beta = 0.154$; $p = 0.022$) and Innovation ($\beta = 0.270$; $p = 0.000$), although its effects were weaker than those of Training Need Analysis. Furthermore, Innovation had a positive and significant effect on Employee Performance ($\beta = 0.248$; $p = 0.025$), indicating that increased innovation contributes to improved employee performance. Overall, these findings suggest that Training Need Analysis is the most dominant determinant in the structural model, while Training Effectiveness and Innovation serve as complementary factors that directly contribute to enhancing employee performance.

Hypothesis Testing and Mediation Analysis Results

Hypothesis Testing

Table 1 Hypothesis Test Results

	Hipotesis	Original Sample	T Statistics	P Values	Results
H1	Training Need Analysis (X1) à Employee Performance (Y)	0,545	6,229	0,000	Accepted, Positive (+)
H2	Training Effectiveness (X2) à Employee Performance (Y)	0,154	2,301	0,022	Accepted, Positive (+)
H3	Training Need Analysis (X1) à Innovation (Z)	0,572	10,233	0,000	Accepted, Positive (+)
H4	Training Effectiveness (X2) à Innovation (Z)	0,270	3,931	0,000	Accepted, Positive (+)
H5	Innovation (Z) à Employee Performance (Y).	0,248	2,255	0,025	Accepted, Positive (+)

Source: Data Processed, 2026

Based on the hypothesis testing results, all proposed hypotheses were supported, as each relationship exhibited a T-statistic greater than 1.96 and a p-value below 0.05. Training Need Analysis had positive and significant effects on both Employee Performance ($\beta = 0.545$; $p = 0.000$) and Innovation ($\beta = 0.572$; $p = 0.000$), making it the strongest predictor in the model. Training Effectiveness also had positive and significant effects on Employee Performance ($\beta = 0.154$; $p = 0.022$) and Innovation ($\beta = 0.270$; $p = 0.000$), although the magnitude of its effects was lower than that of Training Need Analysis. Furthermore, Innovation was found to have a positive and significant effect on Employee Performance ($\beta = 0.248$; $p = 0.025$). Overall, all path coefficients were positive and statistically significant, indicating that the structural model is statistically valid and that all research hypotheses are supported.

Result of Path Coefficient (Confidence Interval Bias Corrected)

Table 2 Result of Confidence Interval Bias Corrected

	Hipotesis	Original Sample	CI 2,5%	CI 97,5%	Results
H1	Training Need Analysis (X1) à Employee Performance (Y)	0,545	0,347	0,726	Accepted, Positive (+)
H2	Training Effectiveness (X2) à Employee Performance (Y)	0,154	0,012	0,263	Accepted, Positive (+)
H3	Training Need Analysis (X1) à Innovation (Z)	0,572	0,451	0,679	Accepted, Positive (+)
H4	Training Effectiveness (X2) à Innovation (Z)	0,270	0,112	0,403	Accepted, Positive (+)
H5	Innovation (Z) à Employee Performance (Y).	0,248	0,061	0,479	Accepted, Positive (+)

Source: Data Processed, 2026

Based on the SEM-PLS analysis using the bootstrapping procedure with bias-corrected confidence intervals, all relationships among the variables were found to be positive and statistically significant, as none of the confidence intervals crossed zero. Training Need Analysis had positive effects on Employee Performance ($\beta = 0.545$) and Innovation ($\beta = 0.572$), while Training Effectiveness positively influenced Employee Performance ($\beta = 0.154$) and Innovation ($\beta = 0.270$). In addition, Innovation had a positive

effect on Employee Performance ($\beta = 0.248$). Therefore, all proposed hypotheses (H1–H5) were supported, indicating that Training Need Analysis and Training Effectiveness play important roles in enhancing Innovation and Employee Performance, while Innovation also contributes significantly to improving Employee Performance.

Mediation Analysis Result

Table 3 Indirect Influence Test Results

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
<i>Training Need Analysis</i> (X1) à Innovation (Z) à Employee Performance (Y)	0,142	0,143	0,069	2,053	0,041
<i>Efektivitas Training</i> (X2) à Innovation (Z) à Employee Performance (Y)	0,067	0,065	0,033	2,007	0,045

Source: Data Processed, 2026

Based on the mediation analysis, Innovation was found to positively and significantly mediate the effects of Training Need Analysis and Training Effectiveness on Employee Performance. The indirect effect of Training Need Analysis on Employee Performance through Innovation yielded a coefficient of 0.142 ($t = 2.053$; $p = 0.041$), while the indirect effect of Training Effectiveness through Innovation produced a coefficient of 0.067 ($t = 2.007$; $p = 0.045$). These findings indicate that Innovation serves as a mediating variable that transmits the effects of both Training Need Analysis and Training Effectiveness to enhance Employee Performance, although the mediating effect of Training Effectiveness is relatively weaker.

To determine the type of mediation, this study calculated the Variance Accounted For (VAF) as follows:

Table 4. Results of VAF Value Calculation

Hipotesis	Direct Influence (a)	Indirect Influence (b)	Total Influence (c = a + b)	VAF (b/c)	Mediation Results
<i>Training Need Analysis</i> (X1) → Employee Performance (Y) Through Innovation (Z)	0,545	0,142	0,687	0,207 (20,7%)	Partial mediation

Training Effectiveness (X2) → Employee Performance (Y) through Innovation (Z)	0,154	0,067	0,021	0,303 (30,3%)	Partial mediation
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Source: *Data Processed, 2026*

Based on the Variance Accounted For (VAF) analysis, Innovation was found to serve as a partial mediator in the relationships between Training Need Analysis and Training Effectiveness and Employee Performance. The VAF value for the indirect effect of Training Need Analysis on Employee Performance through Innovation was 20.7%, while the VAF value for the indirect effect of Training Effectiveness on Employee Performance through Innovation was 30.3%. Since both values fall within the 20%–80% range, the results indicate that Innovation partially mediates the effects of both independent variables on Employee Performance.

These findings suggest that Training Need Analysis and Training Effectiveness influence Employee Performance not only directly but also indirectly by enhancing Innovation. Therefore, Innovation serves as an important mechanism through which improvements in creativity, the generation of new ideas, and enhanced work processes contribute to higher employee performance. Nevertheless, the partial mediation results also indicate that other factors beyond the scope of this study continue to influence Employee Performance.

Discussion

The Effect of Training Need Analysis on Employee Performance

The findings indicate that Training Need Analysis (TNA) has a positive and significant effect on Employee Performance. The more effectively an organization identifies training needs through organizational, task, and individual analyses, the more appropriate the training programs become, thereby enhancing employees' competencies, productivity, work quality, and efficiency. Training programs that are aligned with employees' actual needs also increase learning motivation and reduce competency gaps, ultimately leading to improved employee performance. These findings are consistent with those of (Putri & Hermana, 2023), (Yesicha Dauri et al., 2024), and (Pradita et al., 2025) (S. W. Harahap & Aisyah, 2024) (Arogundade et al., 2019), who concluded that a well-structured TNA serves as a fundamental basis for improving training effectiveness and employee performance (Redondo & Enciso, 2024).

The Effect of Training Effectiveness on Employee Performance

The results demonstrate that Training Effectiveness has a positive effect on Employee Performance. Effective training is characterized by relevant learning materials,

interactive learning methods, competent instructors, hands-on practice, and continuous evaluation, all of which contribute to improving employees' knowledge, skills, problem-solving abilities, and work productivity. As training effectiveness increases, employees are more likely to achieve higher work targets and deliver better performance. These findings are supported by (Zafar & Riswanto, 2023), (Handayani et al., 2025), and (Anggadha & Atmaja, 2023), who argued that systematically designed training programs enhance both individual and organizational performance.

The Effect of Training Need Analysis on Innovation

The findings reveal that Training Need Analysis has a positive effect on Innovation. Accurate identification of training needs enables organizations to develop competency enhancement programs that are aligned with changes in the work environment, thereby fostering creativity, critical thinking, and the generation of new ideas. The more effectively training needs are analyzed, the greater employees' ability to create innovations in work processes and methods. These findings are consistent with those reported by (Ganeva & Pusparini, 2024), (Liyana Hussin et al., 2023), and (Putri & Hermana, 2023), who found that an effective TNA enhances innovative work behavior through targeted competency development.

The Effect of Training Effectiveness on Innovation

The results indicate that Training Effectiveness has a positive effect on Innovation. Effective training provides employees with new insights while strengthening critical thinking, creativity, and the confidence to adopt improved work methods, thereby encouraging innovation within the organization. Competent instructors, relevant training materials, interactive learning approaches, and practical exercises were identified as key factors in enhancing employees' innovative capabilities. These findings are in line with those of (Dahlan & Sahrah, 2023), (Badarani et al., 2025), (Aini et al., 2024), and (Elshifa et al., 2024), who reported that effective training contributes significantly to creativity and workplace innovation.

The Effect of Innovation on Employee Performance

The findings demonstrate that Innovation has a positive effect on Employee Performance. Employees who are capable of generating new ideas, improving work processes, and implementing creative solutions tend to exhibit higher productivity, better work quality, and greater efficiency than those with lower levels of innovative behavior. Innovation also enhances employees' ability to adapt to organizational changes, thereby supporting the achievement of organizational goals more effectively. These findings are supported by (Trisnawati, 2024), (Dewi & Wibawa, 2022) and (Indrajita et al., 2021), who

identified innovative work behavior as one of the key determinants of individual performance.

The Mediating Effect of Innovation on the Relationship Between Training Need Analysis and Employee Performance

The results indicate that Innovation partially mediates the relationship between Training Need Analysis and Employee Performance. This finding suggests that TNA improves employee performance not only directly through competency development but also indirectly by fostering innovative work behavior that enhances work processes and productivity. Training programs designed based on accurate training needs assessment provide employees with opportunities to develop creative ideas that ultimately improve job performance. These findings are consistent with those of (Nguyen & Dao, 2023), (Liyana Hussin et al., 2023) (Gazi et al., 2025), (Putri & Hermana, 2023), and (Yesicha Dauri et al., 2024), who concluded that innovation strengthens the relationship between TNA and employee performance.

The Mediating Effect of Innovation on the Relationship Between Training Effectiveness and Employee Performance

The findings further show that Innovation partially mediates the relationship between Training Effectiveness and Employee Performance. Effective training enhances not only employees' technical competencies but also their creativity and problem-solving abilities, which foster innovation in the workplace. Such innovation subsequently strengthens productivity, work quality, and the achievement of organizational objectives. Therefore, effective training contributes to employee performance both directly and indirectly through the enhancement of innovative work behavior. These findings are supported by (Nguyen & Dao, 2023), (Dahlan & Sahrah, 2023), (Libani et al., 2022) and (Zafar & Riswanto, 2023), who emphasized that innovative behavior serves as an important mechanism for maximizing the impact of training on employee performance.

4. CONCLUSION

Based on the findings of this study, all proposed hypotheses were supported. Training Need Analysis, Training Effectiveness, and Innovation were found to have positive and significant effects on Employee Performance. In addition, Training Need Analysis and Training Effectiveness also had positive and significant effects on Innovation. These findings indicate that the more accurately an organization identifies its training needs and the more effectively training programs are implemented, the greater employees' ability to generate innovation and improve their performance. The study further demonstrates that Innovation serves as a mediating variable in the relationships between Training Need Analysis and Employee Performance, as well as between Training Effectiveness and Employee Performance. This suggests that the competencies developed through training can be translated into more innovative and productive work behaviors.

Overall, the findings highlight Training Need Analysis as the most influential factor in enhancing both Innovation and Employee Performance, as it ensures that training programs are aligned with job requirements and organizational objectives. Training Effectiveness also contributes to improved employee performance, particularly when supported by a work environment that encourages innovative behavior. Therefore, organizations should implement a systematic training needs assessment process and deliver relevant, high-quality training programs to foster a sustainable culture of innovation and achieve optimal improvements in employee performance.

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