



## The Influence of Principal Leadership, Teacher Training, Organizational Culture, and Academic Supervision on the Performance of High School Teachers

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### Abstract

*This study investigates the influence of principal leadership, teacher training, organizational culture, and academic supervision on teacher performance in senior high schools in Labuhanbatu Selatan Regency. Using a quantitative approach with path analysis, data were collected from 152 teachers through questionnaires and analyzed to determine both direct and indirect relationships among the variables. The results indicate that principal leadership, teacher training, organizational culture, and academic supervision each have significant positive effects on teacher performance, both individually and collectively. Academic supervision also plays a mediating role, reinforcing the influence of leadership, training, and organizational culture on teacher performance. These findings highlight the importance of strong educational leadership, continuous professional development, and a positive school culture as key factors in enhancing teacher performance and educational quality. The study emphasizes that an integrated strategy combining effective leadership, collaborative culture, professional training, and consistent academic supervision can significantly improve the overall quality of education in senior high schools.*

## Introduction

Indonesia's National Education System Law (Law No. 20/2003) frames education as a deliberate, planned endeavor to cultivate learners' spiritual, moral, intellectual, and practical capacities so they can contribute meaningfully to society, the nation, and the state. Article 3 further codifies the function of education in forming character and advancing civilization, implying an intentional design for environments that activate students' potential and produce graduates with relevant competencies (Law No. 20/2003; Huang, 2025). Realizing this mandate at school level requires coherent alignment among principal leadership, teacher professional learning, organizational culture, and formative supervision so that classroom practice consistently advances holistic outcomes.

Within this mandate, teachers are the pivotal agents of quality. The Ministry of State Apparatus Regulation No. 16/2009 institutionalizes teacher performance appraisal around core tasks planning, instruction, and assessment while national guidelines emphasize measurable indicators that capture preparation, delivery, and evaluation cycles (KemenPAN-RB No. 16/2009; Kemdikbud, 2012; Marra, 2018). Empirical work affirms that pedagogical competence and professional conduct are central levers: effective teachers plan, manage classrooms, and assess learning in ways that lift achievement and nurture students' potentials (Gunadi & Sumarni, 2023; Hulu, 2021; Paryono, 2020; Ramadhan, 2024). Accordingly, teacher performance must be supported not only by appraisal but also by systematic developmental inputs.

System-level pressures magnify this need. UNESCO summaries referencing PISA indicate that Indonesia's reading, mathematics, and science outcomes continue to trail regional leaders, while human development indicators, though improving, remain below peers (UNESCO, 2023, 2024). The pandemic compounded "learning loss," sharpening the urgency for responsive policy shifts e.g., USBN to school-based exams, UN to ANBK, simplified lesson plans (RPP), and PPDB zoning under the Merdeka Belajar agenda. Yet competency gaps persist, as reflected in UKG results that many teachers have not yet met despite initiatives such as PPG, Guru Penggerak, and the Platform Merdeka Mengajar. In this context, teachers are pressed to adopt innovative, learner-centered approaches aligned with Merdeka Belajar (Daga, 2021), which in practice require leadership support, targeted training, robust culture, and sustained supervision.

A theoretical lens clarifies the behavioral mechanisms at work. Job performance denotes the value of work behaviors contributing to organizational goals, encompassing task performance, citizenship behavior, and the mitigation of counterproductive acts (Colquitt et al., 2009; Sambung, 2019). Performance is shaped jointly by individual factors (ability, efficacy, motivation), group processes (leadership, teamwork), and organizational mechanisms (culture, structure), and it is observed through indicators such as quality, quantity, timeliness, efficiency, and attendance (Davis & Newstrom, 1998; Gibson et al., 2004; Mangkunegara, 2019; Mathis & Jackson, 2006). In schools, these constructs translate to the rigor of instructional planning, effectiveness of delivery and classroom management, fairness and utility of assessment, professional collaboration, and reliable participation.

Within schools, four determinants stand out. First, principal leadership sets direction, aligns resources, and motivates teachers; effective leadership blends managerial coordination with inspiration and instructional guidance (Kurniawati et al., 2020; Mahanis & Nurhimah, 2022; Mutia et al., 2021; Robbins, 2003; Siagian, 2006; Wahyuni et al., 2021). Second, teacher training that is needs-based, practice-rich, coached, and system-supported enhances pedagogical competence and classroom performance, including technology-enabled and neuroscience-informed approaches (Fullan, 2007; Handayani, 2022; Hatip et al., 2023; Hawanti et al., 2023; Heni et al., 2023; Joyce & Showers, 2002; Nurhayati, 2022; Rosita et al., 2021; Syukuri et al., 2023). Third, an enabling organizational culture shared values and routines that foster collaboration, discipline, and innovation amplifies commitment and improvement (Ilham, 2021; Mardhani et al., 2023; Ngo, 2024; Rawanoko et al., 2020; Syaputra & Santosa, 2022; Wasito et al., 2021; Windasari et al., 2023). Fourth, academic supervision operates as quality assurance for instruction when enacted as collegial cycles of pre-observation, observation, and feedback that connect appraisal to learning (Asmadi et al., 2023; Danial et al., 2022; Glickman et al., 2018; Muallifah et al., 2024; Munasir et al., 2024; Putri et al., 2023; Sergiovanni & Starratt, 2015; Setiawati et al., 2021; Susanti et al., 2022).

Preliminary observations in senior secondary schools (SMA) in Labuhanbatu Selatan echo national patterns: uneven lesson preparation, limited use of learning media, constrained student engagement, and inconsistent classroom leadership co-exist with strong practices; access to sustained, needs-based training varies; collaboration norms are inconsistent; and supervision cycles are not always followed through with actionable coaching. Prior research tends to isolate one or two determinants leadership (Mursiani et al., 2023; Pujiyati, 2020; Rachmad et al., 2023), training (Herlina et al., 2024; Kencana et al., 2021; Oyebimpe & Köprülü, 2022), culture (Nasution et al., 2024; Priliantari, 2022; Putra, 2023; Santosa, 2022), or supervision (Astuti & Sa'adah, 2024; Maritasari et al., 2020; Puri et al., 2023; Sunaryo, 2020) leaving limited evidence on their simultaneous and mediated effects in one model.

Responding to these gaps, the present study tests an integrated model of principal leadership, teacher training, organizational culture, and academic supervision as predictors of teacher performance among SMA teachers in Labuhanbatu Selatan. Specifically, it examines both direct effects and indirect pathways via academic supervision, positioning supervision as the developmental hinge that translates leadership, training inputs, and cultural conditions into improved instructional behaviors. This focus also engages current policy architectures Merdeka Belajar, the Platform Merdeka Mengajar (PMM), and e-kinerja by investigating how school-embedded supervision and culture-building can convert policy into classroom practice (Alfiyanto & Hidayati, 2022; Daga, 2021, 2022).

Finally, the study advances a context-specific novelty claim suggested by emerging evidence from the field: teacher training may exert the strongest influence on performance, followed by organizational culture and principal leadership, indicating a shift from structural–hierarchical explanations toward competence- and capacity-building perspectives (cf. Fullan, 2007; Hawanti et al., 2023; Heni et al., 2023). Theoretically, this reframes teacher performance as an outcome of aligned professional learning systems embedded in supportive cultures and enacted through formative supervision. Practically, it offers actionable implications for provincial and district authorities, school leaders, and teacher development programs seeking to raise classroom quality and student learning in Indonesia’s senior secondary schools.

## Methods

This research adopted a quantitative design based on the *ex post facto* design using the assumption that the variables being tested were already functional in real-life settings in school and thus could not be experimentally controlled. The chosen design made it easy to analyze the relationships between leadership practices, professional development, organizational culture, the academic supervision, and the performance of teachers as they occurred naturally in schools. The research was framed in public senior high schools in Labuhanbatu Selatan which comprised of 252 teachers. Out of this, a sample of 152 teachers was drawn by proportionate random sampling and hence providing a fair representation of each school based on its teaching staff make up. This sampling approach contributed to the analytical usefulness of the research because it integrated the respondents in different school settings in one interpretive framework.

The data were collected in the period between September 2024 to August 2025 by the use of questionnaires as the main tool with the support of documentation and observation to enhance the contextual knowledge. The questionnaire was designed into a Likert scale, which is a theoretical indicator to each variable of interest. It encompassed some areas of key leadership, teacher training, organization culture, academic supervision practices and teacher performance. To determine the suitability of the field, a pilot test was performed on thirty respondents not part of the main sample. Questionnaire validity was tested through product-moment correlation methods, whereas reliability was tested with the help of Cronbach Alpha. The constructs were very reliable implying that they had sufficient stability and consistency in data collection. Documentation was also used to further confirm the responses of the questionnaire especially where clarification was necessary.

After the data gathering, the descriptive statistical analysis was conducted to evaluate the distributions of scores and define general tendencies of each research variable. Some of the measures that were computed to explain the position of school leadership, teacher training programs, organizational culture, supervisory intensity, and teacher performance levels include the means, medians, modes, and standard deviations. The descriptive stage estimated numerical trends and provided a preliminary view of possible inter-variable interaction at a higher level of analysis. The results of the descriptive stage then informed interpretation in the inferential

stage especially when the patterns of observation were consistent with the ultimate statistical results.

A series of assumption tests were done to evaluate the appropriateness of the data to parametric analysis before the core analysis. The normal tests revealed that the distributions of data were within reasonable bounds, and linearity tests were used to verify that the relationship among variables had linear patterns. Analysis of homogeneity tests showed equal variances among groups and multicollinearity tests showed that independent variables could be analyzed without redundancy. The passing of these pre-req tests was necessary to warrant that the further analytical works would be done without any hesitation and not distorted statistically.

Path analysis was regarded as the main method of analysis and it allowed assessing both direct and indirect relationships between variables. The method allowed examining independent influences and the relationships that exist between key leadership and teacher training and performance outcomes through the mediating effect of academic supervision. The analysis began with estimation of regression equations and evaluation of their significance based on t - and F -statistics. The tests were used to ascertain that each variable was significant to teacher performance when tested separately and at the same time. Path coefficients were used to estimate the strength of direct and indirect effects. The model fit was tested to ascertain the appropriateness of the structure of the empirical data with the conceptual framework. All statistical calculations were performed in SPSS and the outcome of the statistical figures was the basis of the discussion where statistical evidence was converted into educational meaning.

## Results and Discussion

### Description of Research Data

The research data includes four variables, namely: principal leadership (X2), teacher training (X2), organizational culture (X3), academic supervision (X4), and teacher performance. Based on the results of the data examination, all incoming data met the requirements for processing and analysis. Briefly, it can be stated that this data description reveals information about the total score, highest score, lowest score, average, mode, median, range, standard deviation, and variance. For complete calculations, see Appendix 5. The following Table 1 shows the basic statistical calculations for the four variable data:

Table 1. Summary of Descriptive Statistics Calculation Results

Statistics	Principal Leadership	Teacher Training	Organizational Culture	Academic Supervision	Teacher Performance
N					
Valid	152	152	152	152	152
Missing	0	0	0	0	0
Mean	119.04	114.78	120.08	120.41	119.61
Median	120.00	115.00	120.00	123.00	120.00
Mode	114	122	112	125	117
Std. Deviation	12.997	13.563	11.938	11.782	13.709
Variance	168.912	183.959	142.524	138.813	187.949
Range	76	64	68	56	68
Minimum	71	78	76	88	77
Maximum	147	142	144	144	145
Sum	18,094	17,447	18,252	18,302	18,180

## Descriptive Statistics of Research Variables

The descriptive analysis of all research variables Principal Leadership (X1), Teacher Training (X2), Organizational Culture (X3), Academic Supervision (X4), and Teacher Performance (X5) shows that the data for each variable are approximately normally distributed, as indicated by the close values of the mean, median, and mode. The variable Principal Leadership obtained a minimum score of 71 and a maximum of 147 (M = 119.04, SD = 12.99), Teacher Training ranged from 78 to 142 (M = 114.78, SD = 13.56), Organizational Culture ranged from 76 to 144 (M = 120.08, SD = 11.94), Academic Supervision ranged from 88 to 144 (M = 120.41, SD = 11.78), and Teacher Performance ranged from 77 to 145 (M = 119.61, SD = 13.71). Based on class interval distribution and Sturges' rule, most respondents for each variable were positioned above the mean class, indicating that overall conditions of school leadership, training, organizational culture, supervision, and teacher performance in Labuhanbatu Selatan tend to be in the high category.

Table 2. Descriptive Statistics of Research Variables

Variable	Minimum	Maximum	Mean	Median	Mode	Std. Deviation	Distribution Tendency
Principal Leadership (X1)	71	147	119.04	120	114	12.99	Above average
Teacher Training (X2)	78	142	114.78	115	122	13.56	Above average
Organizational Culture (X3)	76	144	120.08	120	112	11.94	Above average
Academic Supervision (X4)	88	144	120.41	123	125	11.78	Above average
Teacher Performance (X5)	77	145	119.61	120	117	13.71	Above average

## Trend Test of Research Variables

The tendency test for each research variable was conducted using the ideal mean and standard deviation, classifying the data into four categories high, medium, low, and very low. The results show that principal leadership (X1) and organizational culture (X3) tend to be high, with 51.97% of respondents in the high category, while teacher training (X2) is predominantly in the medium category (58.55%). Academic supervision (X4) shows the highest tendency, with 59.87% of respondents categorized as high, followed by teacher performance (X5) at 52.63%. These findings indicate that the overall condition of schools in Labuhanbatu Selatan reflects a generally strong organizational and instructional climate, with teacher training remaining the area needing further reinforcement.

Table 3. Trend Test of Research Variables

Variable	High (%)	Medium (%)	Low (%)	Very Low (%)	Tendency Category
Principal Leadership (X1)	51.97	45.39	2.64	0.00	High
Teacher Training (X2)	37.16	58.55	4.29	0.00	Medium
Organizational Culture (X3)	51.97	46.05	1.98	0.00	High
Academic Supervision (X4)	59.87	39.47	0.66	0.00	High
Teacher Performance (X5)	52.63	46.05	1.32	0.00	High

### Test Requirements Analysis

The statistical analysis conducted in this study used parametric statistical formulas using correlation and regression analysis techniques. This second technique can only be carried out if several requirements have been met. The requirements that must be met in using parametric statistics are: (1) normality test, (2) linearity and significance test of regression, (3) homogeneity test, and (4) multicollinearity test.

#### Normality Test

The normality test for the research data was performed using the Kolmogorov-Smirnov test. The null hypothesis, which states that the sample originates from a normally distributed population, was tested. The significance level for the test was set at  $\alpha = 0.05$ . The next step was to compare it with the obtained significance level. A significant value greater than  $\alpha$  indicates that the sample originates from a normally distributed population. A non-significant value  $< \alpha$  indicates that the sample does not originate from a normally distributed population. The results of the research data normality hypothesis test are summarized in Table 4 below:

Table 4. Summary of Normality Test of Research Variable Data

No.	Variable	Kolmogorov–Smirnov Significance	$\alpha$ Value	Conclusion
1	X1 toward X4	0.199	0.05	Normal
2	X2 toward X4	0.934		Normal
3	X3 toward X4	0.295		Normal
4	X1 toward X5	0.560		Normal
5	X2 toward X5	0.694		Normal
6	X3 toward X5	0.710		Normal
7	X4 toward X5	0.502		Normal

Based on Table 4 above, it shows that the data for the variables resulting from the data normality test are obtained as follows:

#### Normality Test of Principal Leadership Variable (X<sub>1</sub>) on Academic Supervision (X<sub>4</sub>)

The normality test of the principal leadership variable (X<sub>1</sub>) on academic supervision (X<sub>4</sub>) is listed in Table 5 as follows:

Table 5. Normality Test of Variable X<sub>1</sub> Against X<sub>4</sub>

Academic Supervision × Principal Leadership	Values
N	152
Normal Parameters (a,b)	
Mean	0.0000000
Std. Deviation	11.50112174
Most Extreme Differences	
Absolute	0.087
Positive	0.046
Negative	-0.087
Kolmogorov–Smirnov Z	1.074
Asymp. Sig. (2-tailed)	0.199

Based on Table 5 above, it is known that the normality test of the principal leadership variable (X<sub>1</sub>) towards academic supervision (X<sub>4</sub>) obtained a Kolmogorov-Smirnov statistical value of

0.199. The significance value is greater than the value of  $\alpha = 0.05$ , which illustrates that the normality requirements for the principal leadership data ( $X_1$ ) towards academic supervision ( $X_4$ ) are met. Based on these data results, further data analysis can be carried out.

#### **Normality Testing of Teacher Training Variables ( $X_2$ ) Regarding Academic Supervision ( $X_4$ )**

The normality test of the teacher training variable ( $X_2$ ) against academic supervision ( $X_4$ ) is listed in Table 6 as follows:

Table 6. Variable Normality Test  $X_2$  to  $X_4$

<b>Academic Supervision × Teacher Training</b>	<b>Values</b>
N	152
Normal Parameters (a,b)	
Mean	0.0000000
Std. Deviation	9.83204317
Most Extreme Differences	
Absolute	0.044
Positive	0.036
Negative	-0.044
Kolmogorov-Smirnov Z	0.539
Asymp. Sig. (2-tailed)	0.934

Based on Table 6 above, it is known that the normality test of the teacher training variable data ( $X_2$ ) against academic supervision ( $X_4$ ) obtained a Kolmogorov-Smirnov statistical value of 0.934. The significance value is greater than the value of  $\alpha = 0.05$ , this illustrates that the normality requirements for teacher training data ( $X_2$ ) against academic supervision ( $X_4$ ) are met. Based on these data results, further data analysis can be carried out.

#### **Normality Testing of Organizational Culture Variable ( $X_3$ ) Against Academic Supervision ( $X_4$ )**

The normality test of the organizational culture variable ( $X_3$ ) against academic supervision ( $X_4$ ) is listed in Table 7 as follows:

Table 7. Normality Test of Variable  $X_3$  Against  $X_4$

<b>Academic Supervision × Organizational Culture</b>	<b>Values</b>
N	152
Normal Parameters (a,b)	
Mean	0.0000000
Std. Deviation	11.57103410
Most Extreme Differences	
Absolute	0.079
Positive	0.044
Negative	-0.079
Kolmogorov-Smirnov Z	0.977
Asymp. Sig. (2-tailed)	0.295

Based on Table 7 above, it is known that the normality test for the organizational culture variable ( $X_3$ ) against academic supervision ( $X_4$ ) obtained a Kolmogorov-Smirnov statistical

value of 0.295. The significance value is greater than the value of  $\alpha = 0.05$ , which indicates that the normality requirements for the organizational culture data ( $X_3$ ) against academic supervision ( $X_4$ ) are met. Based on these data results, further data analysis can be carried out.

#### Normality Test of Principal Leadership Variable ( $X_1$ ) on Teacher Performance ( $X_5$ )

The normality test of the principal leadership variable ( $X_1$ ) on teacher performance ( $X_5$ ) is listed in Table 8 as follows:

Table 8. Normality Test of Variable  $X_1$  against  $X_5$

Teacher Performance × Principal Leadership	Values
N	152
Normal Parameters (a,b)	
Mean	0.0000000
Std. Deviation	13.23285430
Most Extreme Differences	
Absolute	0.064
Positive	0.038
Negative	-0.064
Kolmogorov–Smirnov Z	0.790
Asymp. Sig. (2-tailed)	0.560

Based on Table 8 above, it is known that the normality test for the principal leadership variable ( $X_1$ ) on teacher performance ( $X_5$ ) obtained a Kolmogorov-Smirnov statistical value of 0.560. The significance value is greater than the value of  $\alpha = 0.05$ , which indicates that the normality requirements for the principal leadership data ( $X_1$ ) on teacher performance ( $X_5$ ) are met. Based on these data results, further data analysis can be carried out.

#### Normality Test of Teacher Training Variable ( $X_2$ ) on Teacher Performance ( $X_5$ )

The normality test of the teacher training variable ( $X_2$ ) on teacher performance ( $X_5$ ) is listed in Table 9 as follows:

Table 9. Normality Test of Variable  $X_2$  against  $X_5$

Teacher Performance × Teacher Training	Values
N	152
Normal Parameters (a,b)	
Mean	0.0000000
Std. Deviation	11.35633331
Most Extreme Differences	
Absolute	0.058
Positive	0.047
Negative	-0.058
Kolmogorov–Smirnov Z	0.711
Asymp. Sig. (2-tailed)	0.694

Based on Table 9 above, it is known that the normality test for the teacher training variable ( $X_2$ ) on teacher performance ( $X_5$ ) obtained a Kolmogorov-Smirnov statistical value of 0.694. The significance value is greater than the value of  $\alpha = 0.05$ , which illustrates that the normality requirements for teacher training data ( $X_2$ ) on teacher performance ( $X_5$ ) are met. Based on these data results, further data analysis can be carried out.

### Normality Test of Organizational Culture Variable (X<sub>3</sub>) on Teacher Performance (X<sub>5</sub>)

Testing the normality of the organizational culture variable (X<sub>3</sub>) against the performance of the X<sub>3</sub> variable against X<sub>5</sub>.

Table 10. Normality Test of Variable X<sub>3</sub> against X<sub>5</sub>

<b>ppp0</b>	
<b>N</b>	152
Normal Parameters (a,b)	
Mean	0.0000000
Std. Deviation	12.88204549
Most Extreme Differences	
Absolute	0.057
Positive	0.043
Negative	-0.057
Kolmogorov-Smirnov Z	0.701
Asymp. Sig. (2-tailed)	0.710

Based on Table 10 above, it is known that the normality test for the organizational culture variable (X<sub>3</sub>) on teacher performance (X<sub>5</sub>) obtained a Kolmogorov-Smirnov statistical value of 0.710. The significance value is greater than the value of  $\alpha = 0.05$ , which illustrates that the normality requirements for organizational culture data (X<sub>3</sub>) on teacher performance (X<sub>5</sub>) are met. Based on these data results, further data analysis can be carried out.

### Normality Testing of Academic Supervision Variable (X<sub>4</sub>) on Teacher Performance (X<sub>5</sub>)

The normality test of the academic supervision variable (X<sub>4</sub>) on teacher performance (X<sub>5</sub>) is listed in Table 11 as follows:

Table 11. Normality Test of Variable X<sub>4</sub> against X<sub>5</sub>

<b>Teacher Performance × Academic Supervision</b>	<b>Values</b>
<b>N</b>	152
Normal Parameters (a,b)	
Mean	0.0000000
Std. Deviation	10.30778783
Most Extreme Differences	
Absolute	0.067
Positive	0.048
Negative	-0.067
Kolmogorov-Smirnov Z	0.827
Asymp. Sig. (2-tailed)	0.502

Based on Table 11 above, it is known that the normality test for the academic supervision variable (X<sub>4</sub>) on teacher performance (X<sub>5</sub>) obtained a Kolmogorov-Smirnov statistical value of 0.502. The significance value is greater than the value of  $\alpha = 0.05$ , which indicates that the normality requirements for academic supervision data (X<sub>4</sub>) on teacher performance (X<sub>5</sub>) are met. Based on these data results, further data analysis can be carried out.

### ***Test of Linearity and Significance of Regression***

The linearity and significance tests were conducted to determine whether the exogenous variables had a linear and meaningful relationship with the endogenous variables. The test criterion states that if  $F_h < F_t$  at  $\alpha = 0.05$ , the relationship is linear, while significance is confirmed if  $t_h > t_t$  at  $\alpha = 0.05$ . These tests were applied to each pair of variables to ensure the validity of simple regression modeling in predicting relationships between leadership, training, organizational culture, supervision, and teacher performance.

The results showed that all regression models met the criteria of linearity and statistical significance. The regression between Principal Leadership ( $X_1$ ) and Academic Supervision ( $X_4$ ) produced a regression equation  $X_4 = 96.990 + 0.197X_1$ , with  $t = 2.723 > 0.164$  and  $Sig = 0.007$ , indicating a significant positive influence. Similarly, Teacher Training ( $X_2$ ) also had a significant effect on Academic Supervision ( $X_4$ ) with the equation  $X_4 = 65.469 + 0.479X_2$  and  $t = 8.087 > 0.164$  ( $Sig = 0.000$ ). The Organizational Culture ( $X_3$ ) variable also showed a significant relationship with Academic Supervision ( $X_4$ ) through the equation  $X_4 = 98.089 + 0.186X_3$  ( $Sig = 0.020$ ).

For the dependent variable Teacher Performance ( $X_5$ ), all independent variables demonstrated linear and meaningful relationships. Principal Leadership ( $X_1$ ) influenced teacher performance with the equation  $X_5 = 86.784 + 0.276X_1$  ( $Sig = 0.001$ ), while Teacher Training ( $X_2$ ) contributed significantly with  $X_5 = 54.610 + 0.566X_2$  ( $Sig = 0.000$ ). Likewise, Organizational Culture ( $X_3$ ) had a significant effect on teacher performance with  $X_5 = 72.426 + 0.393X_3$  ( $Sig = 0.000$ ). The strongest predictor was Academic Supervision ( $X_4$ ), which had a high regression coefficient in  $X_5 = 27.232 + 0.767X_4$  ( $Sig = 0.000$ ), suggesting that supervision plays a dominant role in enhancing teacher performance.

Overall, the analysis confirmed that leadership, teacher training, organizational culture, and academic supervision each have a linear and statistically significant effect on teacher performance, validating the regression models used for this study.

Table 12. Summary of Linearity and Regression Significance Tests

<b>Dependent Variable</b>	<b>Independent Variable</b>	<b>Regression Equation</b>	<b>t count</b>	<b>Sig.</b>	<b>Interpretation</b>	<b>Dependent Variable</b>	<b>Independent Variable</b>
Academic Supervision ( $X_4$ )	Principal Leadership ( $X_1$ )	$X_4 = 96.990 + 0.197X_1$	2.723	0.007	Significant & Linear	Academic Supervision ( $X_4$ )	Principal Leadership ( $X_1$ )
Academic Supervision ( $X_4$ )	Teacher Training ( $X_2$ )	$X_4 = 65.469 + 0.479X_2$	8.087	0.000	Significant & Linear	Academic Supervision ( $X_4$ )	Teacher Training ( $X_2$ )
Academic Supervision ( $X_4$ )	Organizational Culture ( $X_3$ )	$X_4 = 98.089 + 0.186X_3$	2.349	0.020	Significant & Linear	Academic Supervision ( $X_4$ )	Organizational Culture ( $X_3$ )
Teacher Performance ( $X_5$ )	Principal Leadership ( $X_1$ )	$X_5 = 86.784 + 0.276X_1$	3.317	0.001	Significant & Linear	Teacher Performance ( $X_5$ )	Principal Leadership ( $X_1$ )
Teacher Performance ( $X_5$ )	Teacher Training ( $X_2$ )	$X_5 = 54.610 + 0.566X_2$	8.283	0.000	Significant & Linear	Teacher Performance ( $X_5$ )	Teacher Training ( $X_2$ )

### ***Homogeneity Test***

The homogeneity test is conducted to determine whether the data originating from the population has a homogeneous variance or not. The test is conducted using SPSS, with the following provisions: (1) if the significance value or sig.  $< 0.05$  then it is said that the data variance is not the same or not homogeneous, and (2) if the significance value or sig.  $> 0.05$

then it is said that the data variance is the same or homogeneous. The results of the research data homogeneity hypothesis test are summarized in Table 13 below:

Table 13. Summary of Homogeneity Test of Research Variable Data

No.	Variable Relationship	Kolmogorov–Smirnov Significance	$\alpha$ Value	Conclusion
1	X <sub>1</sub> to X <sub>4</sub>	0.630	0.05	Homogeneous
2	X <sub>2</sub> to X <sub>4</sub>	0.078		Homogeneous
3	X <sub>3</sub> to X <sub>4</sub>	0.984		Homogeneous
4	X <sub>1</sub> to X <sub>5</sub>	0.398		Homogeneous
5	X <sub>2</sub> to X <sub>5</sub>	0.780		Homogeneous
6	X <sub>3</sub> to X <sub>5</sub>	0.174		Homogeneous
7	X <sub>4</sub> to X <sub>5</sub>	0.163		Homogeneous

The homogeneity tests were conducted to determine whether the data variances between independent and dependent variables were equal, which is a prerequisite for regression analysis. Based on the Levene’s Test results, all significance values were higher than the alpha level ( $\alpha = 0.05$ ), indicating that each variable pair met the homogeneity assumption. Specifically, the relationships between Principal Leadership (X<sub>1</sub>), Teacher Training (X<sub>2</sub>), Organizational Culture (X<sub>3</sub>), and Academic Supervision (X<sub>4</sub>) toward Teacher Performance (X<sub>5</sub>) all showed significance levels greater than 0.05. Similarly, the relationships among X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, and X<sub>4</sub> themselves were also homogeneous. These findings confirm that the dataset fulfills the requirement for equal variances, allowing further regression and path analyses to be carried out reliably.

Table 14. Summary of Homogeneity Test Results

No.	Variable Relationship	Levene Statistic	df1	df2	Sig.	Conclusion
1	X <sub>1</sub> → X <sub>4</sub>	0.232	1	302	0.630	Homogeneous
2	X <sub>2</sub> → X <sub>4</sub>	3.132	1	302	0.078	Homogeneous
3	X <sub>3</sub> → X <sub>4</sub>	0.000	1	302	0.984	Homogeneous
4	X <sub>1</sub> → X <sub>5</sub>	0.717	1	302	0.398	Homogeneous
5	X <sub>2</sub> → X <sub>5</sub>	0.078	1	302	0.780	Homogeneous
6	X <sub>3</sub> → X <sub>5</sub>	1.854	1	302	0.174	Homogeneous
7	X <sub>4</sub> → X <sub>5</sub>	1.959	1	302	0.163	Homogeneous

### **Multicollinearity Test**

The multicollinearity test aimed to determine whether correlations existed among the exogenous variables that could potentially cause multicollinearity problems in the regression model. This detection was conducted by examining the Tolerance and Variance Inflation Factor (VIF) values. A regression model is considered free from multicollinearity when the VIF value does not exceed 10 and the tolerance value is close to 1. Based on the results, the tolerance values for principal leadership (X<sub>1</sub>), teacher training (X<sub>2</sub>), organizational culture (X<sub>3</sub>), and academic supervision (X<sub>4</sub>) were 0.953, 0.695, 0.963, and 0.655, respectively, with corresponding VIF values of 1.050, 1.438, 1.038, and 1.527. Since all tolerance values are close to 1 and all VIF values are below 10, it can be concluded that there is no multicollinearity among the exogenous variables, indicating that each variable independently contributes to the regression model.

## Hypothesis Testing

The hypothesis testing was carried out after confirming that all research variables met the analytical prerequisites for statistical testing. A correlation analysis was first conducted to identify the relationships among variables. The results presented in the correlation matrix show that all variables principal leadership ( $X_1$ ), teacher training ( $X_2$ ), organizational culture ( $X_3$ ), academic supervision ( $X_4$ ), and teacher performance ( $X_5$ ) were positively correlated with varying degrees of strength. The correlation coefficients ranged from 0.036 to 0.659, indicating that while some relationships were moderate, others were considerably strong, particularly between academic supervision and teacher performance.

The significance tests for each correlation revealed that all exogenous variables had significant relationships with the endogenous variables. Specifically, principal leadership ( $X_1$ ), teacher training ( $X_2$ ), and organizational culture ( $X_3$ ) showed significant positive correlations with academic supervision ( $X_4$ ), with calculated correlation coefficients ( $r$ ) of 0.217, 0.551, and 0.188 respectively, all exceeding the critical value ( $r_{table} = 0.158$ ). The corresponding t-values (2.723, 8.087, and 2.349) were also greater than the critical t-value ( $t_{table} = 1.96$ ), confirming that these relationships were statistically significant at the 5% significance level. These results demonstrate that better leadership, more effective teacher training, and stronger organizational culture are associated with improved academic supervision practices.

Furthermore, the results showed that all exogenous variables also had significant correlations with teacher performance ( $X_5$ ). The correlation coefficients for principal leadership, teacher training, organizational culture, and academic supervision were 0.261, 0.560, 0.342, and 0.659, respectively, all above the  $r_{table}$  value of 0.158. Their corresponding t-values (3.317, 8.283, 4.460, and 10.740) were greater than  $t_{table}$  (1.96), indicating significant positive relationships. Among these, academic supervision exhibited the strongest relationship with teacher performance, followed by teacher training and organizational culture. These findings confirm that strong leadership, consistent teacher training, and a supportive organizational environment reinforced through effective academic supervision collectively enhance teacher performance in senior high schools in Labuhanbatu Selatan.

The flow diagram that describes the structure of the causal relationship between exogenous variables and endogenous variables is made as in Figure 1 below:

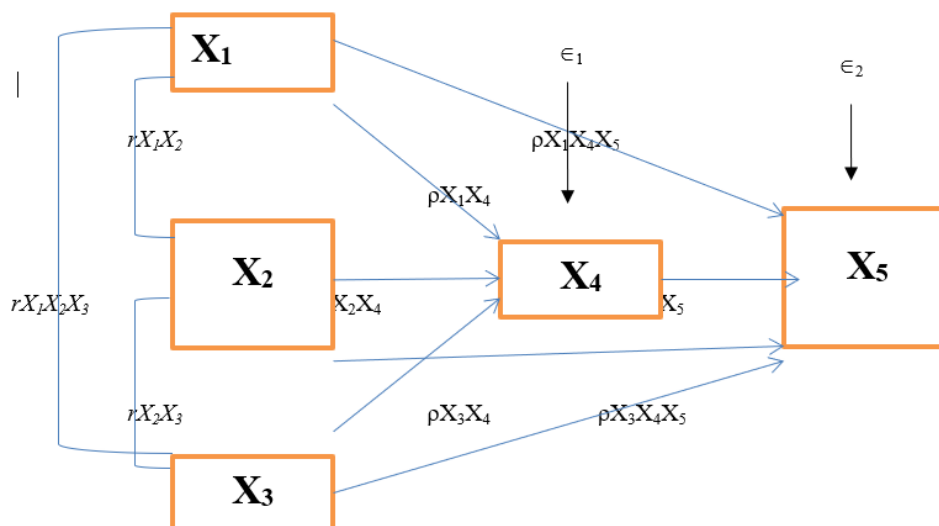


Figure 1. Research Path Diagram

Information :

X<sub>1</sub> = Principal Leadership

X<sub>2</sub> = Teacher Training

X<sub>3</sub> = Organizational culture

X<sub>4</sub> = Academic Supervision

X<sub>5</sub> = Teacher Performance

ε = Influence of other factors

### Structure Testing 1

The test of structure 1 can be described as follows:

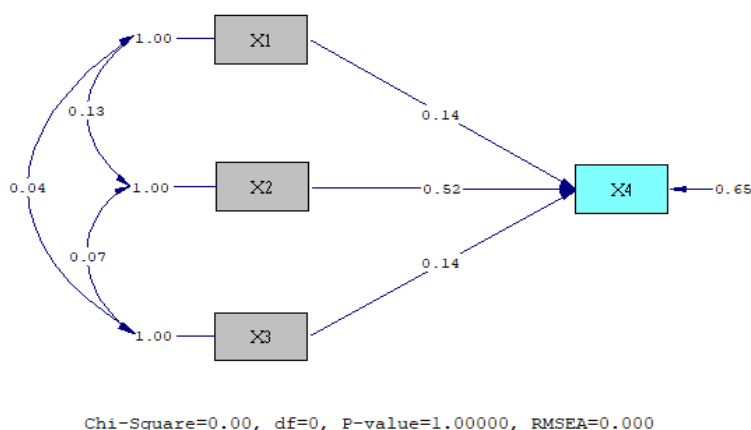


Figure 2. Overall Structure Test 1

Summary of the results of the path analysis between the exogenous variables of principal leadership (X<sub>1</sub>), teacher training (X<sub>2</sub>), and organizational culture (X<sub>3</sub>) with the endogenous variable of academic supervision (X<sub>4</sub>) as shown in Table 15 below:

Table 15. Summary of Path Analysis Results between Exogenous and Endogenous Variables of Academic Supervision

Model		Unstandardized Coefficients		Standardized Coefficients	t		Sig.
		B	Std. Error	Beta	B	Std. Error	
1	(Constant)	36,016	11,719		3,073		,003
	Principal Leadership	,128	,061	,142	2,108		,037
	Teacher Training	,453	,058	,521	7,746		,000
	Organizational culture	,143	,066	,145	2,168		,032

a. Dependent Variable: Supervisi Akademik

Furthermore, the results of the multiple regression analysis found multiple correlation coefficients between the exogenous variables of principal leadership (X<sub>1</sub>), teacher training (X<sub>2</sub>),

and organizational culture (X<sub>3</sub>) with the endogenous variable of academic supervision (X<sub>4</sub>) and the coefficient of determination as in Table 16 below:

Table 16. Summary of the Results of Multiple Regression Analysis between Exogenous and Endogenous Variables of Academic Supervision

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,588(a)	,345	,332	9,630

Predictors: (Constant), Organizational Culture, Principal Leadership, Teacher Training

Based on Table 16, it is known that the multiple correlation coefficient between the exogenous variables of principal leadership (X<sub>1</sub>), teacher training (X<sub>2</sub>), and organizational culture (X<sub>3</sub>) with the endogenous variable of academic supervision (X<sub>4</sub>), namely: R = 0.588 with a coefficient of determination, namely R<sup>2</sup> = 0.345, so that the influence of the residual variable on academic supervision (X<sub>4</sub>) is: 0.655.

### Structure Testing 2

The test of structure 2 can be described as follows:

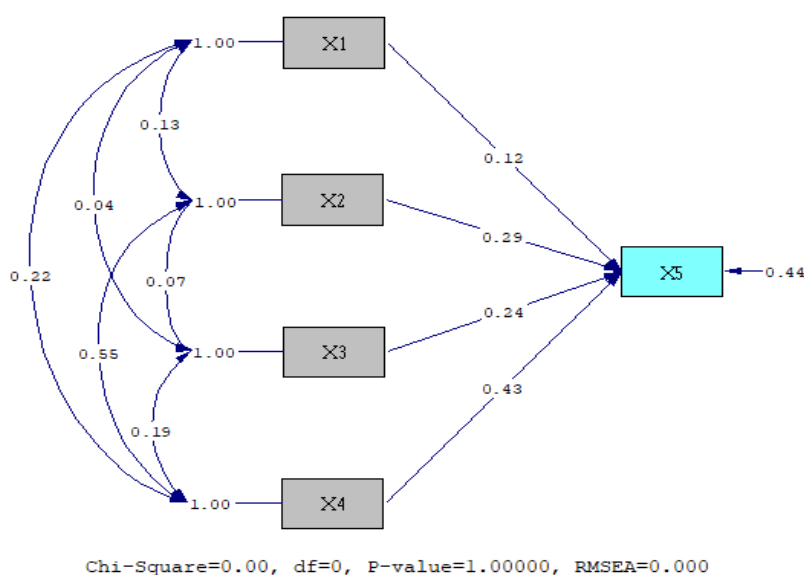


Figure 3. Overall Structure Test 2

### Indirect Effect Testing

The indirect effect testing aimed to determine whether school principal leadership, teacher training, and organizational culture indirectly influenced teacher performance through academic supervision. The results showed that the indirect effect of principal leadership (X<sub>1</sub>) on teacher performance (X<sub>5</sub>) through academic supervision (X<sub>4</sub>) was significant, with a path coefficient of 0.20 and a t-value of 2.72, which is greater than the critical value of 1.96 at  $\alpha = 0.05$ . Similarly, teacher training (X<sub>2</sub>) showed a significant indirect effect on teacher performance through academic supervision, with a path coefficient of 0.48 and a t-value of 8.09. Meanwhile, organizational culture (X<sub>3</sub>) also had a significant indirect effect on teacher performance through academic supervision, with a path coefficient of 0.19 and a t-value of 2.35. These results indicate that academic supervision serves as a mediating variable that strengthens the influence of leadership, training, and organizational culture on teacher performance.

The simultaneous effect testing further revealed that principal leadership, teacher training, organizational culture, and academic supervision collectively influence teacher performance. The F-test results showed that the calculated F-value (46.293) was greater than the F-table value (1.2) at a significance level of  $\alpha = 0.05$  with  $N = 152$ , indicating that the null hypothesis was rejected and the alternative hypothesis accepted. This means that the combination of effective leadership, continuous teacher training, a strong organizational culture, and consistent academic supervision has a significant simultaneous impact on improving teacher performance in senior high schools within Labuhanbatu Selatan.

The discussion of this study reveals that improving educational quality fundamentally depends on the synergy between teacher performance, school leadership, organizational culture, professional training, and effective academic supervision mechanisms. Teachers are not merely transmitters of knowledge but also facilitators and mentors who shape students' character and develop their potential. Teachers with strong pedagogical competence are able to design meaningful, innovative, and adaptive learning experiences. This finding aligns with Gunadi & Sumarni (2023) and Ramadhan (2024), who highlight that teacher quality significantly correlates with educational outcomes. In the context of this study, empirical evidence reinforces that teachers play a central role in educational transformation, where their professionalism and moral responsibility are decisive factors in achieving effective learning outcomes at the secondary school level.

School leadership emerges as a dominant factor influencing teacher performance and overall school quality. Visionary principals can create supportive work environments, foster motivation, and promote collaborative professional cultures among teachers. Consistent with studies by Kurniawati et al (2020) and Wahdah et al (2023), strong leadership contributes to greater discipline, productivity, and teacher professionalism. In this research, the significant relationship between principal leadership and academic supervision underscores that leadership is not merely administrative it is also moral and inspirational, encouraging teachers to continually improve. Effective principals act as catalysts who build a transparent, collaborative, and quality-oriented school culture that drives sustained improvement in teacher performance.

Beyond leadership, teacher training plays a vital role in strengthening pedagogical and professional competence. The results of this study reaffirm the findings of Hatip et al (2023) and Rosita et al (2021), which indicate that innovation- and technology-based training enhances teachers' instructional capabilities. Teachers who participate in continuous training demonstrate greater mastery of active learning strategies, authentic assessment, and the integration of digital tools into teaching. These results also highlight the importance of school principals in facilitating relevant and contextual professional development programs. As Nurhayati (2022) notes, managerial support from school leadership is essential for ensuring the success of teacher capacity-building initiatives and sustaining long-term educational improvement.

Organizational culture also serves as a foundational element shaping teacher performance and professionalism. Schools with strong, value-driven cultures tend to cultivate higher commitment, collaboration, and a shared sense of purpose among staff. This finding is consistent with Syaputra & Santosa (2022) and Windasari et al (2023), who found that a positive organizational culture mediates the relationship between transformational leadership and teacher performance. In the context of this research, a school culture rooted in shared responsibility, innovation, and mutual respect becomes the bedrock for professional excellence. Principals who promote participatory and collaborative cultures indirectly enhance

the effectiveness of academic supervision, thereby improving both instructional practices and institutional outcomes.

Academic supervision functions as a key quality assurance mechanism, ensuring that educational activities align with professional standards. The results of this study emphasize that well-planned and ongoing academic supervision significantly improves teacher performance. Principals, acting as supervisors, provide mentoring, evaluation, and constructive feedback that enable teachers to refine their teaching practices. Consistent with Munasir et al (2024) and Asmadi et al (2023), collaborative supervision has been shown to enhance both pedagogical competence and teaching motivation. Therefore, the synergy between strong leadership, continuous professional training, positive organizational culture, and systematic academic supervision forms the foundation of a high-quality and sustainable educational system one that empowers teachers, strengthens institutional performance, and advances the overall standard of education in secondary school.

## Conclusion

Based on the findings, it can be concluded that principal leadership, teacher training, organizational culture, and academic supervision have both direct and indirect influences on teacher performance. The combined effect of these four factors explains approximately 55.7% of the variation in teacher performance, while the remaining 44.3% is influenced by other variables not included in this study. Academic supervision plays a mediating role that strengthens the impact of leadership, training, and organizational culture on teacher performance. Effective leadership fosters motivation and direction, professional training enhances teachers' pedagogical competence, and a positive organizational culture builds collaboration and commitment among educators. Together, these components create a comprehensive framework for improving teacher effectiveness and, ultimately, the overall quality of education

In light of these findings, several recommendations can be made. First, principals should consistently apply transformational leadership practices that encourage participation, innovation, and professional growth among teachers. Second, schools and educational authorities need to provide regular, context-based teacher training programs that align with technological and pedagogical developments. Third, strengthening organizational culture through collaboration, transparency, and mutual respect will enhance teachers' sense of belonging and accountability. Lastly, academic supervision should be implemented as a constructive mentoring process rather than mere evaluation, allowing continuous professional improvement. Future research is encouraged to explore additional factors such as motivation, job satisfaction, and digital literacy that may further influence teacher performance and educational quality in the modern era.

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