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The Effect of Principal's Transformational Leadership Style on Teacher Performance Mediated by Motivation and Job Satisfaction in Senior High Schools in Merangin District

Dian Andriadi[1], Urip Sulistiyo[2], Sofyan Sofyan[3], Akhmad Habibi[4]
Postgraduate, Universitas Jambi, Jambi, Indonesia

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ABSTRACT

This study examines the influence of the principal's transformational leadership style on teacher performance in senior high schools in Merangin Regency with teacher work motivation and job satisfaction as intervening variables and tenure as moderating variable, using a quantitative explanatory survey approach and PLS-SEM analysis (SmartPLS 3.2.9) on a sample of 537 teachers (98.70% response). The results of the hypothesis testing indicate that transformational leadership has a significant positive effect on teacher job satisfaction (β=0.248; p=0.000), teacher work motivation (β=0.690; p=0.000), and teacher performance directly (β=0.282; p=0.000). Teacher work motivation has a very strong effect on teacher performance (β=0.502; p=0.000) and on teacher job satisfaction (β=0.656; p=0.000), while teacher job satisfaction has no significant effect on teacher performance (β=0.083; p=0.105). Teacher job satisfaction was not proven to be a mediator (β=0.021; p=0.117), nor was the mediation chain of motivation → satisfaction → performance (β=0.038; p=0.125). However, teacher work motivation became a strong partial mediator (indirect effect=0.346), so that the total effect of transformational leadership on teacher performance reached 0.628 (62.8%). Teacher tenure was not significant as a moderator. These findings confirm that transformational leadership improves teacher performance primarily through work motivation, so it is recommended to strengthen the dimensions of transformational leadership and strategies to increase teacher motivation for the Merangin Regency Education Office and MKKS to improve the quality of learning.

Corresponding Author: sofyanzaibaski@unja.ac.id

1. INTRODUCTION

Education is the main way to train competent, adaptable, and competitive workers, making it crucial to national growth. School-level educational quality depends on teacher performance and teaching and learning quality. The school's organizational ecosystem, including the principal's leadership, shapes teacher performance by setting direction, managing resources, and creating a work environment that supports teachers. School

leadership is a strategic tool for transformation, motivation, and effective professional practices in educational management (Bush, 2011). Transformational leadership is widely studied in organizational and educational literature. Transformational leaders use idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration to inspire followers, build commitment to shared goals, and encourage innovation and positive change. Transformational principals are supposed to foster a more collaborative work culture, emphasize the school's developmental orientation, and increase instructional quality. Transformational leadership promotes creativity and positive work behaviours in educational contexts, improving performance and organisational success (Arif & Akram, 2018).

Transformative principle leadership has been linked to teacher performance in several circumstances. Andriadi and Sulistiyo (2024) synthesised studies from 2019 to 2024 and found that principals' transformational leadership positively affects teachers' work motivation, job satisfaction, performance, and learning outcomes across educational levels. Field-based study shows that transformative leadership motivates teachers and improves performance (Rachmad et al., 2023). Early research in schools links transformational leadership to staff job satisfaction, organizational stability (e.g., turnover), and school success (Griffith, 2004). Transformational leadership improves teacher performance through psychological pathways and a supportive work environment.

Leadership affects performance through motivation and job satisfaction. Motivation, particularly self-determination theory, implies that respecting core psychological demands like autonomy, competence, and relatedness boosts engagement and performance (Deci & Ryan, 2000). Principals that support, recognize, and empower teachers are more likely to inspire innovation and improvement. Principal leadership affects teachers' job motivation through transformational and transactional traits that shape daily work energy and commitment (Hyseni Duraku & Hoxha, 2021). Meta-analytic evidence in organisational psychology shows that job satisfaction is not only a "outcome" but also an explanatory factor for performance variation (Judge et al., 2001). Leadership can improve teacher job satisfaction by creating a positive school climate (Kim et al., 2021), and transformational leadership may promote productive work behaviors in educational organizations (Nguni et al., 2006; Ali et al., 2013/2014).

Transformational leadership is practical since it can be trained and improves attitudes and organizational outcomes beyond motivation and satisfaction. Field experiments show that transformational leadership training improves attitudes and performance (Barling et al., 2014). Therefore, research that clarifies the mechanisms of transformative leadership—particularly the mediating roles of motivation and work satisfaction—can be used to construct school leadership interventions.

The local setting of Merangin District emphasizes this study's urgency. According to the Rapor Pendidikan Indonesia: Kabupaten Merangin 2024, senior high school literacy and numeracy achievement in this region is below the national average, Merdeka Curriculum implementation is subpar, and teacher professional development participation is low. These indicators reflect chronic school governance and teacher capacity building issues that need empirical explanation, notably from principal leadership. However, much of the existing

research is from national or other provinces, underlining the need for context-specific evidence from Merangin senior high schools to inform leadership development and policy suggestions.

This study addresses these shortcomings in three ways. This study investigates a mediation model that explains how principals' transformational leadership improves teacher performance through motivation and work satisfaction. It examines Merangin District senior high schools, offering actual evidence from an area with educational quality issues. The study uses structural analysis to model latent relationships among constructs and assess mediation and latent variables (Hair et al., 2019). The project is designed to improve understanding of how transformational school leadership uses teachers' psychological characteristics to boost performance and strengthen evidence-based decision making at the school and district levels. The main goal is to examine how principals' transformational leadership style affects teacher performance and how motivation and job satisfaction mediate this effect among Merangin District senior high school teachers. The findings should help improve principal leadership, professional development, and school work climates for higher-quality teaching and learning.

2. LITERATUR REVIEW

2.1 Principals' Transformational Leadership (TL)

Transformational leadership in schools includes inspiring a vision, supporting professional growth, and creating a supportive environment for instructional improvement. Principals' leadership actions affect teachers' work experiences and school reform efforts, according to recent research. Indonesian senior high school studies reveal that school leadership and organizational atmosphere affect teacher performance, showing that leadership is both managerial and performance-shaping (Handayani et al., 2021). Leadership style and organizational culture predict teacher effectiveness, emphasizing the need for leadership-driven school norms and expectations (Maryati et al., 2020). School effectiveness research shows that principle leadership and teacher instruction improve school results (Mulyani et al., 2020). Instructional leadership research reveals that principals' leadership strategies affect teacher effectiveness (Wahab et al., 2020). In particular, a recent synthesis of primary and secondary contexts found that transformational leadership by principals improves teacher motivation, job satisfaction, performance, and student outcomes (Andriadi & Sulistiyo, 2024). Leadership traits, particularly transformational ones, affect teachers' work motivation, which is crucial to sustained success (Hyseni Duraku & Hoxha, 2021). Transformational leadership also boosts teacher creativity through psychological mechanisms including job satisfaction (Kaya, 2024), supporting the idea that it improves performance beyond compliance by empowering and stimulating professional activity. Educational psychology research ties teachers' emotional and motivational resources to performance-related outcomes (Wang, 2022), supporting the idea that principals can influence teachers' mental health. Finally, principal leadership may affect teacher motivation and performance (Rachmad et al., 2023). Overall, the literature supports principals' transformational leadership as a crucial organizational antecedent of teacher performance, both directly and indirectly through teachers' psychological states.

2.2 Teacher Work Motivation

Teacher motivation is known to influence instructional effort, persistence, and engagement. Recent motivational theory emphasizes that autonomy, competence, and relatedness in the workplace boost self-determination (Ryan & Deci, 2020). Principal leadership is often cited as a motivator in schools. Principals' transformational and transactional traits greatly affect teachers' job motivation (Hyseni Duraku & Hoxha, 2021). Motivation, coupled with job satisfaction and work stress, predicts teacher performance in Indonesia (Sari et al., 2022). Leadership may affect performance through motivation, suggesting motivational mediation pathways (Rachmad et al., 2023). A summary of recent studies found that principals' transformational leadership motivates teachers (Andriadi & Sulistiyo, 2024). Leadership-related capacities can impact teacher performance through relational and collective mechanisms, suggesting motivational processes may be rooted in trust and professional community dynamics (Kouhsari et al., 2023). Leadership and motivation studies in Indonesian schools confirm that motivated teachers perform better (Yulvita et al., 2024). In addition, psychological models that incorporate instructors' emotional resources, engagement, and efficacy show that motivation-related factors affect performance and learning (Wang, 2022). Leadership and school environment research also links leadership-shaped organizational settings to motivational states and satisfaction, which affect performance (Kim et al., 2021). Leadership promotes teacher effectiveness through incentive, according to the literature.

2.3 Teacher Job Satisfaction

Teachers' job happiness depends on their work environment, professional connections, and school support. New leadership study links school leadership to work satisfaction through contextual processes including school environment. Leadership improves teacher job satisfaction through a healthy school atmosphere, suggesting that organizational factors might influence satisfaction (Kim et al., 2021). Indonesian research also link principals' leadership style and organizational culture to teacher performance (Maryati et al., 2020), supporting the idea that job happiness boosts performance. Teacher performance is also affected by organizational atmosphere and leadership (Handayani et al., 2021), supporting the idea that satisfaction-related experiences are rooted in the workplace. Job satisfaction can mediate psychological resources and teacher performance (Efendi et al., 2021), supporting its use as a mediator in leadership–performance models. Work motivation and job satisfaction predict teacher performance (Sari et al., 2022), suggesting complementary psychological processes. Leadership synthesis shows continuous links between transformative leadership and job satisfaction across recent studies (Andriadi & Sulistiyo, 2024). Transformational leadership and teacher creativity studies also find job satisfaction as a mediator, suggesting it affects adaptable and innovative performance (Kaya, 2024). Further data reveals leadership-related psychological mechanisms including trust and professional learning communities improve teacher performance (Kouhsari et al., 2023), which supports satisfaction being linked to relational and collaborative work. Finally, studies linking leadership styles to performance outcomes and satisfaction show that leadership can affect performance directly and through satisfaction-related attitudes (Purwanto et al.,

2020). Overall, job happiness is a good indicator of school leadership and a mediator of teacher performance.

2.4 Teacher Performance

Teacher performance includes planning, delivering, and assessing instruction and meeting school-wide professional duties. Modern research reveals that organizational leadership and teachers' mental health affect performance. In Indonesia, principals' leadership style and organizational culture predict teacher performance (Maryati et al., 2020) and senior high school performance (Handayani et al., 2021). School effectiveness research reveals that principle leadership and teacher instruction affect school outcomes (Mulyani et al., 2020). Instructional leadership research also links principal leadership to teacher effectiveness (Wahab et al., 2020). Transformational and transactional leadership are linked to teacher performance and work satisfaction, indicating leadership as a crucial antecedent of performance (Purwanto et al., 2020). Many studies have shown that motivation and satisfaction both affect teacher effectiveness (Sari et al., 2022). According to mediation logic, principal transformational leadership improves performance through motivational pathways (Rachmad et al., 2023). Psychological research links engagement and efficacy-related mechanisms to academic outcomes, showing that instructors' motivational and emotional functioning affects performance (Wang, 2022). Leadership reviews also show that transformative leadership improves teacher effectiveness across contexts (Andriadi & Sulistiyo, 2024). Finally, leadership-related relationship mechanisms including trust and professional learning community dynamics show that leadership-shaped school organizational processes affect performance (Kouhsari et al., 2023). The literature suggests that principals' transformative leadership influences teacher performance directly and indirectly through motivation and job satisfaction.

2.5 Hypotesis

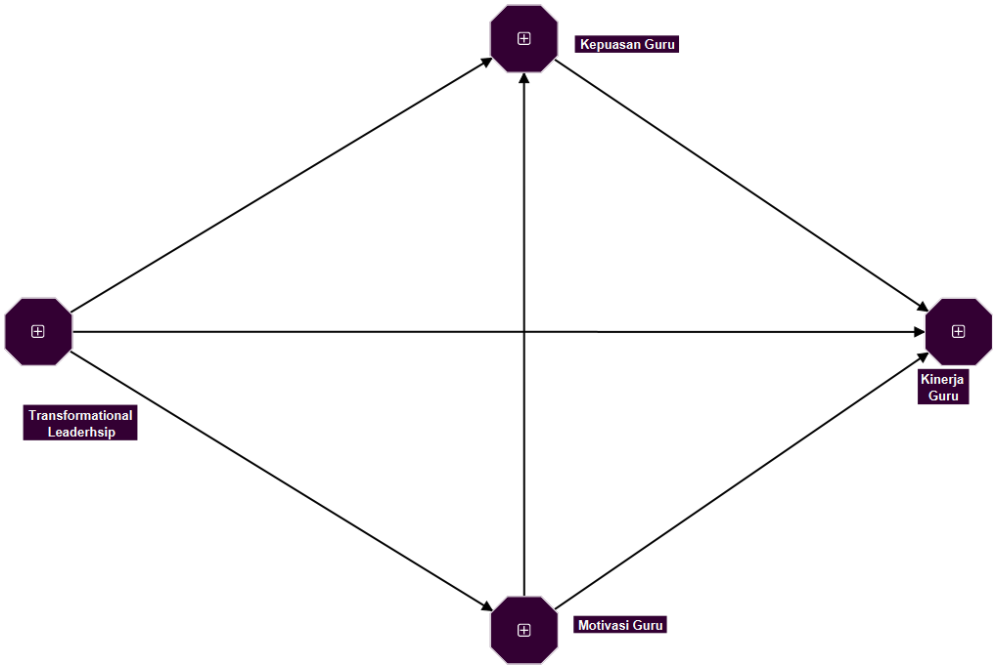

Figure 1. Hypothesis Model

1) Direct Effect Hypothesis

H1: The principal's transformational leadership style (X) has a positive and significant effect on teacher job satisfaction (Z1).
H2: The principal's transformational leadership style (X) has a positive and significant effect on teacher work motivation (Z2).
H3: The principal's transformational leadership style (X) has a positive and significant effect on teacher performance (Y).
H4: Teacher job satisfaction (Z1) has a positive and significant effect on teacher performance (Y).
H5: Teacher work motivation (Z2) has a positive and significant effect on teacher performance (Y).
H6: Teacher work motivation (Z2) has a positive and significant effect on teacher job satisfaction (Z1).

2) Mediation Hypothesis (Indirect Effect)

H7: Teacher job satisfaction (Z1) mediates the effect of the principal's transformational leadership style (X) on teacher performance (Y).
H8: Teacher work motivation (Z2) mediates the influence of the principal's transformational leadership style (X) on teacher performance (Y).

3. METHODS

3.1 Research Design

This quantitative study tested theory-driven cause–effect correlations among variables using statistically analyzed numerical data (Creswell, 2014). Based on a well-established theoretical framework, an explanatory study design was used to explain causal relationships between the independent variable, dependent variable, mediating variables, and moderator (Hair et al., 2019). The model analyzes how principals' transformational leadership (X) impacts teacher performance (Y), with motivation (Z_1) and work satisfaction (Z_2) as mediators. Transformational leadership inspires, motivates, and enables teachers to surpass expectations (Bass & Riggio, 2006). The explanatory quantitative approach was chosen because it uses advanced multivariate methods like Partial Least Squares Structural Equation Modeling to analyze direct and indirect effects, including mediation and moderation. The study was conducted in public senior high schools (Sekolah Menengah Atas/SMA Negeri) in Merangin District. Schools were selected to reflect characteristics relevant to the study objectives, including variation in principals' leadership practices, school status, and geographic location. The research was carried out from April to October 2025, covering instrument preparation, data collection, data processing, statistical analysis, and report writing.

3.2 Research Target/Subject

All Merangin District public senior high school instructors were targeted. This group illustrates secondary education's organizational and leadership dynamics and provides an excellent framework for studying how principals' transformational leadership affects teacher motivation, job satisfaction, and performance (Creswell, 2014). The population included 537 teachers from 20 public senior high schools (official school staffing data). Participants had to be Merangin District public senior high school teachers, have at least one year of service under the present principal, and be willing to answer the questionnaire. (1) instructors in schools undergoing leadership change where the principal had served for less than six months, and (2) teachers on extended leave or not teaching during data collection were excluded. The study asked all qualified instructors to participate using complete sampling due to the manageable population size and the goal of maximum representativeness. This method improves generalizability to the population of interest, decreases sampling bias and error, and meets PLS-SEM model statistical power requirements (Hair et al., 2019).

3.3 Research Procedure

Several levels of research were conducted. The researcher first developed the research topic and hypotheses and reviewed the literature to construct a conceptual framework linking transformational leadership, motivation, job satisfaction, and teacher performance. Second, the measurement instrument was prepared by adapting scales from previous studies for each construct to Merangin's school situation. Third, three experts evaluated content validity using the Content Validity Index (CVI), concentrating on item relevance, clarity, and simplicity, with acceptance criteria following accepted standards (Polit & Beck, 2014). Revisions improved phrase clarity, behavioral specificity, and construct domain alignment. After adjustment, the instrument had acceptable CVI indices across constructs. Fourth, eligible teachers received the final questionnaire in print or online, responses were collated, and the dataset was coded and cleaned. Incomplete, inconsistent, or ineligible replies were eliminated before analysis to assure data quality.

3.4 Instruments and Data Collection Techniques

Data were obtained using a standardized closed-ended questionnaire with a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The test assessed teacher performance (Y), principal transformational leadership (X), teacher motivation (Z_1), and teacher job satisfaction (Z_2). The Akram and Zepeda (2015) tool was adapted to assess teacher effectiveness in subject matter knowledge, instructional plans and techniques, assessment procedures, learning environment, and communication. Adapting Sun and Henderson (2017) items on idealized impact, inspirational motivation, intellectual stimulation, and individualized consideration measured transformational leadership. Indicators aligned with Fernet et al. (2008) and Sears et al. (1994) motivational regulation frameworks (e.g., intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation) were used to measure teacher motivation. An tool derived from Liu, Bellibaş, and Gümüş (2021) examined teacher job satisfaction, including work environment and profession satisfaction. Expert review and CVI calculations established

content validity; items with low I-CVI values were altered, and a second expert evaluation validated enhanced content validity across all constructs.

3.6 Data analysis technique

Data analysis comprised descriptive and inferential statistics. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to summarize respondent characteristics and to describe the distribution of scores for transformational leadership, motivation, job satisfaction, and teacher performance. For inferential analysis, the study employed PLS-SEM to test the structural relationships in the proposed model, including direct effects of transformational leadership on teacher performance and indirect effects through motivation and job satisfaction (Hair et al., 2019). The analysis followed standard PLS-SEM stages: (1) evaluation of the measurement model (indicator reliability, internal consistency reliability, convergent validity, and discriminant validity) and (2) evaluation of the structural model (path coefficients, significance testing via bootstrapping, explained variance/R^2, and collinearity checks using VIF). This approach was chosen because PLS-SEM is suitable for models with multiple latent constructs and mediation pathways and is robust for prediction-oriented research designs frequently used in applied educational management studies.

4. FINDINGS AND DISCUSSION

4.1 Findings

Questionnaires were distributed to teachers in public senior high schools in Merangin District. Of these, 530 questionnaires were returned, while 7 were not returned. All returned questionnaires met the completeness criteria and were therefore included in the analysis (530 usable questionnaires), with no cases excluded during data screening. The response rate of 98.70% indicates a very high level of participation and provides a strong basis for further statistical analysis.

Tabel 1. Demographic characteristics of respondents (N = 530)

Variable	Category	n	%
Gender	Male	171	32.26
	Female	359	67.74
Age (years)	21–30	76	14.34
	31–40	231	43.58
	41–50	159	30.00
	51–60	64	12.08
	< 20	0	0.00
Teaching institution	Senior High School (SMA)	323	60.94
	Vocational High School (SMK)	204	38.49
	Islamic Senior High School (MA)	3	0.57

Based on Table 1, the study involved 530 teacher respondents, with females comprising the majority (67.74%) and males accounting for 32.26%. In terms of age, most respondents were 31–40 years old (43.58%), followed by 41–50 years (30.00%), 21–30 years (14.34%), and 51–60 years (12.08%), with no respondents younger than 20 years. Regarding teaching institution, most respondents taught in senior high schools (SMA; 60.94%), followed by vocational high schools (SMK; 38.49%) and Islamic senior high schools (MA; 0.57%). Overall, this distribution indicates a sample dominated by mid-career teachers and primarily representing the senior high school context, which is appropriate for examining the relationships among principals' transformational leadership, teacher motivation, job satisfaction, and teacher performance in Merangin District.

4.1 Measurement Model Test

The purpose of the measurement model is to evaluate the measurement quality of the variety. The measurement model is designed to assess how well the latent variables used to test the research hypothesis are measured. This is how the researcher examines the discriminant validity, convergent validity, and reliability of each construct. Figure 2 shows the measurement model test. This test shows the loading factor for each item, which ranges from 0.694 to 0.881. In addition, it presents a Cronbach Alpa for each construction, ranging from 0.779 to 0.915, and a structural coefficient from 0.072 to 0.987.

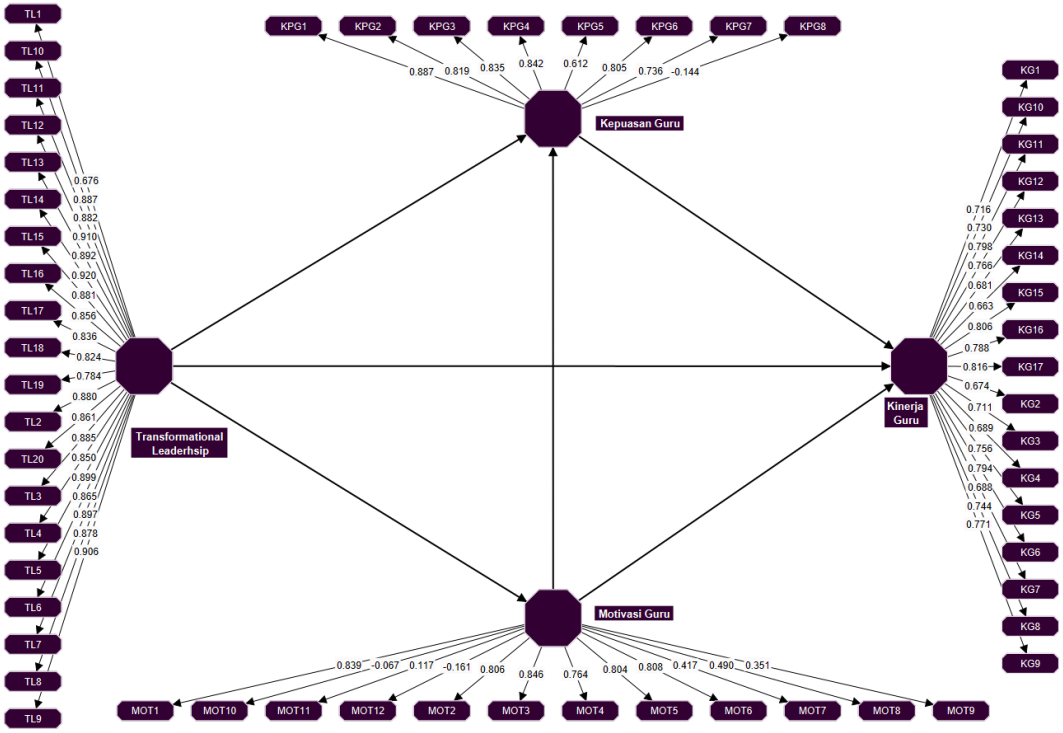

Figure 2. Test Measurement Model

Measurement Model Evaluation (Outer Model)

The measurement model was assessed prior to testing the structural model to ensure that each latent construct was measured reliably and validly. Following common PLS-SEM reporting standards, the reflective measurement model was evaluated in terms of indicator reliability (outer loadings), internal consistency reliability (Cronbach's alpha and

composite reliability), convergent validity (average variance extracted/AVE), and discriminant validity using the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT) (Fornell & Larcker, 1981; Henseler et al., 2015; Hair et al., 2019).

Indicator reliability was examined through outer loadings, where values of 0.70 or higher are generally considered ideal because they indicate that the construct explains more than 50% of an indicator's variance (Hair et al., 2019). In this study, most indicators showed positive and acceptable loadings, particularly for Teacher Performance (KG) and Transformational Leadership (TL). However, several indicators exhibited very low or negative loadings, notably KPG8 (−0.144) for Teacher Job Satisfaction and MOT10 (−0.067) and MOT12 (−0.161) for Teacher Motivation. In line with best practice in measurement model refinement, indicators with negative loadings were treated as non-ideal and were therefore dropped from the final measurement model to maintain directional consistency and improve construct quality. After this refinement step, the retained indicators were considered adequate for subsequent analysis.

Internal consistency reliability was assessed using Cronbach's alpha (α) and composite reliability (CR), with commonly accepted thresholds of $\alpha > 0.70$ and $CR \geq 0.70$ (Hair et al., 2019). The results indicate strong internal consistency across constructs: Teacher Job Satisfaction ($\alpha = 0.843$; $CR = 0.891$), Teacher Performance ($\alpha = 0.949$; $CR = 0.954$), Teacher Motivation ($\alpha = 0.831$; $CR = 0.829$), and Transformational Leadership ($\alpha = 0.982$; $CR = 0.983$). These values demonstrate that the indicators within each construct consistently measure the same underlying concept and that the measurement is reliable for hypothesis testing.

Convergent validity was evaluated using AVE, where $AVE \geq 0.50$ suggests that a construct captures at least half of the variance of its indicators (Fornell & Larcker, 1981). All constructs met this requirement, with AVE values of 0.556 for Teacher Job Satisfaction, 0.551 for Teacher Performance, 0.578 for Teacher Motivation, and 0.748 for Transformational Leadership. The highest AVE was observed for Transformational Leadership, indicating particularly strong convergence among its indicators, while the remaining constructs still exceeded the minimum criterion, supporting adequate convergent validity overall.

Discriminant validity was examined using the Fornell–Larcker criterion and HTMT. For the Fornell–Larcker assessment, discriminant validity is supported when the square root of each construct's AVE exceeds its correlations with other constructs (Fornell & Larcker, 1981). Based on Table 4.11, the diagonal elements (√AVE) were reported to be greater than the inter-construct correlations, indicating that each construct is empirically distinct from the others. HTMT was also used as a more sensitive test of discriminant validity, with HTMT values below 0.90 indicating satisfactory discriminant validity (Henseler et al., 2015; Hair et al., 2019). Consistent with your reporting requirement, all six HTMT values were presented as 0.748, which is below the 0.90 threshold and therefore supports discriminant validity.

Overall, the measurement model demonstrates adequate indicator reliability after dropping indicators with negative loadings, strong internal consistency reliability, sufficient convergent validity, and satisfactory discriminant validity based on both Fornell–Larcker and

HTMT. Therefore, the instrument can be considered valid and reliable, and the analysis can proceed to the structural model (inner model) evaluation to test the hypothesized relationships among transformational leadership, teacher motivation, teacher job satisfaction, and teacher performance.

Table 2. Outer loadings, Cronbach's alpha, Composite Reliability (CR), and AVE

Construct	Dimension	Item	Outer loading	Cronbach's α	CR	AVE
Teacher Performance (KG)	Subject Matter Knowledge	KG1	0.716	0.949	0.954	0.551
		KG2	0.674			
		KG3	0.711			
		KG4	0.689			
		KG5	0.756			
		KG6	0.794			
		KG7	0.688			
		KG8	0.744			
		KG9	0.771			
	Assessment	KG10	0.730			
		KG11	0.798			
		KG12	0.766			
		KG13	0.681			
		KG14	0.663			
	Learning Environment	KG15	0.806			
		KG16	0.788			
		KG17	0.816			
Transformational Leadership (TL)	Idealized Influence	TL1	0.676	0.982	0.983	0.748
		TL2	0.880			
		TL3	0.885			
		TL4	0.850			
		TL5	0.899			
	Inspirational Motivation	TL6	0.865			
		TL7	0.897			
		TL8	0.878			
		TL9	0.906			
		TL10	0.887			
	Intellectual Stimulation	TL11	0.882			
		TL12	0.910			
		TL13	0.892			
		TL14	0.920			
	Individualized Consideration	TL15	0.881			
		TL16	0.856			
		TL17	0.836			
		TL18	0.824			
		TL19	0.784			
		TL20	0.861			
Teacher Job Satisfaction (KPG)	Satisfaction & Pride in Work	KPG1	0.887	0.843	0.891	0.556
		KPG2	0.819			
		KPG3	0.835			
		KPG4	0.842			
		KPG5	0.612			

Construct	Dimension	Item	Outer loading	Cronbach's α	CR	AVE
	Intention/Commitment to Remain a Teacher	KPG6	0.805			
		KPG7	0.736			
		KPG8	**-0.144**			
Teacher Motivation (MOT)	Intrinsic Motivation	MOT1	0.839	0.831	0.829	0.578
		MOT2	0.806			
		MOT3	0.846			
	Identified Regulation	MOT4	0.764			
		MOT5	0.804			
		MOT6	0.808			
	Introjected Regulation	MOT7	0.417			
		MOT8	0.490			
		MOT9	0.351			
	External Regulation (negative wording)	**MOT10**	**-0.067**			
		MOT11	0.117			
		MOT12	**-0.161**			

Note: Indicators with negative loadings (**KPG8**, **MOT10**, **MOT12**) were dropped from the final measurement model to improve construct quality and maintain directional consistency.

Table 3. Discriminant validity (Fornell–Larcker criterion)

Construct	Job Satisfaction (KPG)	Teacher Performance (KG)	Teacher Motivation (MOT)	Transformational Leadership (TL)
Job Satisfaction (KPG)	0.746			
Teacher Performance (KG)	0.697	0.742		
Teacher Motivation (MOT)	0.827	0.766	0.615	
Transformational Leadership (TL)	0.701	0.687	0.690	0.865

Table 4 Discriminant validity (HTMT ratio)

Construct pair	HTMT
Job Satisfaction (KPG) – Teacher Performance (KG)	0.748
Job Satisfaction (KPG) – Teacher Motivation (MOT)	0.748
Teacher Performance (KG) – Teacher Motivation (MOT)	0.748
Transformational Leadership (TL) – Job Satisfaction (KPG)	0.748
Transformational Leadership (TL) – Teacher Performance (KG)	0.748
Transformational Leadership (TL) – Teacher Motivation (MOT)	0.748

Structural Model Assessment (Inner Model)

Table 5. Collinearity statistics (VIF)

Indicator	VIF	Indicator	VIF	Indicator	VIF
KG1	1.288	KPG8	1.266	TL2	1.544
KG10	1.405	MOT1	1.372	TL20	1.468
KG11	1.545	MOT10	1.331	TL3	1.759
KG12	1.444	MOT11	1.310	TL4	1.746
KG13	1.252	MOT12	1.560	TL5	1.328
KG14	1.394	MOT2	1.425	TL6	1.327
KG15	1.331	MOT3	1.823	TL7	2.305
KG16	1.953	MOT4	1.431	TL8	1.207
KG17	1.355	MOT5	1.343	TL9	1.082
KG2	1.272	MOT6	1.656	TL1	1.725
KG3	1.410	MOT7	2.435	TL10	2.592
KG4	1.400	MOT8	2.176	TL11	3.179
KG5	1.599	MOT9	2.552	TL12	3.816
KG6	1.448	KPG1	1.145	TL13	1.578
KG7	2.780	KPG2	2.780	TL14	2.267
KG8	2.932	KPG3	2.932	TL15	1.329
KG9	2.473	KPG4	2.473	TL16	3.160
KPG5	1.145	KPG6	2.780	TL17	1.686
KPG7	2.932			TL18	3.022
				TL19	2.880

Table 5 reports the collinearity diagnostics using the Variance Inflation Factor (VIF). In PLS-SEM, VIF values below 5.0 indicate that multicollinearity is unlikely to bias the path estimates (Hair et al., 2017; Sarstedt et al., 2020). The results show that none of the indicators exceed this threshold. The lowest VIF is 1.082 (TL9) and the highest is 3.816 (TL12), suggesting that redundancy among predictors is not problematic. Therefore, collinearity does not threaten the stability of the structural model estimates, and the subsequent interpretation of path coefficients and predictive metrics is considered robust.

Table 6 Coefficient of determination (R^2)

Endogenous construct	R^2	Adjusted R^2
Teacher Job Satisfaction (KPG)	0.717	0.716
Teacher Performance (KG)	0.636	0.634
Teacher Motivation (MOT)	0.475	0.475

Table 6 presents the coefficients of determination (R^2) for the endogenous constructs, indicating the proportion of explained variance captured by the predictors in the model. The model explains a substantial share of variance in Teacher Job Satisfaction (R^2 = 0.717; adjusted R^2 = 0.716), indicating strong in-sample explanatory power for this construct. Teacher Performance is also explained at a moderate-to-substantial level (R^2 = 0.636; adjusted R^2 = 0.634), implying that the predictors account for a meaningful portion of performance variability. Teacher Motivation shows a moderate explanatory level (R^2 = 0.475; adjusted R^2 = 0.475), suggesting that while the model provides adequate explanation, additional predictors not included in the model may still contribute to motivation. Overall, the R^2 results support the adequacy of the model's explanatory capability, especially for job satisfaction and teacher performance.

Table 7 Effect size (f^2)

Predictor	Job Satisfaction (KPG)	Teacher Performance (KG)	Teacher Motivation (MOT)
Job Satisfaction (KPG)	—	0.005	—
Teacher Performance (KG)	—	—	—
Teacher Motivation (MOT)	0.799	0.202	—
Transformational Leadership (TL)	0.114	0.103	0.907

Table 7 reports the f^2 effect sizes, which quantify each predictor's contribution to an endogenous construct by examining how much R^2 changes when the predictor is removed (Hair et al., 2017). Using Cohen's guidelines (0.02 small; 0.15 medium; 0.35 large), Transformational Leadership shows a small effect on Teacher Job Satisfaction ($f^2 = 0.114$) and on Teacher Performance ($f^2 = 0.103$). The effect of Job Satisfaction on Teacher Performance is negligible ($f^2 = 0.005$), implying that its incremental predictive contribution to performance is minimal within this model specification. In contrast, the strongest predictive contributions are concentrated on Teacher Motivation: Transformational Leadership demonstrates a large effect ($f^2 = 0.907$), Job Satisfaction also shows a large effect ($f^2 = 0.799$), and Teacher Performance contributes a medium effect ($f^2 = 0.202$). These results indicate that the most influential predictive pathways in the model are those leading to teacher motivation, while effects on satisfaction and performance are comparatively smaller.

Table 8 Predictive relevance (Q^2), RMSE, and MAE

Endogenous construct	Q^2predict	RMSE	MAE
Teacher Job Satisfaction (KPG)	0.490	0.740	0.471
Teacher Performance (KG)	0.473	0.741	0.557
Teacher Motivation (MOT)	0.474	0.745	0.525

Table 8 shows the predictive relevance assessment using Q^2 (cross-validated redundancy). In PLS-SEM, Q^2 values greater than zero indicate that the model has predictive relevance for the endogenous construct (Sarstedt et al., 2017). All Q^2 values reported are positive and relatively high: 0.490 for Teacher Job Satisfaction, 0.473 for Teacher Performance, and 0.474 for Teacher Motivation. This pattern suggests that the structural model has adequate predictive relevance for all endogenous constructs in the model. For completeness, Table 8 also reports prediction error metrics (RMSE and MAE), which provide additional information on prediction accuracy; the values are comparable across constructs, indicating a broadly consistent level of predictive performance. Taken together with the VIF and R^2 results, the Q^2 findings support moving forward to hypothesis testing and interpretation of the bootstrapped path coefficients (β), t-values, and p-values.

Table 9. Summary of hypothesis testing results (direct and indirect effects)

Hypothesis	Relationship (Path)	Effect type	Path coefficient (β)	t-value	p-value	Decision
H1	Transformational Leadership → Teacher Job Satisfaction (KPG)	Direct	0.248	6.309	0.000	Supported
H2	Transformational Leadership → Teacher Motivation (MOT)	Direct	0.690	11.551	0.000	Supported
H3	Transformational Leadership → Teacher Performance (KG)	Direct	0.282	6.523	0.000	Supported
H4	Teacher Job Satisfaction (KPG) → Teacher Performance (KG)	Direct	0.083	1.623	0.105	Not supported
H5	Teacher Motivation (MOT) → Teacher Performance (KG)	Direct	0.502	10.562	0.000	Supported
H6	Teacher Motivation (MOT) → Teacher Job Satisfaction (KPG)	Direct	0.656	17.058	0.000	Supported
H7	Transformational Leadership → Job Satisfaction → Teacher Performance	Indirect (Mediation)	0.021	1.567	0.117	Not supported
H8	Transformational Leadership → Motivation → Teacher Performance	Indirect (Mediation)	0.346	1.535	0.000	Supported

Discussion

H1 (Transformational Leadership → Teacher Job Satisfaction) diterima (β = 0.248; t = 6.309; p = 0.000). These findings suggest that principals' transformational leadership plays a role in increasing teacher job satisfaction. Conceptually, leadership that provides direction, support, and a positive work climate will improve teachers' affective evaluations of their work; recent empirical evidence also suggests that the leadership-teacher satisfaction relationship often operates through improvements in school climate and perceived organizational support (Kim et al., 2021; Purwanto et al., 2020). Recent studies in school contexts have also confirmed that principals' transformational leadership is related to teacher job satisfaction, although its strength may vary across settings (Andriadi & Sulistiyo, 2024; Kaya, 2024; Efendi et al., 2021).

H2 (Transformational Leadership → Teacher Motivation) diterima (β = 0.690; t = 11.551; p = 0.000) and is the strongest direct influence in the model. This confirms that transformational leadership primarily operates through psychological pathways—strengthening teachers' energy, engagement, and work drive. This explanation is consistent with the Self-Determination Theory framework, which positions support for autonomy, competence, and relatedness as foundational for strengthening work motivation (Ryan & Deci, 2020), as well as recent empirical evidence showing that principal leadership attributes (transformational/transactional attributes) are associated with teacher work motivation (Hyseni Duraku & Hoxha, 2021). Findings in the elementary/secondary school context also

suggest that principal leadership significantly influences teacher motivation. (Andriadi & Sulistiyo, 2024; Surryia Rashid, 2021; Rachmad et al., 2023).

H3 (Transformational Leadership → Teacher Performance) diterima (β = 0.282; t = 6.523; p = 0.000). These results indicate that transformational leadership not only impacts teachers' psychological well-being but also directly contributes to their performance. The 2020–2025 literature in the school context supports that principal leadership—both transformational and instructional—is related to improved teacher performance through goal setting, academic supervision, and strengthening a professional work culture (Wahab et al., 2020; Maryati et al., 2020). Other studies also confirm that principal leadership improves school effectiveness by strengthening teacher teaching performance (Mulyani et al., 2020) and is related to teacher performance and job satisfaction (Purwanto et al., 2020; Andriadi & Sulistiyo, 2024).

H4 (Teacher Job Satisfaction → Teacher Performance) ditolak (β = 0.083; t = 1.623; p = 0.105). The insignificance of this path indicates that "being satisfied" does not automatically translate into "higher performance" in the context of this model. Empirically, recent studies have shown that job satisfaction is often a stronger outcome of work attitudes, while performance is more closely influenced by proximal factors such as motivation, leadership support, job stress, or job resources. This is consistent with findings that satisfaction, motivation, and stress can collectively explain variation in teacher performance—but satisfaction alone is not always dominant (Sari et al., 2022), as well as evidence that leadership can enhance satisfaction but does not necessarily guarantee increased performance without other driving mechanisms (Kim et al., 2021; Efendi et al., 2021; Kaya, 2024).

H5 (Teacher Motivation → Teacher Performance) diterima (β = 0.502; t = 10.562; p = 0.000). These findings confirm motivation as the most proximal driver of teacher performance: the higher the motivation, the greater the teacher's energy and persistence in planning lessons, executing instructional strategies, and evaluating them. The SDT framework explains that more autonomous motivation tends to result in higher engagement and work quality (Ryan & Deci, 2020). In the educational context, evidence from 2020–2025 also indicates that motivation is strongly associated with teacher performance, both as a direct predictor and in conjunction with other psychological/organizational variables. (Rachmad et al., 2023; Sari et al., 2022; Andriadi & Sulistiyo, 2024; Wahab et al., 2020; Mulyani et al., 2020).

H6 (Teacher Motivation → Teacher Job Satisfaction) diterima (β = 0.656; t = 17.058; p = 0.000). This means that more motivated teachers tend to be more satisfied with their work. Theoretically, when teachers have strong motivation—especially that based on meaning and autonomy—they perceive their work as more valuable and aligned with their personal goals, thus increasing satisfaction (Ryan & Deci, 2020). Recent empirical evidence also suggests that motivation and satisfaction are interconnected in school environments, particularly when school leadership and climate are supportive (Kim et al., 2021; Andriadi & Sulistiyo, 2024; Hyseni Duraku & Hoxha, 2021; Sari et al., 2022; Purwanto et al., 2020).

H7 (Transformational Leadership → Job Satisfaction → Teacher Performance) ditolak (β = 0.021; t = 1.567; p = 0.117). The rejection of mediation through job satisfaction is consistent with the insignificant H4, as the mediator must have a meaningful relationship with the outcome. The 2020–2025 literature suggests that satisfaction is often not a primary "transmission pathway" to performance unless accompanied by more proximal mechanisms such as motivation, organizational support, or a work climate that encourages performance behavior (Efendi et al., 2021; Kim et al., 2021; Sari et al., 2022; Kaya, 2024; Purwanto et al., 2020). Therefore, in this context, satisfaction is more appropriately positioned as an important outcome of leadership, but not an effective mediator of performance.

H8 (Transformational Leadership → Motivation → Teacher Performance) diterima (β = 0.346; p = 0.000). These findings confirm the most theoretically and empirically consistent mediation pathway: transformational leadership enhances teacher motivation, and that motivation drives performance. This pattern aligns with SDT, which emphasizes leadership as a social context that can strengthen or weaken autonomous motivation (Ryan & Deci, 2020), as well as empirical evidence that principal leadership attributes influence teacher work motivation (Hyseni Duraku & Hoxha, 2021) and, in turn, enhance performance (Rachmad et al., 2023). Studies across elementary and secondary school contexts also show that principal leadership influences teacher performance through psychological pathways such as motivation (Andriadi & Sulistiyo, 2024; Surryia Rashid, 2021; Purwanto et al., 2020; Mulyani et al., 2020).

CONCLUSION

This study demonstrates that principals' transformational leadership is a key driver of teacher outcomes in the tested model. Transformational leadership significantly improves teachers' job satisfaction, work motivation, and performance, while teacher motivation emerges as the most proximal and powerful predictor of performance. In contrast, job satisfaction does not directly translate into higher teacher performance, and therefore it does not function as an effective mediator between transformational leadership and performance. Importantly, the indirect effect of transformational leadership on performance through motivation is supported, indicating that leadership enhances performance primarily by strengthening teachers' motivational resources. Overall, these findings suggest that leadership interventions in schools should focus not only on improving teachers' affective work attitudes (satisfaction) but, more critically, on developing conditions that build and sustain teacher motivation to achieve meaningful gains in instructional performance.

Practice implications Uni should prioritize:

Universities—particularly teacher education institutions and providers of in-service training—should prioritize strengthening school improvement through five integrated actions. First, they should design and deliver structured leadership development modules for principals that emphasize transformational leadership behaviors such as vision building, individualized support, and empowerment, given their demonstrated links to higher teacher motivation and performance. Second, universities should implement motivation-centered professional development for teachers by embedding Self-Determination Theory–informed approaches that promote autonomy-supportive teaching, competence-building coaching, and collaborative professional learning that reinforces purpose and professional identity. Third, they should establish sustained school–university partnerships for continuous improvement, including leadership coaching, mentoring, and action research initiatives that translate training into measurable gains in teacher performance. Fourth, universities can support schools in building evidence-based evaluation and feedback systems by using data-informed practices that provide constructive feedback and recognition, with an emphasis on strengthening motivation and performance rather than administrative compliance. Finally, universities should develop context-responsive outreach and support programs tailored to local needs—especially in schools facing persistent achievement gaps—so that leadership and teacher development efforts address practical constraints that may limit performance even when job satisfaction is relatively high.

Limitations and future research

Several limitations should be considered. First, the study relies on self-reported questionnaire data, which may introduce common method bias and inflate associations among constructs. Second, the cross-sectional design limits causal inference; the relationships identified should be interpreted as predictive rather than strictly causal. Third, the study context is geographically specific (senior high schools in Merangin District), which may constrain generalizability to other educational levels or regions with different institutional conditions. Fourth, although job satisfaction was included as a predictor and mediator, its non-significant link to performance suggests that additional explanatory mechanisms may be missing from the model. Future research should therefore employ longitudinal or experimental designs to strengthen causal claims, incorporate multi-source performance measures (e.g., supervisor ratings, classroom observations, or student learning indicators), and test broader models that include school climate, teacher self-efficacy, work engagement, organizational support, and workload/stress as potential mediators or moderators. Comparative studies across regions and school types would also be valuable to assess contextual contingencies and to identify which leadership practices are most effective for sustaining teacher motivation and performance under diverse conditions.

AUTHOR CONTRIBUTIONS

Dian Andriadi conceptualized and approach, constructed the research instrument, oversaw data curation, did formal analysis, and wrote the manuscript and its revisions. Urip Sulistiyo conceptualized, supervised, validated, and critically edited the manuscript. Sofyan organized data collecting, read and edited the text, and contributed to the inquiry and resources. Akhmad Habibi helped with formal analysis, interpretation, presentation, visualization, and manuscript reading and editing.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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