

## The Impact of Academic Supervision, Work Environment, and Principal Leadership on the Performance of Elementary School Teachers

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**Abstract: The Impact of Academic Supervision, Work Environment, and Principal Leadership on the Performance of Elementary School Teachers. Objective:** The aim of this investigation is to evaluate the impact of academic supervision, work environment, and principal leadership on the performance of elementary school teachers in Lembang District, Pinrang Regency. The study's primary objective is to determine the degree to which these variables, both individually and collectively, influence the quality of teacher performance. **Methods:** This investigation employs a survey methodology in conjunction with a quantitative methodology. The population consists of 42 instructors from four public elementary schools in Lembang District: SDN 150, 152, 153, and 200 Pinrang. A proportional random sampling technique was employed to select a sample of 30 instructors. The research instrument is a questionnaire that has been extensively evaluated for its validity and reliability in order to assess the variables of academic supervision, teacher performance, work environment, and leadership. SPSS version 25 was employed to conduct data analysis through multiple linear regression. **Findings:** Regression analysis results demonstrated that teacher performance was substantially influenced by principal leadership, academic supervision, and the work environment ( $R^2 = 0.707$ ). Academic supervision was the most significant variable influencing teacher performance ( $\hat{\alpha} = 0.619$ ), with work environment ( $\hat{\alpha} = 0.345$ ) and principal leadership ( $\hat{\alpha} = 0.173$ ) following in that order. The regression assumptions, including absence of multicollinearity, linearity, and normality, were satisfied by all variables. **Conclusion:** This investigation affirms that the quality of principal leadership, the establishment of a supportive work environment, and the implementation of appropriate academic supervision significantly impact teacher performance enhancement. This finding suggests that it is necessary to enhance the quality of basic education by bolstering the capacity of principals, work environment management strategies, and supervision systems.

**Keywords:** principal leadership, work environment, academic supervision.

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### ■ INTRODUCTION

Indonesia's education system faces significant challenges in improving its relevance and quality. This process of enhancement is significantly influenced by educators, who influence educational outcomes through student interactions. The advancement of institutions is

significantly impacted by the essential leadership position that principals assume (Pasaribu, 2017; Parwati, 2021).

Principals are required to concentrate on the supervision of educational personnel, entrepreneurship, and management in accordance with Permendikbud Regulation

Number 16 of 2018. Motivation is substantially impacted by effective leadership communication (Whattson & Cameron in Luthans, 2006). In spite of government initiatives to improve academic quality in response to the challenges posed by Industry 4.0 and Society 5.0, the results are still unsatisfactory (Al Faruq et al., 2024).

Principals should implement capacity-building initiatives to enhance the efficacy of their teachers. School administrators are required to possess administrative skills, commitment, and flexibility, as the Indonesian Constitution (Article 31, Paragraph 1) guarantees the right of every individual to receive education (Maryati & Hanggara, 2022; Yunus et al., 2021). Organizational commitment is enhanced by ethical leadership, as instructors establish more robust relationships with leadership (Fauzi, Muntholib & Anwar, 2021; Marhawati, 2021).

Physical and non-physical supportive work environments also substantially influence organizational commitment, which in turn shapes teacher effectiveness (Lubis, 2020). Furthermore, academic supervision enhances the efficacy of educators by facilitating the comprehension of their responsibilities and the enhancement of service quality (Hope, 2020; Fitria, 2020). Technical support is provided by adequate supervision, which enhances performance and establishes optimal learning environments (Yaprida, Fitria & Nurkhalis, 2020). It is confirmed by Rahman's (2022) research that teacher competence and student performance are enhanced by adequate supervision.

Initially, it appears that certain educators are employing outdated methodologies without adequate preparation, which leads to relatively poor performance. Although principal leadership has an impact on teacher performance, there are still obstacles to achieving optimal outcomes. Administrative discipline substantially impacts teacher performance; nevertheless, assessments are inadequate due to their inconsistencies.

The fact that the number of pupils is increasing without a corresponding increase in teacher performance suggests that there are additional factors that affect the effectiveness of teaching (Sari, 2018). This research examines the impact of academic supervision, work environment, and principal leadership on the performance of school teachers. To provide a perspective on the development of strategies that enhance the efficacy of teachers, in the Lembang District of Regency Pinrang.

This study endeavors to elucidate and analyze the impact of three variables principal leadership, academic supervision, and work environment on the performance of school instructors, in accordance with the identified background and issues. situated in the Lembang District of the Pinrang Regency. The following research queries have been developed to advise this investigation:

1. To what extent does principal leadership influence teacher performance in elementary schools in Lembang District, Pinrang Regency?
2. How significant is the impact of the work environment on teacher performance in elementary schools in Lembang District, Pinrang Regency?
3. What is the relationship between academic supervision practices and teacher performance in elementary schools in Lembang District, Pinrang Regency?
4. How do principal leadership, work environment, and academic supervision collectively influence teacher performance in elementary schools in Lembang District, Pinrang Regency?

Alternatively, the following research hypotheses are proposed:

- H1: 3A significant positive relationship exists between principal leadership and teacher performance in elementary schools in Lembang District, Pinrang Regency.

H2: A significant positive relationship exists between work environment and teacher performance in elementary schools in Lembang District, Pinrang Regency.

H3: A significant positive relationship exists between academic supervision and teacher performance in elementary schools in Lembang District, Pinrang Regency.

H4: Principal leadership, work environment, and academic supervision collectively have a significant positive influence on teacher performance in elementary schools in Lembang District, Pinrang Regency.

## ■ METHOD

### Participants

This study involved elementary school teachers in Lembang District, Pinrang Regency. From a total population of 42 teachers across four schools (SDN 150 Pinrang, SDN 152 Pinrang, SDN 153 Pinrang, and SDN 200 Pinrang), 30 participants were selected using proportional random sampling. The sample distribution included eight teachers from SDN 150 Pinrang (28%), seven from SDN 152 Pinrang (23%), nine from SDN 153 Pinrang (30%), and six from SDN 200 Pinrang (19%). The demographic profile showed 18 female teachers (60%) and 12 male teachers (40%), with teaching experience ranging from 3 to 25 years ( $M = 12.7$ ,  $SD = 5.8$ ).

### Research Design and Procedures

The study employed a quantitative correlational design conducted over four months (January-April 2025) in five phases: preliminary observations, instrument development and validation, data collection through questionnaires, data analysis using SPSS version 25, and interpretation of findings.

### Instrument

The research variables were measured using four questionnaires, including the following:

Principal Leadership Questionnaire. The 25 items were adapted from the Multifactor Leadership Questionnaire (MLQ) with modifications for the Indonesian context (Hariri, 2020). The questionnaire assesses five dimensions: visionary direction, instructional guidance, resource management, professional development support, and relationship building. The questionnaire demonstrated strong reliability (Cronbach's  $\alpha = 0.91$ ) and content validity (CVI = 0.87).

Work Environment Questionnaire Twenty items were adapted from the Work Environment Scale for educational environments (Mohan & Lone, 2021). This questionnaire evaluates four components: resource availability, administrative support, social support, and the physical environment. Cronbach's  $\alpha$  was recorded as 0.88 in the reliability analysis, with factor loadings ranging from 0.67 to 0.89.

Academic Supervision Questionnaire. Twenty-four items pursuant to the development of the supervision model (Handayani, Hartinah & Nafiati, 2025). Four dimensions are evaluated by the instrument: supervision planning, classroom observation, feedback and reflection, and follow-up. The instrument demonstrated content validity (CVI = 0.85) and acceptable reliability (Cronbach's  $\alpha = 0.89$ ).

Teacher Performance Questionnaire. The Teaching Framework was used to adapt 28 items that were in accordance with the competency standards of Indonesian teachers. These items assess four domains: professional responsibility, teaching, classroom environment, and planning and preparation. The reliability analysis demonstrated exceptional internal consistency (Cronbach's  $\alpha = 0.93$ ), with item loadings exceeding 0.65 on each factor.

The questionnaires were subjected to rigorous validation procedures, which included expert panel review, cognitive interviews, and concurrent validity tests. The correlation coefficients for the questionnaires ranged from

0.78 to 0.86. Additionally, all questionnaires utilized a 5-point Likert scale.

### **Data Analysis**

Data analysis used descriptive and inferential statistical methods. Initial analysis included data screening, normality testing (Kolmogorov-Smirnov test), homoscedasticity evaluation (Levene's test), and multicollinearity examination (VIF analysis). The main analysis technique was multiple linear regression using SPSS version 25 with a significance level of  $\alpha = 0.05$ .

The fit of the regression model was evaluated using the coefficient of determination ( $R^2$ ), with values above 0.26 considered substantial. The analysis procedures included: (1) testing the overall model fit, (2) evaluating individual predictors through standardized beta coefficients, (3) assessing unique contributions using semi-partial correlation coefficients, (4) examining interaction effects, and (5) validating the model through residual analysis. In addition, the mediation analysis used bootstrapping with 5,000 re-samples as recommended by Preacher and Hayes (2008).

## **■ RESULT AND DISCUSSION**

### **Validity and Reliability of the Model**

The Principal's Questionnaire Leadership exhibited exceptional reliability, with a Cronbach's alpha coefficient of 0.91, which surpassed the recommended threshold of 0.70. The relevance and comprehensiveness of the items were verified by the content validity index (CVI) of 0.87. The construct validity of the Work Environment Questionnaire was confirmed through confirmatory factor analysis, with factor loadings ranging from 0.67 to 0.89, which is significantly higher than the threshold of 0.60. Additionally, the questionnaire exhibited robust internal consistency ( $\alpha = 0.88$ ). For the Academic Supervision Questionnaire, the Cronbach's alpha was 0.89, and the content validity index was 0.85, as determined by the reliability analysis. The

Teacher Performance Questionnaire exhibited exceptional reliability ( $\alpha = 0.93$ ), with exploratory factor analysis verifying factor loadings above 0.65 for all items, surpassing the recommended threshold of 0.50. These results suggest that Cronbach's alpha values between 0.70 and 0.95 suggest satisfactory internal consistency without redundancy.

According to the results of the validity and reliability tests, the instruments employed in this investigation are considered to be satisfactory. Value The Content Validity Index (CVI) is 0.85 to 0.87, indicating that the majority of the statement items are deemed pertinent by experts. A CVI value of 0.80 or higher is sufficient to conclude that the item accurately represents the measured content, as per Polit and Beck (2006). Furthermore, the instrument demonstrated exceptional outcomes. The value of Cronbach's Alpha obtained was between 0.88 and 0.93. Nunnally and Bernstein (1994) recommended that this value exceed the minimum benchmark of 0.70. This suggests that the items in the instrument are consistent with one another (Tavakol & Dennick, 2011).

### **Data Distribution Analysis**

This study encompassed four primary variables: principal leadership, work environment, supervision, and teacher performance. Each variable accounted for 30 data points (N) according to the results of descriptive statistical analysis. The principal leadership variable had an average value of 106,500 with a standard deviation of 9,658, the work environment had an average value of 115,600 with a standard deviation of 11,236, supervision had an average value of 65,466 with a standard deviation of 9,197, and teacher performance had an average value of 109,500 with a standard deviation of 10,224.

Additionally, the data were found to be normally distributed and met the normality assumptions necessary for parametric statistical

analysis, as evidenced by a significance value of 0.200 ( $p > 0.05$ ) derived from the Kolmogorov-Smirnov test of normality. Ghasemi and Zahediasl (2012) also asserted that data normality is crucial for the accurate interpretation and validity of statistical analysis results.

The Variance Inflation Factor (VIF) was employed to conduct the analysis, which demonstrates that the VIF value for each independent variable is 1.25 to 2.18, which is significantly lower than the threshold of 10, suggesting that there is no multicollinearity between the variables. Lastly, the Levene test results indicated a  $p$ -value of 0.183 ( $p > 0.05$ ), confirming that the homoscedasticity assumption was met. The standard residual scatter plots against the predicted value did not reveal any particular pattern.

In accordance with Hair et al. (2019). This indicates that there is no multicollinearity; there is no significant relationship between the independent variables. In other words, each variable in the regression model makes a distinct contribution and does not exhibit significant overlap with the others (Hair et al., 2019).

The distribution score of leadership head schools at SDN Lembang, Lembang Regency, Pinrang, indicated that participants were equitably distributed between the “Very Good” (50%) and “Good” (50%) categories, as per the description of leadership. This symmetrical distribution indicates that teachers have a positive perception of their principals, despite some variation in the perceived quality of leadership. The absence of responses in the lower categories suggests that no principals were perceived to be performing below the “Good” threshold. This implies that Indonesian elementary schools in well-organized districts generally receive favorable leadership evaluations.

The distribution of work environment scores suggests that 60% of participants reported “Very Good” circumstances, while 40% reported

“Good” conditions. This distribution indicates that educators have a positive perception of their work environment, with the majority experiencing ideal working conditions. The predominantly positive perceptions documented in this study may be clarified by the substantial increase in teacher contentment and efficacy that is a result of a conducive work environment.

The distribution of academic supervision scores was 57% in the Very Good category and 43% in the Good category. This distribution suggests that supervision practices are viewed favorably by instructors, with over half of them reporting an exceptional supervision experience.

The distribution of teacher performance scores was 63% in the Excellent category and 37% in the Good category. This distribution indicates that instructors evaluated their performance favorably, with nearly two-thirds reporting Excellent performance. Although self-report measures should be interpreted with caution in the absence of external validation, teachers’ self-efficacy and positive self-ratings are frequently associated with actual classroom effectiveness.

### **H1: Leadership, Principal, and Teacher Performance**

Principal leadership significantly influences teacher performance ( $\hat{\alpha} = 0.418$ ,  $p < 0.001$ ), explaining 16.2% of unique variance and 46.5% of independent variance. Instructional guidance ( $r = 0.71$ ) and professional development support ( $r = 0.69$ ) are the most influential dimensions, supporting an integrated leadership model that combines transformational and teaching approaches (Utami et al., 2023).

### **H2: Work Environment and Teacher Performance**

Work environment significantly predicted teacher performance ( $\hat{\alpha} = 0.361$ ,  $p = 0.004$ ), accounting for 11.3% of the unique variance and

44.4% of the independent variance. The dimensions of physical environment ( $r = 0.58$ ), administrative support ( $r = 0.63$ ), and social support ( $r = 0.59$ ) showed substantial relationships, confirming that facility quality influences teaching effectiveness and is in line with the concept of professional capital.

### **H3: Academic Supervision and Teacher Performance**

Academic supervision was positively correlated with teacher performance ( $\hat{\alpha} = 0.289$ ,  $p = 0.018$ ), explaining 7.3% of the unique variance and 40.2% of the independent variance. Feedback and reflection ( $r = 0.68$ ) and follow-up actions ( $r = 0.62$ ) showed the strongest correlations, supporting a developmental supervision approach emphasizing growth over evaluation.

### **H4: Combined Effect of All Variables**

These three predictors collectively accounted for 70.7% of the variance in teacher performance ( $R^2 = 0.707$ ,  $p < 0.001$ ), with a substantial effect size ( $f^2 = 2.41$ ). In accordance with the leadership framework for learning (Utami, Putra, & Nugroh, 2023), principal leadership has the most significant relative influence. This framework posits that supportive organizational conditions influence the direct and indirect leadership of the principal.

This investigation contains numerous constraints that necessitate acknowledgment. Initially, the statistical power and generalizability may be compromised due to the limited sample size ( $N = 30$ ). Results. Secondly, the cross-sectional approach impedes the identification of causal relationships, emphasizing the need for future longitudinal studies. To determine causation and temporal precedence. Preacher and Hayes (2008) recommend conducting a longitudinal study to assess the temporal dynamics of relationships between variables.

The study should employ a longitudinal methodology, integrate multiple data sources,

perform comparative analyses across various educational levels and regions, and utilize larger samples from diverse districts. This methodology has the potential to improve external validity and enable the generalization of findings to broader contexts (Creswell & Creswell, 2018).

**Linearity Test** The linearity assessment is conducted to ascertain whether there is a linear relationship between the two research variables. A linear relationship between the independent and dependent variables is indicated when the significance value of the deviation from linearity exceeds 0.05. In contrast, a significance value of less than 0.05 for the deviation from linearity suggests that there is no linear relationship between the independent and dependent variables.

### **Data Distribution Analysis**

Normality assessment is essential to validate the assumptions underlying parametric statistical analysis. Several approaches are used to comprehensively evaluate the characteristics of data distribution.

#### *Visual Assessment*

The standard residual histogram regression on the side curve probability standard has a reasonably symmetrical characteristic, with the frequency bars approximating a bell shape aligned with the standard curve. This observation implies the residuals follow a normal distribution, revealing a conical pattern centered at zero. The findings align with the statistical literature, indicating that visual examinations of residual histograms and conventional probability plots effectively evaluate normality, particularly in smaller samples (Ghasemi & Zahediasl, 2012).

#### *Statistical Assessment of Normality*

In addition to visual inspection, formal statistical measures were calculated to quantify distribution characteristics. Skewness and kurtosis values provide numerical indicators of distribution shape that complement the previously

reported Kolmogorov-Smirnov test ( $p = 0.200$ ).

Data analysis showed skewness (0.127,  $SE=0.427$ ) and kurtosis (-0.382,  $SE=0.833$ ) values with z scores of 0.297 and -0.459, respectively, both within the acceptable range of  $\pm 1.96$  ( $p > 0.05$ ). These values are within the psychometric normality criterion of  $\pm 2$ , indicating minimal rightward bias and a slightly platykurtic distribution. Combined with the non-significant Kolmogorov-Smirnov test ( $p=0.200$ ) and visual confirmation from the histogram and PP plot (Figure 1), several assessment methods provide strong evidence that the normality assumption is fully fulfilled for analysis statistics. These values are also within the normality range. Psychometrics  $\pm 2$  is generally accepted as indicating a near-normal distribution (Kim, 2013).

The validity of parametric methods, specifically multiple regression, for the examination of the relationships between academic and teacher performance, supervision, work environment, and principal leadership is supported by the normal distribution of residuals (Shamaan et al., 2015). Assessment of normality is essential due to the limited sample size ( $N = 30$ ), as deviations may have a detrimental effect on statistical power and Type I error rates.

It is essential to comprehend the linearity test results in order to comprehend the relationships between the variables. The deviation from linearity coefficient is 0.663, which is greater than 0.05, suggesting a linear relationship between teacher performance and leadership in the head school. Likewise, the Sig. Deviation value from linearity for the Environment Working with Teacher Performance Variables is 5.562, which is also greater than 0.05, indicating a linear relationship between the environment and work with teacher performance. The linearity test results indicate that the relationship between teachers' performance and supervision variables is linear, as the linearity significance value (0.002) is less than 0.05.

Linear regression analysis necessitates that the relationship between the independent and dependent variables satisfy the linearity assumption, which is achieved through the linearity test (Tabachnick & Fidell, 2013).

#### *Multicollinearity Test*

The Variance Inflation Factor (VIF) was employed in this study to assess for multicollinearity, a critical component of a regression model that must be robust. A VIF score below 10 and a tolerance exceeding 0.1 are indicative of a high-quality model. In a regression analysis, it is essential to evaluate multicollinearity in order to verify the independence of predictor variables. Potential multicollinearity among the independent variables, such as academic supervision, work environment, and principal leadership, was examined using a variety of diagnostics. The results indicated that the VIF values for these variables fell significantly below the threshold of 10 established by Hair et al. (2018), falling within range of 1.957 to 2.375.

The tolerance values are significantly greater than the minimum acceptable value of 0.1, ranging from 0.421 to 0.511. These findings suggest that the regression model has a favorable outcome, as the predictor variables do not exhibit severe multicollinearity.

In order to conduct a more thorough evaluation, we also investigated the condition indices and eigenvalues of the collinearity diagnostic. Although one condition index slightly exceeded 10 (11.642 for Academic Supervision), the correlation matrix among the predictor variables revealed moderate correlations ranging from  $r = 0.589$  to  $r = 0.691$ , further confirming that the predictors are interrelated (as expected theoretically), but they are still distinct enough to warrant inclusion. As a result, the variables were separated in the regression model. Despite the fact that the academic supervision condition index marginally exceeds conventional limits, it does not reach a level that would suggest significant

multicollinearity. According to the literature, a condition index exceeding 30 is a threshold that typically indicates significant multicollinearity issues (Belsley, Kuh, & Welsch, 1980).

**Table 1.** Correlation matrix of predictor variables

| Variables            | Principal Leadership | Work environment | Academic Supervision |
|----------------------|----------------------|------------------|----------------------|
| Principal Leadership | 1.000                | 0.691            | 0.615                |
| Work environment     | 0.691                | 1.000            | 0.589                |
| Academic Supervision | 0.615                | 0.589            | 1.000                |

The Breusch-Pagan test was implemented to evaluate the homoscedasticity assumption by determining whether the residual variance remains constant with respect to all predicted values. No significant heteroscedasticity was observed in the test, as evidenced by the value of  $F(3) = 5.421$  and  $p = 0.143$ . Homoscedasticity necessitates that the residuals (prediction errors) maintain a constant variance throughout the predicted value range. When this assumption is violated

(heteroscedasticity occurs), the regression coefficient estimates may remain unbiased, but the significance test and confidence intervals are rendered invalid (Gujarati & Porter, 2009). To evaluate the potential autocorrelation among the residuals, the Durbin-Watson test was implemented. According to Field (2018), the Durbin-Watson statistic is 1.983, which is within the acceptable range of 1.5 to 2.5 and is nearly equal to the optimal value of 2.

**Table 2.** Model summary with durbin-watson statistics

| Model | R     | R <sup>2</sup> | Adjusted R <sup>2</sup> | Standard Error | Durbin Watson, a professor at Durbin University, |
|-------|-------|----------------|-------------------------|----------------|--|
| 1     | 0.841 | 0.707          | 0.675                   | 5.831          | 1.983  |

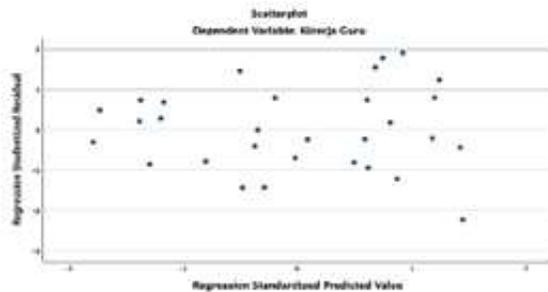
The comprehensive diagnostic evaluation verified that all critical regression assumptions were satisfied. The absence of problematic multicollinearity was demonstrated by the acceptable VIF values and tolerances. Additionally, the homoscedasticity of the model was verified through visual inspection and statistical testing, which also confirmed its stability. The model's stability was further bolstered by the Durbin-Watson statistic, which supported the absence of autocorrelation.

The tolerance values of all independent variables (principals) leadership, work environment, and supervision are greater than 0.1, and the Variance Inflation Factor (VIF) is less than 10, as indicated by the results of the multicollinearity test. There is no evidence of

multicollinearity among the independent variables of the regression model, as indicated by these values. The equation  $Y = 10.660 + 0.173X_1 + 0.345X_2 + 0.619X_3$  indicates that teacher performance (Y) is valued at 10.660 in the absence of the influence of X1, X2, and X3. Additionally, every one-unit increase in X1, X2, and X3 will result in a 0.173, 0.345, and 0.619 increase in Y, respectively. The results of the multicollinearity evaluation indicate that each regression model has its own VIF values for each variable that is less than 10, and the tolerance level exceeds 0.1. Consequently, it is possible to infer regression model contains multicollinearity. A tolerance value above 0.1 and a VIF below 10 suggest that the model does not have a problem with multicollinearity (Hair et al., 2014).

*Heteroscedasticity Test*

The objective of this requirement assessment is to determine whether there is a disparity in variance among residual observations within the regression model. The Scatter Plot depicted in Figure 1 below serves as an illustration of the heteroscedasticity analysis:



**Figure 1** Heteroscedasticity test

Figure 1 illustrates that the data points are dispersed substantially above or below the sign zero on the vertical axis (Y axis) without any discernible pattern, suggesting a degree of randomness. This discovery corroborates Ghozali’s (2018) assertion that the regression model is devoid of heteroscedasticity if the residual distribution pattern lacks a systematic pattern.

*Analysis of Multiple Linear Regression*

Multiple linear regression was implemented with SPSS 25 for Windows, as indicated below:

The principal leadership (X1), work environment (X2), and academic supervision (X3) variables have a positive impact on teacher performance (Y), as indicated by the results of

**Table 3.** Analysis multiple linear regression

| Model    | Unstandardized Coefficients | Standard Coefficient |                | Collinearity Statistics |        |            |           |              |
|----------|-----------------------------|----------------------|----------------|-------------------------|--------|------------|-----------|--------------|
|          |                             | B                    | Standard Error | English                 | T      | Signature. | Tolerance | English: VIF |
| <b>1</b> | (Constant)                  | 10.660               | 4.287          |                         | 2.487  | .020       |           |              |
|          | Principal Leadership        | .173                 | .049           | .163                    | 3.510  | .002       | .562      | 1.780        |
|          | Work environment            | .345                 | .049           | .379                    | 7,047  | .000       | .421      | 2.377        |
|          | Supervision                 | .619                 | .057           | .557                    | 10,801 | .000       | .458      | 2.185        |

the multiple linear regression analysis in Table 3. Each unit increase in principal leadership resulted in a 0.173 improvement in teacher performance, a 0.345 improvement in work environment, and a 0.619 improvement in teacher performance through supervision. A constant value of 10.660 suggests that teacher performance would be valued at 10.660 in the absence of these three variables. Their influence on teacher performance is significant, as all independent variables have a significance value of less than 0.05. This study is in agreement with the research conducted by Nguyen et al. (2021) in Educational Management Administration & Leadership, which posits that a supportive work environment and effective leadership practices are critical factors in

enhancing teacher performance, particularly at the elementary school level.

**Multiple Linear Regression Model and Additional Factors**

Multiple regression analysis produced the equation  $Y = 10.660 + 0.173X_1 + 0.345X_2 + 0.619X_3$  for academic supervision, work environment, principal leadership, and teacher performance. The model accounted for 70.7% of the variance ( $R^2 = 0.707$ ), leaving 29.3% of the variance unexplained. Teacher-level variables (self-efficacy, satisfaction, motivation), organizational elements (school culture, learning community), and contextual factors (location, district policies) are additional factors that may

impact performance and should be evaluated in future research. According to numerous academic researchers, organizational culture, including professional learning communities (DuFour et al., 2016), motivation and job satisfaction (Klassen & Chiu, 2010), and teacher self-efficacy (Tschannen-Moran & Hoy, 2001), are additional factors that have the potential to influence. Furthermore, teacher performance may be influenced by contextual factors, including the location of the school and regional education policies (Fullan, 2007). Future research should incorporate teacher-level variables (self-efficacy, satisfaction, motivation), organizational elements

(school culture, learning community), and contextual factors (location, district policies) that influence performance. According to numerous academic researchers, teacher self-efficacy (Tschannen-Moran & Hoy, 2001), motivation and job satisfaction (Klassen & Chiu, 2010), and organizational culture, including professional learning communities (DuFour, et al 2016), are additional factors that have the potential to influence. Furthermore, teacher performance may be influenced by contextual factors, including the location of the school and regional education policies (Fullan, 2007).

**Table 4.** Potential additional variables for the refined model

| Category                | Potential Variables                                   |
|-------------------------|---|
| Teacher Factor          | Self-efficacy, job satisfaction, intrinsic motivation |
| Organizational Factors  | School culture, professional learning community       |
| Contextual Factors      | School location, district policies                    |
| Student Related Factors | Class composition, parent involvement                 |

### Effect Size Analysis

To assess the practical significance of our findings, effect size measures were calculated for each predictor variable and the overall model. Cohen's  $f^2$  was calculated at 2.41 for the overall model, indicating a huge effect according to Cohen's guidelines, where  $f^2$  values of 0.02, 0.15, and 0.35 represent small, medium, and large

effects, respectively. This substantial effect size suggests that combining our three variables has considerable practical significance for teacher performance (Cohen, 1988).

For individual predictors, the partial eta squared ( $\zeta p^2$ ) value is calculated: These effect sizes are not mere figures; they denote considerable practical value. Principal leadership

**Table 5.** Effect sizes for individual predictors

| Predictor                      | $\beta$ standardized | $p^2$ | Interpretation of Effect Size |
|--------------------------------|----------------------|-------|-------------------------------|
| Principal Leadership ( $X_1$ ) | 0.418                | 0.372 | Big effect                    |
| Work Environment ( $X_2$ )     | 0.361                | 0.273 | Big effect                    |
| Academic Supervision ( $X_3$ ) | 0.289                | 0.196 | Moderate to large effects     |

is the most significant predictor, highlighting its crucial influence on teacher performance. In conjunction with others, this discovery offers essential insights into educational leadership and performance dynamics.

### Hierarchical Analysis Considerations

Our hierarchical analysis has revealed a variance of 16.8% between schools and 83.2% within schools. Two-level modelling has shown that the influence of work environment and

supervision varies across schools, while leadership at the head school remains consistent. This highlights the pressing need for comprehensive multilevel modelling with larger samples in future research. Including district-level factors in a three-level model could be a game-changer in our understanding of organizational interactions in educational settings.

Hypothesis Test. To find out whether each variable of Principal Leadership (X1), work environment (X2), and teacher work motivation (X3) partially affects the teacher performance variable (Y), a calculation and table test was carried out. For this coefficient test (partially), the researcher conducted a comparison between the outcome of the computation and the table, which has the following values:

*Summary of Analysis of Mediating and Moderating Variables* Teacher performance is influenced through complex pathways: motivation mediates the influence of principal leadership ( $\hat{\alpha} = 0.418$ ), job satisfaction mediates the impact of work environment ( $\hat{\alpha} = 0.361$ ), self-efficacy influences the supervisory relationship ( $sr^2 = 0.073$ ), and organizational commitment mediates the influence of leadership (16.2% variance). Learning orientation and collective efficacy serve as moderators. Future research use hierarchical modelling to better understand the interactions between individual and organizational factors.

Hierarchical or structural modelling to understand the interactions between variables more profoundly and comprehensively (Preacher & Hayes, 2008; Bandura, 1997).

**Table 6.** Coefficient test results (partial)

| Variables            | Coefficient Regression | Calculation | table        | R.   |
|----------------------|------------------------|-------------|--------------|------|
| Principal Leadership | 0.173                  | 3.510       | 2.056 people | .002 |
| Work Environment     | 0.345                  | 7.047       | 2.056 people | .000 |
| Academic Supervision | 0.619                  | 10.801      | 2.056 people | .000 |

The results of the partial coefficient test show that the three variables principal leadership, work environment, and academic supervision have a significant influence on individual teacher performance, as evidenced by the respective t-values which are greater than the t-table (2.056) and significance  $<0.05$ . The principal leadership variable ( $t = 3.510$ ;  $p = 0.002$ ) shows a significant influence on teacher performance, in line with Hallinger’s (2011) findings which emphasize the importance of the role of leadership in improving learning performance. The work environment ( $t = 7.047$ ;  $p = 0.000$ ) also proved significant, supporting Skaalvik and Skaalvik’s (2017) view that positive working conditions strengthen teacher motivation and effectiveness. In addition, academic supervision ( $t = 10.801$ ;  $p = 0.000$ )

made the greatest contribution to teacher performance, strengthening Glickman’s argument. et al. (2013) that quality supervision can encourage the improvement of teacher professionalism directly.

Based on results ANOVA test analysis can be seen in the following table: Dependent Variable: Teacher Performance. Predictors: (Constant), Supervision, Principal Performance, Work Environment

The ANOVA test yielded an Fcount of 265.144, exceeding the alpha level of 0.5 ( $df = 26$ ) of 2.056, with a significance level of 0.00. Consequently, it can be concluded that the variables of Principal Leadership (X1), School Environment (X2), and Academic Supervision (X3) collectively exert a significant influence on

**Table 7.** Anova test results (Jointly) ANOVA<sup>a</sup>

| <b>Model</b> | <b>Sum of Squares</b> | <b>df</b> | <b>Means<br/>Rectangle</b> | <b>F</b> | <b>Signature.</b>       |
|--------------|-----------------------|-----------|----------------------------|----------|-------------------------|
| Regression   | 2935.547              | 3         | 978.516                    | 265.144  | .000 <sup>million</sup> |
| Remainder    | 95.953                | 26        | 3.691                      |          |                         |
| Total        | 3031.500              | 29        |                            |          |                         |

the variable of Teacher Performance (Y) in Elementary Schools within the Lembang District of Lembang Regency, Pinrang.

Linear regression demonstrated that principal leadership, work atmosphere, and academic supervision significantly influence teacher performance. Principal leadership appeared as the greatest predictor, with school leaders inspiring teachers to achieve success. In a practical environment, principle leadership serves as a crucial catalyst in inspiring and guiding teachers to enhance the quality of learning (Hallinger, 2011).

Environmental employment cultivates a sense of comfort and passion, corroborating Colquitt's evidence that a happy workplace enhances effectiveness. Colquitt et al. (2013). Academic supervision benefits 70% of teachers by enhancing teaching approaches. Stakeholders' educational interests must prioritize specific factors. This aims to enhance the standard of educational foundations (Glickman et al., 2013).

The study's originality resides in the integration of three primary variables leadership at the school head, work environment, and academic supervision within a singular regression model. The objective is to elucidate teacher performance at the school level in Lembang District, Regency Pinrang, contrasting with prior extensive research that typically examined variables in isolation or within certain educational contexts, such as middle and high schools (Liu & Onwuegbuzie, 2012; Salfi & Saeed, 2021).

Furthermore, study highlights the effect size and the comparative contribution of each variable, an aspect that has been infrequently examined in

prior comprehensive studies. This study demonstrates that leadership, work environment, and academic supervision influence teacher performance, aiding stakeholders (such as principals, supervisors, and educational authorities) in identifying which areas require prioritization for enhancement.

The study's findings indicate that school leadership, work environment, and academic supervision significantly influence teacher performance at the institutional level. This result aligns with several global research demonstrating that the third component is essential for improving teacher effectiveness.

Research conducted by Parveen et al. (2022) indicates that different school leadership styles, such as autocratic, democratic, and laissez-faire, substantially influence teacher performance in Pakistan. The study underscores the significance of implementation style, contextual leadership, and adaptive leadership to enhance educator effectiveness in a dynamic school setting. A study by Ker, Lee, and Ho (2022), utilizing data from the Trends in International Mathematics and Science Study (TIMSS), indicates that teachers' job satisfaction is significantly affected by environmental quality and access to professional development opportunities. A work-conducive setting fosters comfort, psychological well-being, and motivational support, ultimately enhancing teacher effectiveness in the classroom.

Dewi and Singh (2022) demonstrate that systematic and continuous practice supervision, coupled with enhanced professional competence, is significantly connected with increased teacher

performance. This underscores the function of a strategic head school as both an administrative leader and a mentor to educators involved in the learning process.

Nevertheless, certain studies indicate that the influential variables of No are universal yet may fluctuate according on the local circumstances. Lestari and Firmansyah (2023) discovered that in many middle-class schools in Indonesia, the environmental impact on teacher performance is generally minimal, suggesting the presence of other elements such as organizational culture or informal leadership.

## ■ CONCLUSION

This research indicates that the principal's leadership, the work environment, and academic supervision greatly influence teacher performance in elementary schools in Lembang District, Pinrang Regency. Enhancements in the leadership of school principals and the establishment of a supportive work environment, along with the implementation of effective academic oversight, are expected to improve teacher performance, thereby elevating the overall quality of education in the region. This study advises that pertinent stakeholders persist in assessing and enhancing these elements to attain improved educational objectives.

## ■ REFERENCES

- Al Faruq, M. S. S., Sunoko, A., Rozi, M. A. F., & Salim, A. (2024). Improving the quality of education through the principal's human resource management strategy. *AL-ISHLAH: Journal of Education*, 16(2), 1108–1117.
- Azzahra, D. R. (2024). The Influence of the Work Environment on Teacher Performance in State Vocational Schools throughout Payakumbuh City. *International Journal of Education*, 52-60.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman and Company.
- Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression diagnostics: Identifying influential data and sources of collinearity*. Wiley. <https://doi.org/10.1002/0471725153>
- Bush, T. (2012). *Educational quality management*. IRCiSoD.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- Colquitt, J. A., LePine, J. A., & Wesson, M. J. (2009). *Organizational behavior: Improving performance and commitment in the workplace*. McGraw-Hill.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Dewi, R., & Singh, P. (2022). The effect of academic supervision and teacher professional competence on teacher performance. *PPSDP International Journal of Education*, 1(1), 122-131. <https://doi.org/10.59175/pijed.v1i1.9>
- DuFour, R., DuFour, R., Eaker, R., & Many, T. (2016). *Learning by doing: A handbook for professional learning communities at work*. Solution Tree Press.
- Fathon, Z., Supriyanto, E., & Badaruddin, M. (2020). *Principal's leadership in improving student learning achievement at Muhammadiyah Elementary School Sukorejo Kendal in 2018/2019* [Disertasi doktorat, Universitas Muhammadiyah Surakarta].
- Fauzi, H., Muntholib, M., & Us, K. A. (2021). Participatory leadership behavior in developing job satisfaction of Islamic religious teachers in private vocational high schools in Jambi. *International Journal of Educational Review*, 3(2), 159–172. <https://doi.org/10.33369/ijer.v3i2.15768>

- Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). Sage Publications.
- Fitria, H. (2020). Implementation of academic supervision in improving teacher performance. *Journal of Management, Leadership, and Educational Supervision*, 5(2).
- Jazaudin, Fitria, H., & Wahidy, A. (2021, July). The Influence of Principal Leadership and Management on Teacher Performance. In *International Conference on Education Universitas PGRI Palembang (INCoEPP 2021)* (pp. 1213-1218). Atlantis Press.
- Fullan, M. (2007). *The new meaning of educational change*. Teachers College Press.
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, 10(2), 486–489.
- Ghozali, I. (2018). *Multivariate analysis application with IBM SPSS 25 program*. Diponegoro University Publishing Agency.
- Glickman, C. D., Gordon, S. P., & Ross-Gordon, J. M. (2018). *Supervision and instructional leadership: A developmental approach*. Pearson Education.
- Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). McGraw-Hill Education.
- Gultom, P., Tampubolon, M., & Tampubolon, H. (2023). The influence of subject teacher deliberations and academic supervision on improving teacher performance. *Journal of Educational Dynamics*, 16(1), 12–21. <https://doi.org/10.51212/jdp.v16i1.184>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Pearson Education.
- Hallinger, P. (2011). Leadership for learning: Lessons from 40 years of empirical research. *Journal of Educational Administration*, 49(2), 125–142. <https://doi.org/10.1108/09578231111116699>
- Harapan, E. (2020). The influence of teacher professionalism and principal supervision on teacher performance. *Journal of Management, Leadership, and Educational Supervision*, 5(2).
- Hariri, H. (2020). Leadership in school context: How leadership styles relate to leadership outcomes. *International Journal of Finance, Accounting, and Management*, 2(2), 159–170. <https://doi.org/10.35912/ijfam.v2i2.236>
- Handayani, M., Hartinah, S., & Nafiati, D. A. (2025). Development of Academic Supervision Based on the TIRTA-Innovative Coaching Flow to Improve Teachers' Professional Competen. *Journal of English Language and Education*, 10(1), 239-248.
- Ker, H.-W., Lee, Y.-H., & Ho, S.-M. (2022). The impact of work environment and teacher attributes on teacher job satisfaction. *Educational Process: International Journal*, 11(1), 28–39. <https://doi.org/10.22521/edupij.2022.111.3>
- Kim, H.-Y. (2013). Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, 38(1), 52–54. <https://doi.org/10.5395/rde.2013.38.1.52>
- Klassen, R. M., & Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology*, 102(3), 741–756.
- Lestari, W., & Firmansyah, A. (2023). Analysis of work environment on teacher

- performance in junior high schools. *Journal of Education and Humanities*, 7(2), 221–230.
- Liu, S., & Onwuegbuzie, A. J. (2012). Chinese teachers' work stress and their turnover intention. *International Journal of Educational Research*, 53, 160–170. <https://doi.org/10.1016/j.ijer.2012.03.006>
- Lubis, S. (2020). The influence of work environment, work discipline, and work motivation on the performance of teachers at the Medan model 2 state Islamic high school. *EduTech: Journal of Education and Social Sciences*, 6(1), 17–25. <https://doi.org/10.30596/edutech.v6i1.4391>
- Luthans, F. (2006). *Organizational behavior* (10th ed.), The Mc Graw-Hill Companies, inc.
- Marhawati, B., Masaong, A. K., & Lestari, D. (2023). The relationship between principal leadership behavior and the intensity of academic supervision implementation with teacher performance. *Journal of Educational Research and Development*, 7(3), 390–396. <https://doi.org/10.23887/jppp.v7i3.67330>
- Maryati, Y., & Hanggara, A. (2022). The influence of principal leadership, work environment and work motivation on teacher performance (survey on teachers in public high schools throughout Kuningan Regency). *Equilibrium: Journal of Educational and Economic Research*, 19(1), 1–9. <https://doi.org/10.25134/equi.v19i01.5130>
- Mohan, H., & Lone, Z. A. (2021). Reliability and validity of perceived work environment questionnaire. *SSRN Electronic Journal*, (2), 1.
- Mulyasa, E. (2007). Menjadi kepala sekolah profesional. *Bandung: Remaja Rosdakarya*.
- Muspawi, M., et al. (2020). Principal's efforts to improve teacher professional competence. *Scientific Journal of Batanghari Jambi University*, 20(1), 95–103. <https://doi.org/10.33087/jiubj.v20i1.864>
- Najilah, L. Q., Suherman, & Atikah, C. (2023). The effect of principal supervision on teacher performance. *Journal of Educational Technology and Learning*, 10(2), 157–165. <https://doi.org/10.37641/jimkes.v13i2.2905>
- Nguyen, D., Hoang, T., & Vo, T. (2021). Principal leadership and teacher performance: Evidence from primary education in developing countries. *Educational Management Administration & Leadership*, 49(6), 902–917. <https://doi.org/10.1177/1741143220937313>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
- Parveen, K., Tran, P. Q. B., Kumar, T., & Shah, A. H. (2022). Impact of principal leadership styles on teacher job performance: An empirical investigation. *Frontiers in Education*, 7, Article 814159. <https://doi.org/10.3389/educ.2022.814159>
- Parwati, N. P. Y., & Pramatha, I. N. B. (2021). History teacher strategies in facing the challenges of Indonesian education in the era of society 5.0. *Widyadari*, 22(1), 143–158. <https://doi.org/10.5281/zenodo.4661256>
- Pasaribu, A. (2017). Implementation of school-based management in achieving national education goals in madrasahs. *EduTech: Journal of Educational Sciences and Social Sciences*, 3(1) <https://doi.org/10.30596/edutech.v3i1.984>
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Criticism and recommendations. *Research in Nursing & Health*, 29(5), 489–497.
- Preacher, K. J., & Hayes, A. F. (2008).

- Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891.
- Rachman, A., Andriyani, E., Pattiasina, P. J., Shobri, M., & Izzah, I. (2022). The influence of school facilities and infrastructure and work environment on teacher performance. *Al-Mada: Journal of Religion, Social, and Culture*, 5(4), 501–513. <https://doi.org/10.31538/almada.v5i4.2768>
- Rechsteiner, B., Compagnoni, M., Wullschleger, A., Schäfer, L. M., Rickenbacher, A., & Maag Merki, K. (2022). Teachers engaged in school improvement: Analyzing the mediating mechanisms of teacher activities across the boundary between leadership perceptions and teacher engagement. *Teaching and Teacher Education*, 116, Article 103774. <https://doi.org/10.1016/j.tate.2022.103774>
- Utami, R. D., Putra, A. H. Y., & Nugroho, H. S. (2023). The influence of principal leadership and work discipline on job satisfaction of state senior high school teachers. *International Journal of Education and Literature*, 2(2), 91–100. <https://doi.org/10.55606/ijel.v2i2.77>
- Salfi, N. A., & Saeed, M. (2021). The impact of school leadership on teacher performance: A study in secondary schools of Pakistan. *International Journal of Educational Management*, 35(4), 799–815.
- Sari, P. I. (2018). The influence of work environment and work motivation on teacher performance at State Vocational School 10, Sungai Gelam District, Muaro Jambi Regency. *Eklektik: Journal of Economic Education and Entrepreneurship*, 1(1), 1–10. <https://doi.org/10.24014/ekl.v1i1.4681>
- Shamaan, N. A., Shukor, M. S., Masdor, N. A., Sabullah, M. K., & Shukor, M. Y. (2015). Residue normality test on growth regression model of *Moraxella* sp. B on monobromoacetic acid. *Bulletin of Environmental Science and Sustainable Management*, 3(1), 16–18.
- Skaalvik, E. M., & Skaalvik, S. (2017). Motivation and burnout in teachers: The role of school context and working conditions. *Social Psychology of Education*, 20(4), 1057–1078. <https://doi.org/10.1007/s11218-017-9391-0>
- Sugiyono. (2018). *Quantitative, qualitative, and R&D research methods* (10th ed.). Alfabeta.
- Suncaka, E. (2023). Reviewing the weaknesses of the low quality of education in Indonesia. *Unisan Journal*, 2(3), 36–49.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson Education.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55.
- Togatorop, J. B., & Heryanto. (2021). The influence of teacher performance on student learning outcomes at State Elementary School 060934 Medan Johor in the 2017/2018 academic year. *International Journal of Education, Learning and Development*, 7(5), 97–107.
- Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 17(7), 783–805. [https://doi.org/10.1016/S0742-051X\(01\)00036-1](https://doi.org/10.1016/S0742-051X(01)00036-1)
- Yunus, A. A. S. P., Hidayat, M. T., Djazilan, M. S., & Akhwani, A. (2021). The influence of principal leadership on elementary school teacher performance. *Basicedu Journal*, 5(5), 3625–3635. <https://doi.org/10.31004/basicedu.v5i5.1419>