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The Impact of Employee Competency and Experiential Training on Employee Performance: The Mediating Role of Organisational Commitment

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ABSTRACT

In the industry, technical competence and experiential training significantly influence operator performance. The purpose of this study is to examine the impact of technical competence and experiential training on the performance of production operators. Specifically, this study aims to analyze the mediating effect of organizational commitment on this relationship. This study used a quantitative explanatory approach and applied it to survey data from 41 production operators at PT ISIW. The data were analyzed using Partial Least Squares Structural Equation Modeling. The results indicate that competence has a positive and significant influence on operator performance. Other findings indicate that experiential training has a direct influence on employee performance, indicating that technical ability is the main foundation of performance. This study concludes that sustainable performance improvement requires integrating technical competence, continuous training systems, and organizational commitment. Theoretically, this study emphasizes the importance of standardized training and strengthening technical skills in the workspace.

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Introduction

In the industrial revolution 4.0 era, employee competence is a prerequisite for adopting the latest technology into company operations. Workforce competence is crucial to the productivity and professionalism of the manufacturing's industry process[1]. Without employees with adequate competence, company operations will find it difficult to run effectively and efficiently, even with the latest technology [2]. Similarly, employees with high skills will perform at a higher level and achieve optimal results, making positive contributions in line with their responsibilities [3]. In addition, employees who perform well are often able to manage their actions independently, making appropriate and efficient decisions to achieve company goals [4], [5]. However, although competency development is essential for companies, investment it in Indonesia has weakened. World Talent Ranking data shows Indonesia's position dropping from 46th in 2024 to 53rd in 2025, far below Singapore, Malaysia, and

Thailand. One indicator of human resource development that has declined is job training and internships [6].

Similarly, PT ISIW experienced a decline in human resource performance. Production operator performance, measured by Overall Equipment Effectiveness (OEE), is often below the 87% of target. There was a sharp decline between 2023 and 2024. This points to suboptimal workforce competency, resulting in increased downtime and defective products. As a manufacturing company with high production complexity across Primary and Secondary units, human resources management indicates that 70.7% of operators master only one machine type. This limits production flexibility during employee absences. Policy implementation gaps exist: although training programs like the 4 Disciplines of Execution (4DX) were introduced, they are not consistently used across all units. This underscores the need for stronger employee development and performance.

To improve human resource performance, several studies have explained that it is strongly influenced by individual ability or competence [1], [7], [8], [9], [10]. Moreover, competence which is a combination of the knowledge, skills, abilities, and other characteristics (KSAOs), is the main driving force in achieving maximum work results [11], [12]. In addition, effective training and competence plays a significant role as a strategy to close the gap between technological potential and actual results in the performance [2], [13]. The integration among capability development, internships, and supportive training is essential to boosting operator industry performance [1], [14], [15].

Several previous studies have examined the positive impact of training and competency on employee performance [16], [17], [18], [19], [20]. However, other study results are contradictory. A prior study revelead that job competency had a positive but insignificant effect on employee performance [21]. While it did improve performance, the contribution was insignificant because competency development was not accompanied by employee career development. Furthermore, a previous study found that job competency did not have a significant positive impact on performance among rural bank employees [22]. This was because employee skills and knowledge development in the workplace were not fully aligned with skill requirements, thus not accelerating job completion [22]. Similarly, the finding show job competence does not significant impact on performance [23].

This study proposes organizational commitment as a mediating factor in improving employee performance in the industry. Organizational commitment is a crucial factor in determining the extent to which employees comply with policies and voluntarily contribute to the company's progress[24],. Furthermore, organizational commitment is a very important because it contributes greatly to improving performance [20], [25], [26], [27], [28], [29]. The next novelty is the use of technical competency data obtained directly from operators' actual machine operation abilities. The last novelty is the evaluation of the implementation of the 4 Disciplines of Execution (4DX) as a Training mesurement [30], [31], which has not been widely discussed in similar literature.

This study aims to analyze how training and job competence impact to the employee performance of production operators in industry. The study purpose also examines the role of organizational commitment as a mediator for improved Employee performance. Managerially benefits, the results of this study are expected to help companies improve the performance of production operators, and, theoretically, to contribute to literature on job training and competencies.

This study was underpinned by following the Dynamic Training Transfer Model (DTT) [32], Social Exchange Thory [33], and the Competency Models, which offer a comprehensive view of the effect of employee competence and training in the workplace. The competence models describe how to maximize job performance by identifying individuals whose dimensional values, such as knowledge level and self-motivation, align with required competencies for a job performance [34]. Moreover, the DTT describes a cyclical process in which transfer intentions, initial application, and feedback integration repeatedly influence behavior. Effective training programs consider multiple factors: the trainees, the trainer, the environment, and the organizational context. The success of workplace learning is often measured by its impact on competency, professionalism, and adaptability [32].

Technical competencies are a fundamental pillar of modern workforce effectiveness, driving an employee's integrated capacity. These competencies include technical skills, job-specific knowledge, and intellectual abilities, enabling the effective and responsible execution of job tasks [28]. The integration of work attitudes, technical skills, and job knowledge forms the three core pillars of professional competence. This underscores that technical competence is not simply cognitive or physical ability, but is closely linked to the worker's relationship with their role and environment [35]. Intellectual and physical abilities are the two main dimensions of an employee's work competence, which reflect the responsibility to perform their work [36]. This is because competency is built as an integration of three main aspects, namely work attitude, technical skills, and job knowledge [11]. In addition, technical competency is an accumulation of work knowledge and technical skills to achieve the right job performance [37]. As summary, technical competence define as an employee's ability, consisting of technical and intellectual abilities to carry out responsibilities in their work.

Experiential training or learning is a method to support participants in applying techniques to new scenarios, developing thinking and decision-making in the workplace [38]. Experiential training centers on hands-on experience as the primary channel for understanding concepts and acquiring skills. This method is rooted in the experiential learning cycle, a four-stage process: concrete experience, reflective observation, abstract conceptualization, and active experimentation [39]. It is essential because with training, employees can upgrade their knowledge, reskills, and build attitudes, so they can perform daily tasks [40]. Experiential training enables an employee will acquire knowledge and skills [41], thereby increasing their readiness to face many work challenges [42]. Training is needed to improve or develop skills when an industry upgrades its system, which requires employees to upgrade their skills [43]. Furthermore, experiential training is the process of acquiring skills and knowledge in a practical work environment [44], [45]. This training can occur through formal and informal mechanisms, including structured programs, work experiences, and collaborative interactions [46], [47]. Moreover, training is a learning approach designed to help participants understand and apply the four disciplines of execution in their work context [30]. This training should be participatory, measurable, and results-oriented, with an emphasis on developing the habit of disciplined execution at the individual and team levels. The Training method generally goes through four main stages: conceptual understanding, initial implementation, execution, and evaluation and sustainability. Training evaluation uses a four-level framework: participant reactions, ability to understand learning concepts, participants change work behavior, and the impact of training on overall performance [31].

Expectancy theory stated that organizational commitment is influenced by employees' expectations regarding their efforts and rewards [48]. It because employees' belief that their performance is recognized with career advancement or skill development makes them more likely to remain committed to the organization [49]. Inline this, the skill development make employee more have commitment to give high contribution support organizational goal [50]. This is supported by previous research that found that employee competence enhances employees' commitment to their organization [51], [52], [53]. This literature describes the crucial role of employee competence, therefore the second hypothesis can be proposed:

H1: There is a positive influence of employee competence on organizational commitment.

Organizational commitment is the degree to which an employee accepts the organization's goals or value acceptance and desires to retention [41]. It mean that highly committed employees place organizational interests above personal interests, working to achieve organizational goals. In contrast, employees with low commitment may act in their own self-interest rather than in line with organizational priorities [54]. Furthermore, the 4DX training as an experiential learning approach was designed to help participants understand and apply the four disciplines of execution in their work context. This training should be participatory, measurable, and results-oriented, with an emphasis on developing the habit of disciplined execution at the individual and team levels [31]. Several previous studies have showed that Training has a positive effect on organizational commitment [55]. Based on the arguments, the hypothesis can be declare:

H2: There is a positive influence of Training on organizational commitment.

Employee competence refers to the combination of skills, knowledge, attributes, and behaviors that allow an individual to perform a task or role effectively within a professional environment [36], [56]. Findings from several studies indicate that employee ability and expertise as employee competence play an important role in shaping the quality and quantity of work in industry [57], [58]. Similarly, the previous results demostrated that employee competence significantly influence on employee performance [59], [60], [61]. Based on the prior studies, the fifth hypothesis can be declare:

H3: There is a positive influence of employee competence on industry employee performance.

Training is a learning approach that provides participants with the opportunity to apply theoretical knowledge and experiences they have learned to specific contexts [30]. Training through experiential practice can be achieved through problem-based, project-based, and challenge-based learning approaches. By providing challenges, problems, or scenarios to solve, participants are encouraged to find unique, innovative, and original solutions, while also developing creativity and critical thinking skills. This is support by several studies that suggest employee experiences in education, training and work experience can enhance organizational commitment and employee performance through physical, technological, and cultural experiences [55], [62]. Refer the previous studies, the third hypothesis can argued:

H4: There is a positive influence of training on industry employee performance.

Organisational commitment refers to the psychological attachment and degree of loyalty an employee feels toward their organisation or company [63]. It is the influence on whether they will stay, work hard, advocate for the organization's goals, and higher productivity [64]. It supported by numerous studies show that employees with high organizational commitment have a positive and significant influence on employee performance [53], [65], [66], [67]. According to the description, the five hypothesis can be declare:

H5: There is a positive influence of organisational commitment on industry employee performance.

H6: There is a positive indirect influence of employee competence on industry employee performance trought organisational commitment.

H6: There is a positive indirect influence of training on industry employee performance trought organisational commitment.

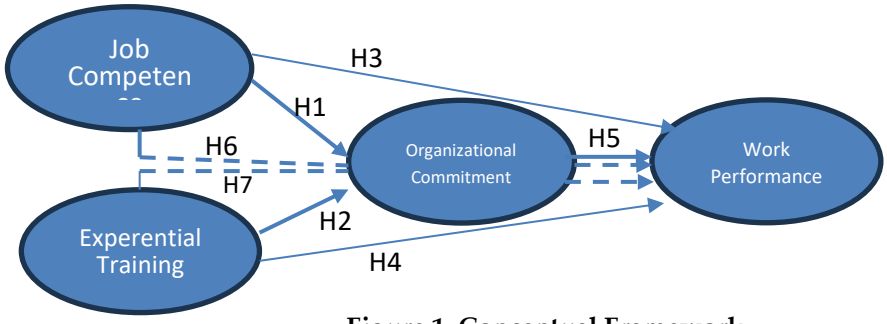

Figure 1. Conceptual Framework

Figure 1 illustrates the conceptual research framework. The model was built on five direct effects: the relationships among Training, job competency, organizational commitment, and operator Employee performance. Besides that, the model also examines two indirect effects in which organizational commitment serves as a mediating variable.

Method

This study was designed to be explanatory, clarifying cause-and-effect relationships among variables. It also used a quantitative approach, focusing on collecting and analyzing numerical data to test hypotheses and determine the direction and strength of relationships among variables [68].

Specifically, Training and job competency served as independent variables, Employee performance was the dependent variable, and organizational commitment functioned as a mediating variable. It assessed how Training and job competency directly influence Employee performance, as well as their indirect effects through organizational commitment.

The study population consisted of all 80 employees of PT ISIW, a tobacco product company based in Kudus Regency, Central Java Province, Indonesia. The sample size was calculated using Power Analysis [69], and it was used G*Power software [70]. The input parameters for this study were a target Large Effect Size f-square of 0.35, an Alpha Error Probability of 0.05, a Power of 0.90, and two Predictor Variables. The calculation resulted in a sample size of 40 respondents (see Figure 2).

The sample was selected using purposive sampling because this study focuses on a highly specialized industry [71]. The selection criteria were production operators with technical skills in the tobacco processing industry. Therefore, the sample included PT ISIW operators in the Primary unit, responsible for processing raw materials into finished blended tobacco, and operators in the Secondary unit, which processes finished blended tobacco into ready-to-consume products. Based on this approach, 41 production operators from both divisions were selected as the sample. This number meets rule of thumb criteria that a sample size greater than 30 and less than 500 is adequate for most studies [72]. Furthermore, it meets the PLS-SEM analysis technique requirement that the research model has only three paths to the dependent variable [73].

This study uses four latent constructs, and each requiring a research instrument to measure. To achieve good content validity, the indicators for the research variables were developed based on previous studies or experts. The instrument of employee competence was adopted from several studies [1], [37], [60], [74]. It consists of ten items: knowledge of production processes, production machines, product quality standards, occupational health and safety in the production arena, basic knowledge of mechanical engineering, machine operating skills, machine setup skills, production disturbance detection skills, product quality inspection skills, and machine cleanliness and maintenance skills.

The experiential raining variable instrument in this study is unique because it was designed by integrating the 4 Disciplines of Execution (4DX)-based training [31]. Therefore, five items were used as survey mesuring instruments, including consistency of 4DX implementation, focus on truly important goals, identification and control of lead measures, effective use of scoreboards, and implementation of accountability rhythms.

Organizational commitment is a manifestation of three main dimensions: affective commitment, continuance commitment, and normative commitment [75]. Each dimension, as identified in a previouse study [53], [76], [77], [78], is elaborated through 10 items. These include a strong belief in and acceptance of the organization's vision; belief in the organization's mission; belief in the organization's values; a sense of loyalty to the organization; a willingness to strive for the organization's interests; employees' perceptions of the benefits or advantages of remaining with the organization; consideration of potential losses if they decide to leave the organization; a desire to work; and a sense of responsibility to support the organization's progress.

The instrument for Employee or operator industry performance was developed based on prior studies [15], [79]. It was operationalized in 10 items, including minimizing customer complaints, managing the frequency of product defects, managing overall equipment effectiveness (OEE), minimizing rejected products, minimizing raw material variation, minimizing downtime, minimizing workplace accidents, minimizing overtime, building teamwork, self-maintenance, and managing compliance with the 5Ss (seiri, seiton, seiso, seiketsu, and shitsuke or concise, neat, clean, maintained, and diligent).

The first section of the research questionnaire concerns the respondents' profiles. The second section contains the research variables instrument, which, in this study, used a Likert scale as the measurement method. The assessment questionnaire were structured using a five-point Likert scale (1–5), allowing identify respondents' level of agreement or disagreement with each statement. There are

five response options, with the following categories: 1 for very poor, 2 for poor, 3 for fair, 4 for good, and 5 for very good.

The collected data were then analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is an alternative SEM method, namely, variance-based or component-based SEM, that focuses on predicting and exploring relationships between variables. PLS-SEM aims to maximize the explained variance of the dependent (endogenous) variables. PLS-SEM is an alternative SEM method that can be used to address weak theoretical foundations or small sample sizes [80].

The measurement model in PLS-SEM introduces readers to key concepts, including construct types, essential evaluation criteria to ensure that indicators validly and reliably measure the intended latent construct. The measurement model defines how each indicator block relates to its latent variables. Validity testing assessed how accurately the questionnaire measured data from the research object. Higher validity indicates a lower error rate and more adequate data. In this study, validity was measured by outer loadings above 0.6, discriminant validity via a Heterotrait-Monotrait Ratio (HTMT) matrix below 0.95, and the Fornell-Larcker criteria. Reliability testing is conducted to assess the extent to which responses to various items in an instrument demonstrate consistency, both when measured at different times and when assessed by multiple evaluators using the same instrument. In this study, reliability will be measured using the Construct Reliability and Cronbach's Alpha coefficient, with a value above 0.7, and the average variance extracted (AVE) above 0.4 [80].

The structural model describes the relationship between latent variables based on substantive theory. The design of the relationship between latent variables is based on the problem formulation or research hypothesis. The structural model, or inner model, is evaluated by examining the percentage of explained variance, namely the R2 value for the dependent latent construct, which indicates the causal variable's ability to explain the influenced variable. To test the significance of the relationship between variables, the t-statistic was used, while t-values above 1.96 indicate acceptance the hypothesis [80].

Results and Discussion

This research began with the distribution of questionnaires to respondents, conducted from November to December 2025. The respondents' demographic profile. The result show that the majority of 33 respondents were male (80.5%), while 8 respondents were female (19.5%). This composition reflects the actual conditions in the cigarette industry, particularly in the machine production sector, which tends to be dominated by male Employees due to the demands of the work, which requires physical strength and specific technical skills. The data further illustrates the age of the 41 respondents from PT ISIW's production operators. The majority of respondents were in the 19–30 age group, representing 18 people (43.9% of the total). This group represents a young generation still in the early stages of their careers, with high physical endurance and a tendency to adapt quickly to machine-based work systems. The majority of respondents, 15 people (36.6% of the total), had 6-10 years of work experience. This group can be categorized as employees with a relatively mature level of experience, thus possessing a deep understanding of work processes and production machine operations. The following data describe the most recent educational backgrounds of PT ISIW's production operators, a sample of 41 respondents. Finally, the majority of respondents (73.2%) were vocational high school graduates. This indicates that the company tends to recruit Employees with vocational education backgrounds.

To ensure the accuracy and reliability of the instruments used, this study conducted a validity test to assess the extent to which the measuring instrument accurately measured the intended aspects. This test provided empirical evidence regarding the instrument's reliability while ensuring the appropriateness of the data obtained, thus supporting the theoretical and practical foundations of the

study. Researchers conducted validity and reliability tests using SmartPLS version 4 [81], with 41 respondents completing the questionnaire.

Tabel 1 present the convergent validity. It can be explained that the Training variable has a loading factor value between 0.693 and 0.796, employee competence has a value between 0.543 and 0.796, organizational commitment has a value between 0.559 and 0.846, and Employee performance has a value between 0.547 and 0.812. These results indicate that all items have loading factor values above the threshold of 0.5, indicating good convergent validity. The loading factor value of 0.7 is considered ideal, while values above 0.5 are still strong enough to explain the variance in the research latent construct [82]. This is in line with statement that the PLS-SEM analysis method, loading factor values above 0.5 or 0.6 are still acceptable [83]. Likewise, other scholar emphasized that in business research, indicators with loading factor values above 0.5 are retained or do not need to be removed from the model [84].

Table 1. Convergent Validity Testing Results

Variables	Statement	Code	Loading
Employee competence	Knowledge about the cigarette production process	COMP1	0.739
	Knowledge about cigarette production machines	COMP2	0.730
	Knowledge of cigarette product quality standards	COMP3	0.728
	Knowledge of K3 in production areas	COMP4	0.691
	Basic knowledge of mechanical engineering	COMP5	0.666
	Skills in operating a cigarette machine	COMP6	0.635
	Skills in setting up machines	COMP7	0.543
	Skills in detecting production disturbances	COMP8	0.683
	Product quality inspection skills	COMP9	0.796
	Skills in maintaining cleanliness and machine maintenance	COMP10	0.699
Experiential Training	Consistency of 4DX implementation	TRAIN1	0.756
	Focus on the truly -important goals (WIG)	TRAIN2	0.796
	Identification and control of Lead Measures	TRAIN3	0.795
	Effective use of the scoreboard	TRAIN4	0.693
	Implementation of accountability rhythm (WIG Session)	TRAIN5	0.729
Organizational Commitment	I am proud because cares about development employee capabilities.	COMI1	0.732
	I am enthusiastic about participating in every training held by the company.	COMI2	0.846
	I attended are important for my progress and the company's.	COMI3	0.774
	I feel that the work environment supports me to continue learning and developing.	COMI4	0.623
	I continue to work because the company gives me the opportunity to develop my work skills.	COMI5	0.750
	I'm at a loss if I leave before take advantage of all opportunities	COMI6	0.736
	I have learned a lot and gained work experience, so I want to continue working at this company	COMI7	0.706
	I feel obliged to apply the training results to support my performance in the company.	COMI8	0.609
	I want to repay the trust companies by working better	COMI9	0.559
	I feel compelled to remain loyal because the company has helped me develop professionally.	COMI10	0.662
Employee Performance	Minimizing Customer Complaints	PERF1	0.593
	Managing Product Defect Frequency	PERF2	0.812
	Managing OEE	PERF3	0.743
	Minimizing Rejected Products	PERF4	0.794
	Minimizing Raw Material Variation	PERF5	0.671
	Minimizing Production Downtime	PERF6	0.606
	Minimizing Workplace Accidents	PERF7	0.587
	Minimizing Overtime	PERF8	0.603
	Building Teamwork	PERF9	0.644
	Managing Compliance with 5S	PERF10	0.547

The reliability calculations in Table 2 show strong reliability values. This is shown for training, having a Cronbach's Alpha (⟨) of 0.812 and Composite Reliability (CR) of 0.868, employee competence, having an ⟨ of 0.880 and CR of 0.902, organizational commitment, having an ⟨ of 0.887 and CR of 0.907, and finally Employee performance with ⟨ of 0.858 and CR of 0.887. Other results show that the AVE for training of 0.570 meets the ideal threshold of 0.50, whereas those for employee competence of 0.487, organizational commitment of 0.496, and employee performance of 0.443, are slightly below it. The AVE value is less than 0.50, but the CR value is higher than 0.60, then the convergent validity of the construct can still be considered acceptable [86].

Table 2. Reliability Testing Results

Variables	Cronbach's Alpha (⟨)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Employee competence	0.880	0.902	0.487
Experiential Training	0.812	0.868	0.570
Organizational Commitment	0.887	0.907	0.496
Employee Performance	0.858	0.887	0.443

Tabel 3 presents the first discriminant validity results, which aim to ensure that each latent variable is uniquely distinct from the others in the model. The results demonstrate that the AVE root values on the diagonal for each construct are greater than the correlation with other constructs below and to the left. For example, in Training, the AVE root value is 0.755, which is greater than its correlations with employee competence (0.369), organizational commitment (0.465), and Employee performance (0.611). The discriminant validity criterion is met because the variance shared by a construct with its own indicators is greater than the variance it shares with other constructs [85]. In line it, the Fornell-Larcker criterion is an effective traditional method in PLS-SEM for comparing inter-construct correlations, using the square root of the AVE as the validity threshold [80].

Table 3. Fornell-Larcker Criterion as Discriminant Validity

Variables	Comp	Comi	Perform	Train
Employee competence	0.694			
Organizational Commitment	0.599	0.705		
Employee Performance	0.665	0.701	0.666	
Experiential Training	0.369	0.465	0.611	0.755

Tabel 4 summarizes the results of the discriminant validity test using the Heterotrait-Monotrait Ratio (HTMT) criterion, which is the most advanced and rigorous method in Partial Least Squares (PLS-SEM) model testing. The calculation results indicate that the discriminant validity criterion, as measured by the HTMT value, has been met, as the inter-construct ratio is below the threshold of 0.9 [86], [87].

Table 4. Heterotrait-Monotrait Ratio (HTMT) as Discriminant Validity

Variables	Comp	Comi	Perform	Train
Employee competence				
Organizational Commitment	0.616			
Employee Performance	0.714	0.758		
Experiential Training	0.411	0.528	0.684	

Based on the results of the convergent validity, reliability, Fornell-Larcker, and HTMT tests, all were found to meet the requirements; thus, the measurement model was declared very strong and valid. The graphical calculations, as shown in Figure 2, revealed that all indicators had loading values above 0.50, and the path coefficients, which illustrate the strength of the relationships between the latent variables, were positive.

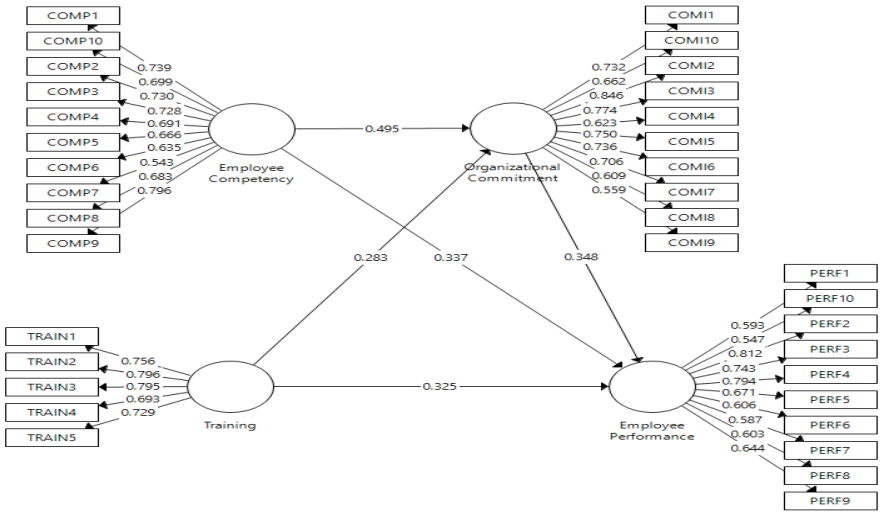

Figure 2. Structural Model Result

Structural analysis was used to determine whether the direct effects hypothesis is accepted, with significance criteria in PLS-SEM using T-Statistics > 1.96 and P-Values < 0.05 at the 95% confidence level. The results of the bootstrapping-estimated value are shown in Table 6. The result indicates that H1 is accepted, which employee competence has a very strong, positive, and significant effect on organizational commitment (T = 5.090; P = 0.000). The next results indicate that H1 is accepted, which training positively influences organizational commitment (T = 2.236; P = 0.025). Next, the test results show that employee competence has a positive and significant effect on employee performance (T=2.874; P=0.004), thereby supporting H3. Other findings indicate that training has a positive and significant effect on employee performance (T = 3.010; P = 0.003), thereby supporting H4. The final result demonstrates that H5 is accepted, that organizational commitment has a positive and significant effect on employee performance (T=3.094; P=0.002).

Indirect effects analysis wass used to see the mediating role of organizational commitment. In testing H6 regarding the influence of employee competence on organizational commitment and then employee performance shows a significant (T = 2.532; P = 0.011). This indicates that organizational commitment acts as a significant mediating. However, the result of H7, namely the influence of training on organizational commitment and then employee performance, the results show no significance (T = 1.612; P = 0.107). This indicates that organizational commitment does not mediate. Furthermore, The final results explain the determination coefficient of organizational commitment (R^2 = 0.428), meaning it has a moderate category, and Employee performance (R^2 = 0.666) shows a strong influence.

Table 5. Variable Relationship

Hypothesis	Estimate	T Statistics	P Values	Decision
H1: Employee competence -> Organizational Commitment	0.495	5.090	0.000	Supported
H2: Experiential Training -> Organizational Commitment	0.283	2.236	0.025	Supported
H3: Employee competence -> Employee Performance	0.337	2.874	0.004	Supported
H4: Experiential Training -> Employee Performance	0.325	3.010	0.003	Supported
H5: Organizational Commitment -> Employee Performance	0.348	3.094	0.002	Supported
H6: Employee competence -> Organizational Commitment -> Employee Performance	0.172	2.532	0.011	Supported
H7: Experiential Training -> Organizational Commitment -> Employee Performance	0.098	1.612	0.107	Rejected

Note: R Square for Organizational Commitment = 0.428, Employee Performance = 0.666

Discussion

The main aims of this study are to analyze how employee competence and experiential training impact organizational competence, thereby contributing to the performance of production operators. Based on the results, this study has several significant research contributions. First, employee competence have a significant positive effect on affective, normative, and continuance employee commitment to the organization. Social Exchange Theory sees company training as a long-term investment [33], and the employees respond by showing greater loyalty and commitment, when organizations support job competency, employees feel a stronger obligation to stay. This strengthens the normative aspect of commitment and encourages a sense of duty to remain with the organization. these results support previous studies showing that employees with strong knowledge, skills, and work attitudes tend to demonstrate affective commitment by developing an emotional attachment to the company [14], [29], [52]. Moreover, employees who can perform their duties well are likely to comply with the company's regulations. In addition, employees' strong intellectual and emotional competence plays an important role in helping them achieve organizational excellence [53]. These results are consistent with previous research showing that competent employees report greater role engagement at work and develop stronger emotional connections with the organizations they work for [88], [89].

This study further confirms that experiential training can improve operator performance in industry. These results align with literatures indicating that improving employees' skills is crucial to ensuring they can operate the latest technology products in industrial operations [32], [57], [90]. In this context, it is also important to plan training based on the industry's future skill needs [1], [23]. As previous research has shown, appropriate training will reduce unnecessary errors, enabling employees to produce products in accordance with technical specifications [19]. Spesially, a 4DX-based training needs assessment is an experiential learning approach designed to help participants understand and apply the four disciplines of execution in their work context [31].

This study also empirically confirms the positive and significant influence of organizational commitment on operator performance in industry. Organizational commitment, as an employee's psychological attachment, identification, and involvement in their organization, is a critical psychological driver that significantly improves operational outcomes [50], [91]. This relationship is not merely correlational but demonstrates a strong causal mechanism: committed operators show increased reliability, productivity, safety compliance, and discretionary effort. At the heart of this relationship lies affective organizational commitment, which represents emotional attachment and a desire to remain with the organization. Research consistently shows that affective commitment has the strongest positive relationship with job performance among the various forms of commitment [92]. In an industrial context where precision, consistency, and safety are critical, operators with high affective commitment demonstrate superior task execution because they internalize organizational goals as personal goals [1]. This internalization leads to greater role clarity, reduced cognitive dissonance during challenging tasks, and an increased willingness to engage in extra-role behaviors that support team and organizational success. The employees' preference to remain with the organization remains high even when faced with alternative opportunities that demonstrate their organizational commitment [49].

Based on the mediation test results, this study confirms the mediating role of organizational commitment in the relationship between job competency and operator employee performance. Consistent with previous research, the study's results confirm the significant impact of skill-building practices on collective affective commitment, which positively mediates the relationship between increased ability and voluntary employee willingness to maintain work quality and performance quality [53], [93]. In industrial settings, this stability is valuable because it preserves institutional knowledge, reduces training costs, and maintains consistent quality standards.

However, the results of this study do not provide evidence of a significant indirect effect of experiential training on industrial operator performance with organisational commitment as mediator. This is because the impact of training on performance is particularly strong in the manufacturing

industry [19]. The influence of organizational commitment extends beyond individual performance to the point where collective operational excellence becomes insignificant. Employee loyalty to the organization is established over time, making it less significant. This suggests that appropriate training for operators directly impact performance outcomes. This is in line with previous studies, which found that organisational commitment does not serve as a mediator of job performance [94].

Based on the research findings, this study has several implications for managing HR development in a more targeted and integrated manner. First, standardization and consistency in the application of technical competencies are key performance factors, so companies are advised to develop critical technical competency standards by standardizing SOPs across shifts and using work checklists. Second, integrating training into daily work systems by establishing clear WIGs, monitoring lead measures, using visual scoreboards, and holding regular WIG sessions. This aligns with the 4DX principle that strategies are effective when translated into work routines. Third, maximizing the role of senior operators as reinforcers of work standards. The third implication is that companies should involve senior operators as role models by providing on-the-production-line support, briefing on critical SOPs, and using daily work checklists to ensure competencies are applied uniformly and consistently. Finally, strengthening affective commitment to encourage work quality. The implication of the dominance of normative commitment is maintaining procedural compliance and encouraging proactive behavior, because emotional attachment (affective commitment) remains low. Therefore, companies need to strengthen affective commitment by recognizing quality contributions, involving operators in process improvements, and consistent supervisor support.

This study was limited to manufacturing production operators with machine-based work characteristics and relatively homogeneous operational standards, as well as respondent profiles. Therefore, the research results are not intended to be directly generalized to other sectors or types of work without considering differences in work context and human resource characteristics. Another limitation is the limited literature base, which is largely theoretical and does not yet describe the determinants of organizational commitment and employee performance.

This study provides an initial overview of the influence of competence and training on production operator performance through organizational commitment, and opens up opportunities for further, more in-depth and comprehensive research. Further research is recommended to use a longitudinal design to understand the dynamics of changes in competence, commitment, and performance over time. Based on the Adjusted R Square, which still leaves performance variations outside the studied variables, further research is recommended to add other organizational variables, for example: organizational support/perceived organizational support, supervisory leadership, reward and incentive systems, job characteristics such as workload and role clarity, and work engagement, to explain the remaining uncovered performance variations.

Conclusions

This study develops a quarterly revenue-forecasting-based business-block analytical framework to interpret the gas-pricing economics of PGN Group. The findings show that PGN Group's gas-related business portfolio cannot be meaningfully explained through a single aggregate gas price because each activity has different revenue, cost, and volume characteristics. Core natural gas trading is best interpreted using ownership-based volume, gas transmission or transportation, regasification, and gas processing using throughput-based volume, and LNG trading using transaction-based volume. Through this remapping, consolidated financial and operating data can be transformed into quarterly pricing indicators, namely revenue rate, cost rate, and indicative spread. The forecasting results also show that no single method performs best for all accounts; therefore, account-specific model selection using Simple Moving Average, Exponential Smoothing, and Linear Regression is more appropriate for constructing forecast-based pricing indicators.

The comparison between forecast-based and actual 2025 indicators indicates that the proposed framework can generate useful business-block pricing signals. Core natural gas trading, gas

regasification, and LNG trading show positive spreads, while gas transmission or transportation requires separate monitoring due to cost attribution and throughput effects. Gas processing reflects a near cost-revenue matched structure in 2025. The main contribution of this study is the development of a simple, transparent, and replicable framework that bridges consolidated financial reporting and managerial pricing interpretation. The framework can support internal pricing review, quarterly performance interpretation, and managerial decision-making through a Quarterly Business-Block Pricing Dashboard. However, this study is limited to business-block-level analysis and does not cover customer-level, contract-level, asset-level, or cargo-level pricing. Future research may extend the framework by using more granular data, longer time-series observations, and more advanced forecasting models.

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