



Principal Leadership, Work Climate, and School Culture as Predictors of Teacher Performance in Madrasah Aliyah: Evidence from Mranggen, Indonesia

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Abstract:

Teacher performance in Madrasah Aliyah is associated with organizational conditions that shape teachers' professional experiences. This study examined principal leadership, work climate, and school culture as predictors of teacher performance among 184 teachers from 21 Madrasah Aliyah in Mranggen District, Indonesia, selected through proportional random sampling from a population of 343 teachers. Data were collected using five-point Likert instruments and analyzed using Pearson correlation, simple regression, and multiple regression. All three organizational variables were positively associated with teacher performance at the bivariate level, with principal leadership showing the strongest relationship ($r = .692$, $R^2 = .479$, $p < .001$), followed by school culture and work climate. The simultaneous model explained 49.9% of the variance in teacher performance. Principal leadership retained a strong positive unique association ($\beta = .783$, $p < .001$), whereas work climate showed a negative partial coefficient and school culture was not independently significant after the other predictors were controlled. Relational leadership emerged as the most prominent leadership dimension. These findings clarify the substantial overlap among leadership, work climate, and school culture while identifying principal leadership as the most consistent organizational predictor in the model. Practically, the results highlight the importance of strengthening relationship-centered leadership while simultaneously maintaining psychologically supportive working conditions and an academic culture that supports professional improvement.

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Introduction (مقدمة)

Teacher performance is a central component of educational quality because it is reflected in how teachers plan instruction, implement learning activities, assess student progress, and maintain productive interpersonal relationships with students. These professional responsibilities are shaped not only by individual competence but also by the organizational conditions in which teachers work. Supportive organizational arrangements can strengthen teachers' motivation, professional learning, collaboration, and capacity to improve classroom practice (Mulalic, 2024). Understanding the organizational conditions associated with teacher performance is therefore important, particularly in educational institutions where professional expectations intersect with distinctive institutional and cultural values.

Principal leadership is frequently identified as one of the most influential organizational factors associated with teacher performance. Principals shape school direction, professional expectations, communication patterns, opportunities for development, and the quality of relationships within the organization. Previous studies have reported positive relationships between managerial and leadership practices and teacher performance (Bahera et al., 2025; Hamidah et al., 2024). Similar evidence has been found in madrasah settings, where leadership and the work environment contribute to teacher performance (Zahru et al., 2025). These findings indicate that leadership may influence teacher performance not only through formal managerial functions but also through relational processes such as communication, trust, professional support, and motivation.

Work climate and school culture represent related but conceptually distinct organizational conditions. Work climate concerns teachers' immediate experience of psychological demands, autonomy, social relationships, physical conditions, organizational rules, and role expectations. A supportive climate can reduce uncertainty and provide conditions that enable teachers to concentrate on their professional responsibilities. Previous studies have generally found positive associations between school or work climate and teacher performance, although the strength of these relationships varies across settings (Ansyu et al., 2023; Haryanto et al., 2021). In Islamic educational contexts, ethical work climate and organizational support have also been associated with proactive teacher behavior and professional productivity (Pradesa et al., 2023; Murtisari et al., 2025).

School culture, by contrast, reflects the shared values, norms, routines, and expectations that guide behavior within an institution. Academic, social, and democratic cultural practices can encourage critical thinking, creativity, openness to feedback, cooperation, shared responsibility, and recognition of achievement. Empirical studies suggest that positive school culture is associated with teacher motivation, commitment, professionalism, and performance (Aisjah, 2023; Rosida et al., 2025). In madrasah settings, organizational culture has also been linked to educator performance and educational transformation (Santoso et al., 2024; Lestari, 2025). However, leadership, work climate, and school culture are unlikely to operate independently. Leadership practices can shape teachers' experience of the work environment while simultaneously reinforcing the values, expectations, and interaction patterns that constitute school culture.

This interdependence is particularly relevant in Madrasah Aliyah. As Islamic senior secondary schools, Madrasah Aliyah combine formal academic responsibilities with religious values and institutional traditions. Leadership in these institutions may therefore be expressed not only through managerial competence but also through exemplary conduct, integrity, responsibility, participation, and commitment to shared values. Research has shown that Islamic principal leadership contributes to the formation and maintenance of religious school culture, while leadership in Islamic boarding-school contexts is closely related to human-resource management, professional capacity, and institutional performance (Hudori et al., 2024; Zumardin

et al., 2026). These characteristics are especially relevant in Mranggen District, where many educational institutions operate within a social and religious environment strongly influenced by pesantren traditions.

Despite the general evidence supporting the importance of organizational factors, previous findings are not entirely consistent. Ansyu et al. (2023) reported substantial contributions of principal leadership and school climate to teacher performance, whereas Haryanto et al. (2021) found weaker bivariate relationships. Other studies have identified combinations of principal leadership, organizational climate, work discipline, school culture, and teacher professionalism as relevant predictors of performance (Masitha et al., 2024; Susanto et al., 2024). These differences suggest that the magnitude and relative contribution of organizational predictors may depend on institutional and contextual conditions. They also indicate the limitation of examining leadership, climate, or culture separately, because their relationships with teacher performance may overlap when considered within the same organizational setting.

A further limitation in the existing evidence concerns the institutional context in which these relationships have been examined. Much of the Indonesian research has been conducted in public senior high schools or general educational settings, while evidence from Madrasah Aliyah across multiple institutions in a pesantren-influenced district remains comparatively limited. Moreover, studies frequently examine leadership, work climate, or school culture as separate predictors, providing less information about their relative and unique contributions when analyzed simultaneously. The present study addresses these gaps by examining principal leadership, work climate, and school culture within a single empirical model among teachers from multiple Madrasah Aliyah in Mranggen District. Pesantren culture is treated as the broader institutional context rather than as an independently measured variable. This approach allows the study to distinguish the bivariate relationships of each organizational factor from their unique partial contributions when the three predictors are considered together.

Accordingly, this study examines whether principal leadership, work climate, and school culture are associated with teacher performance among Madrasah Aliyah teachers in Mranggen District, both individually and simultaneously. Four hypotheses were tested: H1, principal leadership is positively associated with teacher performance; H2, work climate is positively associated with teacher performance; H3, school culture is positively associated with teacher performance; and H4, principal leadership, work climate, and school culture jointly predict teacher performance. The study therefore seeks to clarify not only whether these organizational factors are related to teacher performance, but also how their contributions differ once their shared variance is taken into account.



Method (منهج)

Research Design and Setting

This study employed a quantitative cross-sectional correlational survey design to examine the relationships between principal leadership, work climate, school culture, and teacher performance. The study was conducted in 21 Madrasah Aliyah located in Mranggen District, Demak Regency, Central Java, Indonesia. A correlational design was considered appropriate because the study focused on estimating the strength and direction of associations among naturally occurring organizational variables without manipulating the conditions experienced by teachers.

Data were collected at a single point in time using self-report questionnaires. Accordingly, the statistical relationships identified in this study are interpreted as associations and predictive relationships rather than evidence of causal effects. The cross-sectional design does not establish temporal ordering among the variables, while the use of self-report measures may introduce perceptual bias, socially desirable responses, and shared method variance. These characteristics were considered when interpreting the regression results.

Population and Sample

The study population consisted of 343 teachers employed across 21 Madrasah Aliyah in Mranggen District. A proportional random sampling procedure was used to ensure that teachers from each madrasah were represented in accordance with the relative size of its teacher population. The number of participants allocated to each madrasah was determined proportionally using the ratio of the number of teachers in that madrasah to the total population of 343 teachers. Thus, madrasahs with larger teacher populations contributed proportionally more respondents, whereas smaller madrasahs contributed fewer respondents.

After the proportional allocation for each madrasah had been determined, teachers within each institution were selected randomly from the eligible teacher population. This procedure was intended to reduce disproportionate representation of particular schools while maintaining representation across all 21 Madrasah Aliyah. The final analytic sample consisted of 184 teachers. The resulting sample therefore represented teachers from multiple Madrasah Aliyah rather than being concentrated within a single institution, allowing the study to examine organizational relationships across the broader Madrasah Aliyah context of Mranggen District.

Measures

Data were collected using four five-point Likert-type instruments measuring principal leadership, work climate, school culture, and teacher performance. The instruments were operationalized according to the theoretical dimensions specified for each construct.

Principal leadership was measured using 34 items representing five dimensions: educational, personal, relational, intellectual, and organizational leadership. Work climate was assessed using 31 items covering psychological, structural, social, and bureaucratic dimensions. School culture was measured using 34 items representing academic, social, and democratic culture. Teacher performance was assessed using 32 items covering lesson planning, instructional implementation, learning assessment, and interpersonal relationships with students. Table 1 summarizes the structure and internal consistency of the four instruments.

Table 1. Research Instruments and Internal Consistency

Construct	Items	Dimensions	Cronbach's alpha
Principal leadership	34	Educational; personal; relational; intellectual; organizational	0.964
Work climate	31	Psychological; structural; social; bureaucratic	0.970
School culture	34	Academic; social; democratic	0.969
Teacher performance	32	Planning; implementation; assessment; interpersonal relationships	0.969

Note. All instruments used a five-point response format. Reliability estimates are based on the instrument testing conducted before the main analysis.

Validity and Reliability

Before the main data collection, the instruments were pilot-tested with 35 teachers. The dimensional structure of each instrument was specified according to the operational definition of the corresponding construct, so that the items represented the dimensions of principal leadership, work climate, school culture, and teacher performance described above. Empirical item screening during the pilot test was conducted using corrected item-total correlations. A reference value of .334 at the 5% significance level was used, and the retained items met the stated criterion. This procedure provided item-level evidence that the retained statements were consistently related to the overall scores of their respective scales.

Internal consistency was evaluated using Cronbach's alpha. The coefficients were .964 for principal leadership, .970 for work climate, .969 for school culture, and .969 for teacher performance. These values indicate very high internal consistency among the items within each instrument. However, coefficients approaching or exceeding .95 should be interpreted cautiously

because they may also reflect substantial similarity or overlap among some items. Therefore, the high alpha coefficients were treated as evidence of strong internal consistency rather than as independent evidence of construct validity or unidimensionality. The interpretation of each scale remained anchored to its theoretically specified dimensions and operational definition.

Data Analysis

Data were analyzed using SPSS. Descriptive statistics were first calculated to summarize the distributions of principal leadership, work climate, school culture, and teacher performance. Because the instruments contained different numbers of items, raw mean scores across constructs were not interpreted as directly comparable measures of magnitude.

Dimension-level standardized coefficients were examined to identify the dimension showing the strongest statistical contribution to the total score of each construct. Pearson product-moment correlation was used to estimate the direction and strength of the bivariate relationships between each organizational predictor and teacher performance. Simple linear regression was subsequently used to estimate the individual predictive relationship of principal leadership, work climate, and school culture with teacher performance.

Multiple linear regression was then conducted to examine the simultaneous contribution of the three organizational predictors to teacher performance and to estimate the unique coefficient of each predictor after accounting for the other variables in the model. Multicollinearity was assessed using tolerance and variance inflation factor (VIF) statistics to determine whether substantial overlap among the predictors compromised the interpretation of the regression coefficients. Statistical significance was evaluated at $\alpha = .05$, and SPSS output reported as .000 was presented as $p < .001$.

Because all variables were measured through self-report questionnaires at the same point in time, the regression coefficients were interpreted as statistical predictive associations rather than causal effects. Particular attention was therefore given to differences between bivariate coefficients and partial coefficients in the simultaneous model, especially where the direction or statistical significance of a predictor changed after the other organizational variables were controlled.

Result (نتائج)

Descriptive Profile of the Study Variables

The descriptive statistics indicate that the average scores of teacher performance, principal leadership, work climate, and school culture all fell within the study's 'fairly good' category. The means should be interpreted relative to the different number of items in each scale rather than compared directly as raw totals. Table 2 presents the descriptive statistics together with the dominant dimension identified for each construct.

Table 2. Descriptive Statistics and Dominant Dimensions

Variable	N	Min	Max	Mean	SD	Dominant dimension	Beta
Teacher performance	184	32	160	96.54	34.722	Assessment	.317
Principal leadership	184	34	170	101.72	36.827	Relational	.241
Work climate	184	31	155	94.36	33.821	Psychological	.298

Variable	N	Min	Max	Mean	SD	Dominant dimension	Beta
School culture	184	34	170	102.84	36.762	Academic	.472

Note. Beta refers to the standardized coefficient used in the dimension analysis against the total construct score.

For teacher performance, learning assessment was the dominant dimension ($\beta = .317$), followed by planning ($\beta = .291$), interpersonal relationships ($\beta = .228$), and instructional implementation ($\beta = .186$). For principal leadership, the relational dimension had the highest standardized coefficient ($\beta = .241$). The psychological dimension was dominant in work climate ($\beta = .298$), while the academic dimension was dominant in school culture ($\beta = .472$).

Principal Leadership and Teacher Performance

Principal leadership had a strong positive correlation with teacher performance ($r = .692$, $p < .001$). The simple regression coefficient was positive ($B = .652$, $SE = .050$, $\beta = .692$), and the test was statistically significant, $t = 12.929$, $p < .001$. Principal leadership alone accounted for 47.9% of the variance in teacher performance ($R^2 = .479$; adjusted $R^2 = .476$). Thus, H1 was supported. The corresponding simple regression equation was $Y = 30.182 + .652X1$.

Work Climate and Teacher Performance

Work climate was positively related to teacher performance at the bivariate level ($r = .364$, $p < .001$). The simple regression coefficient was $B = .374$ ($SE = .071$, $\beta = .364$), $t = 5.272$, $p < .001$. Work climate explained 13.2% of the variance in teacher performance ($R^2 = .132$; adjusted $R^2 = .128$), supporting H2. The simple regression equation was $Y = 61.278 + .374X2$.

School Culture and Teacher Performance

School culture had a moderate positive bivariate correlation with teacher performance ($r = .523$, $p < .001$). The simple regression coefficient was $B = .494$ ($SE = .060$, $\beta = .523$), $t = 8.278$, $p < .001$. School culture explained 27.4% of the variance in teacher performance ($R^2 = .274$; adjusted $R^2 = .270$), supporting H3. The resulting simple regression equation was $Y = 45.739 + .494X3$.

Table 3. Bivariate Correlations and Simple Regression Results for Teacher Performance

Predictor	r	B	SE	β	t	p	R^2	Adj. R^2
Principal leadership (X1)	.692	.652	.050	.692	12.929	< .001	.479	.476
Work climate (X2)	.364	.374	.071	.364	5.272	< .001	.132	.128
School culture (X3)	.523	.494	.060	.523	8.278	< .001	.274	.270

Note. Each row represents a separate simple regression model with teacher performance as the dependent variable.

Joint Contribution of Principal Leadership, Work Climate, and School Culture

The simultaneous model was statistically significant, $F(3, 180) = 59.791$, $p < .001$. The multiple correlation was $R = .706$, with $R^2 = .499$ and adjusted $R^2 = .491$. Thus, principal leadership, work climate, and school culture jointly explained 49.9% of the observed variance in teacher performance, supporting H4. The standard error of the estimate was 24.778. Multicollinearity diagnostics were within conventional limits: VIF = 3.085 for principal leadership, 1.864 for work climate, and 2.020 for school culture, with corresponding tolerance values of .324, .536, and .495.

Table 4. Multiple Regression Coefficients Predicting Teacher Performance

Term	B	SE	β	t	p	Tolerance	VIF
Constant	34.703	6.365	—	5.452	< .001	—	—
Principal leadership (X1)	.738	.087	.783	8.447	< .001	.324	3.085
Work climate (X2)	-.188	.074	-.183	-2.537	.012	.536	1.864
School culture (X3)	.043	.071	.046	.614	.540	.495	2.020

Note. Model: $R = .706$, $R^2 = .499$, adjusted $R^2 = .491$, $F(3, 180) = 59.791$, $p < .001$.

The estimated multiple regression equation was $Y = 34.703 + .738X_1 - .188X_2 + .043X_3$. Once the three predictors were entered together, principal leadership retained a strong positive and statistically significant unique relationship with teacher performance ($\beta = .783$, $p < .001$). In contrast, the partial coefficient for work climate became negative and remained statistically significant ($\beta = -.183$, $p = .012$), whereas the unique coefficient for school culture became small and nonsignificant ($\beta = .046$, $p = .540$). These partial coefficients should be distinguished from the positive bivariate associations reported above.



Discussion (مناقشة)

Discussion

The findings show that principal leadership, work climate, and school culture were all positively associated with teacher performance when examined separately, but their relationships changed when the three organizational factors were considered simultaneously. This distinction is important because it suggests that the organizational conditions experienced by teachers are interconnected rather than independent. Principal leadership retained a substantial positive association with teacher performance in the simultaneous model, whereas the coefficient for work climate became negative and the unique contribution of school culture was no longer statistically significant. The pattern therefore points to considerable shared variance among leadership, climate, and culture and requires interpretation beyond the magnitude of the individual coefficients.

At the dimension level, relational leadership was the most prominent component of principal leadership. This finding is consistent with Bahera et al. (2025), who emphasized communication, professional support, motivation, and a positive working environment as important features of leadership associated with teacher productivity. It also corresponds with research on Islamic leadership in which exemplary conduct, participation, integrity, and responsibility are closely related to the maintenance of school culture (Zumardin et al., 2026). In the context of Madrasah Aliyah in Mranggen, the prominence of relational leadership is particularly relevant because professional relationships operate within institutions where organizational expectations coexist with religious and community values. Nevertheless, the present data do not establish that relational leadership produces better performance; rather, teachers who reported stronger relational leadership also tended to report stronger performance.

Principal Leadership and Teacher Performance

Principal leadership showed the strongest bivariate association with teacher performance and remained positively associated with performance after work climate and school culture were included in the same model. This pattern is consistent with previous studies linking principal leadership with teacher performance through managerial direction, professional support, communication, and motivational practices (Bahera et al., 2025; Rostini et al., 2022). It is also in line with findings from madrasah settings showing associations between leadership, the work environment, and teacher performance (Zahru et al., 2025), as well as research emphasizing transformational leadership in relation to an inspiring work climate and teacher performance (Nurizayani et al., 2024).

The prominence of the relational dimension provides a more specific interpretation of this association. Teachers may perceive leadership more positively when principals communicate openly, respond to professional concerns, provide support, and maintain constructive relationships with staff. These practices may coincide with conditions in which teachers are better

able to carry out their professional responsibilities. However, an alternative explanation should also be considered. Because principal leadership and teacher performance were both reported by teachers at the same point in time, respondents who viewed their school environment positively may also have evaluated both leadership and their own performance more favorably. The observed relationship may therefore reflect not only organizational processes but also shared perceptions arising from the use of self-report measures.

The cross-sectional design also prevents the temporal direction of the relationship from being established. Although leadership is theoretically relevant to teacher performance, the present analysis cannot determine whether stronger leadership precedes higher teacher performance, whether higher-performing teachers perceive their principals more favorably, or whether both are associated with other unmeasured characteristics of teachers or schools. The finding should therefore be understood as evidence of a comparatively strong statistical association within this sample rather than as proof of a causal leadership effect.

Work Climate and Teacher Performance

Work climate was positively associated with teacher performance when examined independently, although the relationship was weaker than those observed for principal leadership and school culture. This finding corresponds with earlier studies reporting positive but varying relationships between school or work climate and teacher performance (Ansyu et al., 2023; Haryanto et al., 2021). It is also compatible with evidence associating principal support and supportive working conditions with teacher well-being and productivity (Murtisari et al., 2025).

The psychological dimension was the most prominent component of work climate in the present data. This pattern indicates that teachers' perceptions of psychological demands, autonomy, and opportunities for professional fulfillment were particularly salient within their overall assessment of the work environment. Such conditions may be closely connected with how teachers experience their professional roles, although the present design does not establish that these conditions directly improve performance.

A more complex pattern emerged in the simultaneous regression model. After principal leadership and school culture were statistically controlled, the coefficient for work climate changed from positive to negative. This reversal should not be interpreted as evidence that a favorable work climate reduces teacher performance. The positive bivariate relationship demonstrates that better perceived work climate was associated with better teacher performance when examined on its own. The negative partial coefficient represents only the residual component of work climate after the variance it shares with principal leadership and school culture has been removed.

Several explanations are possible. First, work climate may overlap substantially with teachers' perceptions of leadership and school culture. Conditions such as professional support, communication, autonomy, recognition, and role clarity may not be experienced as entirely separate organizational phenomena. Once the portions associated with leadership and culture are statistically accounted for, the remaining variance in work climate may represent a narrower aspect of the construct than its original meaning. Second, the result may be specific to the organizational configuration represented in this sample and therefore requires replication in other Madrasah Aliyah settings. Third, because all measures were obtained from the same respondents at one time, shared perceptions and common measurement conditions may have contributed to the relationships among the predictors. The negative partial coefficient should consequently be treated as a context-dependent statistical finding rather than as evidence of an adverse effect of work climate.

School Culture and Teacher Performance

School culture was positively associated with teacher performance at the bivariate level. This finding is consistent with research indicating that positive school culture is associated with teacher motivation, commitment, professionalism, and collaborative practice (Rosida et al., 2025). Similar relationships have been reported in private madrasahs, where organizational culture has been associated with educator performance (Santoso et al., 2024), and in studies emphasizing cultures that support innovation and adaptability in Madrasah Aliyah (Lestari, 2025).

The academic dimension was the most prominent component of school culture. Within the operationalization used in this study, this dimension encompasses critical and objective consideration, creativity, openness to feedback, time discipline, and recognition of achievement. Its prominence suggests that teachers perceived these academically oriented norms as particularly salient within the broader school culture. In Madrasah Aliyah, such norms can coexist with institutional values related to integrity, responsibility, mutual respect, and collective commitment. This interpretation is compatible with Zumardin et al. (2026), who showed that religious school culture is closely connected with leadership practices involving participation, values, and exemplary behavior.

However, the unique coefficient for school culture became small and statistically nonsignificant when principal leadership and work climate were entered simultaneously. This does not mean that school culture is irrelevant to teacher performance. Rather, it indicates that the variance uniquely attributable to school culture was limited after its overlap with the other organizational predictors was taken into account. One plausible interpretation is that teachers experience leadership and culture as closely related organizational conditions. Principals are involved in communicating expectations, modeling professional norms, recognizing performance, establishing interaction routines, and supporting collaboration, all of which may also be reflected in teachers' perceptions of school culture. Research on Islamic leadership and religious school culture similarly points to a close relationship between leadership practices and cultural processes (Zumardin et al., 2026), while Taufik et al. (2026) emphasizes communication, coordination, and shared leadership in institutional effectiveness.

An alternative interpretation is that the nonsignificant partial coefficient reflects the statistical overlap among conceptually related self-report measures rather than the absence of a meaningful role for culture. Because the study did not examine temporal or mediating relationships, it cannot determine whether school culture operates indirectly through leadership practices, whether leadership is embedded within culture, or whether both reflect broader organizational characteristics. These possibilities require designs that can examine organizational processes over time and distinguish individual- and school-level influences more clearly.

Joint Effects and Shared Variance

The simultaneous model provides an important extension of the bivariate findings. When considered separately, principal leadership, work climate, and school culture were each positively related to teacher performance. When considered together, however, only principal leadership retained a clear positive unique association, while the coefficients for work climate and school culture changed substantially. This difference indicates that interpreting the predictors solely from separate correlations would provide an incomplete picture of their relationships with teacher performance.

The multicollinearity diagnostics did not indicate severe multicollinearity, but the regression results nevertheless demonstrate meaningful shared variance among the predictors. This is substantively plausible because leadership, climate, and culture operate within the same organizational setting. Teachers who experience open communication and professional support from their principals may also perceive greater psychological support in their work environment and stronger norms of collaboration and academic achievement. Consequently, the statistical

contribution of one construct may decrease when related organizational experiences are included in the same model.

The findings therefore suggest that principal leadership, work climate, and school culture should not be viewed as three completely independent organizational influences. Their relationships may be interconnected, with principal leadership occupying a particularly prominent position in this dataset. The dominance of relational leadership, psychological work climate, and academic culture further illustrates this interconnection. Relational practices involve communication, trust, recognition, and support; psychological climate concerns teachers' experience of their professional environment; and academic culture reflects norms related to feedback, achievement, discipline, and improvement. These domains may reinforce one another within everyday school life. Previous research similarly emphasizes the importance of collaborative leadership, communication, and institutional coordination in relation to professional performance (Bahera et al., 2025; Taufik et al., 2026).

At the same time, the relative prominence of principal leadership should be interpreted cautiously. The data show that principal leadership had the strongest statistical relationship with teacher performance within the model used in this study, but they do not demonstrate that leadership is the underlying cause of the other organizational conditions or of teacher performance. Unmeasured teacher-level or school-level characteristics may also contribute to the observed relationships. Moreover, teachers were situated within 21 different madrasahs, while the present analysis was conducted at the individual level. Differences between institutions may therefore form part of the observed variation and should be examined more explicitly in future multilevel research.

Madrasah Context and Practical Implications

The Madrasah Aliyah context provides an important setting for interpreting these findings. Schools in Mranggen operate within a social and religious environment influenced by pesantren traditions, where values such as exemplary conduct, responsibility, sincerity, respect, discipline, and collective commitment may shape organizational expectations. Research on pesantren leadership similarly emphasizes the relationship between leadership, human-resource management, professional capacity, and institutional functioning (Hudori et al., 2024).

However, pesantren culture was not directly measured as an independent variable, mediator, or moderator in this study. The results therefore should not be interpreted as empirical evidence that pesantren values explain the statistical relationships identified in the model. Rather, the pesantren-oriented environment represents the institutional context within which respondents experienced and evaluated principal leadership, work climate, school culture, and their own performance. Future research could examine these contextual values explicitly to determine whether they modify or help explain organizational relationships in Madrasah Aliyah.

The findings nevertheless have practical relevance for organizational improvement. Because principal leadership retained the clearest positive association with teacher performance after the other predictors were considered, strengthening the relational aspects of school leadership represents a relevant area for managerial attention. In practice, this may involve maintaining open communication, providing consistent professional support, encouraging meaningful teacher participation, recognizing professional contributions, and demonstrating consistency between institutional expectations and leadership behavior. These recommendations should be understood as organizational priorities informed by the observed associations rather than as interventions whose causal effects have been established by the present study.

The results also indicate that leadership development should not be separated from efforts to improve work climate and school culture. The prominence of the psychological dimension

suggests the importance of attending to teachers' experience of workload, role expectations, appropriate autonomy, professional support, and opportunities for innovation. Similarly, the prominence of academic culture points to the relevance of institutional routines that support constructive feedback, timely completion of professional responsibilities, recognition of achievement, reflective practice, and continuous improvement. Rather than treating leadership, climate, and culture as independent programs, madrasahs may benefit from considering them as interconnected dimensions of organizational management.

These implications must be considered alongside the methodological limitations of the study. The cross-sectional design does not establish temporal or causal relationships, and reliance on self-report measures may introduce perceptual bias, socially desirable responding, and shared method variance. In addition, the study was conducted within one district and analyzed teachers at the individual level despite their being nested within 21 madrasahs. Accordingly, the findings are best interpreted as evidence of statistical associations within the studied context. Longitudinal and multilevel research, together with data obtained from multiple sources, would provide a stronger basis for examining how leadership, work climate, and school culture are related to changes in teacher performance over time.



Conclusion (خاتمة)

The findings indicate that principal leadership, work climate, and school culture are all related to teacher performance in Madrasah Aliyah in Mranggen District, although their roles are not equivalent when examined within the same model. Principal leadership showed the most consistent positive association with teacher performance. By contrast, the coefficient for work climate changed after the other organizational variables were controlled, while school culture did not retain a statistically significant unique contribution in the simultaneous analysis. This pattern suggests that leadership, work climate, and school culture are closely interconnected organizational conditions. The dimension-level results further showed that relational leadership was the most prominent aspect of principal leadership, while psychological conditions and academic culture were the most prominent dimensions of work climate and school culture.

From a practical perspective, improvement efforts in Madrasah Aliyah should give particular attention to relational aspects of school leadership. Open communication, professional support, meaningful teacher involvement, recognition of professional contributions, and consistent interaction between principals and teachers are especially relevant areas for organizational development. At the same time, attention should be given to teachers' psychological working conditions through appropriate autonomy, clear expectations, manageable professional demands, and opportunities for professional growth. Strengthening an academic culture that supports constructive feedback, professional discipline, recognition of achievement, reflective practice, and continuous improvement is also important. These areas should be viewed as interconnected elements of school management rather than as separate programs.

These results should be interpreted as statistical associations and predictive relationships rather than causal effects. The cross-sectional design does not establish the temporal direction of the relationships, and the use of self-report measures may introduce perceptual bias and shared method variance. The study was also limited to one district, and the analysis was conducted at the individual level even though the teachers were nested within 21 madrasahs. Future studies should therefore consider longitudinal and multilevel designs, include data from multiple sources, and examine possible mediating or moderating relationships among principal leadership, work climate, school culture, and teacher performance. Direct measurement of pesantren-oriented values would also provide a stronger basis for understanding how the social

and religious context of Madrasah Aliyah relates to organizational processes and teacher performance.

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