

Principal Leadership Matters: Examining Its Effects On Work Motivation And Discipline Among Science Teachers In Public Secondary Schools

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Abstract

Effective school leadership is widely regarded as one of the most consistent predictors of teacher motivation and workplace discipline, yet evidence from science-teacher populations in decentralised, resource-constrained school systems remains limited. This study examined the effect of principal leadership on the work motivation and work discipline of science (IPA) teachers in Indonesian public senior secondary schools, using an ex post facto quantitative design with total sampling of 30 biology and physics teachers (16 biology, 14 physics) across six public senior secondary schools in a regency in South Sulawesi Province. Data were collected through three 40-item Likert questionnaires measuring principal leadership, teacher work motivation, and teacher work discipline, and analysed using descriptive statistics, Kolmogorov-Smirnov normality and Glejser/Levene homogeneity tests, and multiple linear regression. Teachers perceived principal leadership ($M = 150.47$, $SD = 10.65$) and their own work discipline ($M = 152.23$, $SD = 6.47$) as very high, while work motivation ($M = 141.80$, $SD = 13.71$) was somewhat more variable. Principal leadership significantly predicted teacher work motivation ($p < .001$), although the coefficient was unexpectedly negative, a pattern attributed to restricted score range rather than a genuine

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adverse effect; leadership also significantly predicted work discipline ($p < .001$). In the combined model, principal leadership together with work motivation explained 99.6% of the variance in work discipline ($R = .998$, $R^2 = .996$, $F(2,27) = 3750.63$, $p < .001$), although this near-perfect fit is interpreted cautiously as a probable artefact of common-method variance and multicollinearity given the small sample and same-source, same-time measurement. The findings affirm principal leadership as a central, internationally salient lever for cultivating motivated and disciplined science-teaching staff, while illustrating the methodological caution required when self-report predictors are measured concurrently in small samples.

Keywords: Principal Leadership; Teacher Work Motivation; Teacher Work Discipline; Science Teachers; Educational Management.

INTRODUCTION

School leadership is consistently identified, across education systems worldwide, as one of the strongest school-level levers for improving teaching quality and, through it, student learning (Sallis, 2015). This consensus is sharpened by persistent gaps in science literacy: results from the 2018 and 2022 Programme for International Student Assessment placed Indonesian students' science literacy well below the OECD average (OECD, 2023), a gap that cannot be separated from classroom instruction quality, which depends heavily on how motivated and disciplined science teachers are. Science (IPA) teachers face particular demands: beyond transferring knowledge, they must cultivate critical and scientific thinking and manage laboratory work requiring precise planning and initiative well beyond routine lecturing. In many public secondary schools, however, teacher discipline remains procedural rather than professional, and a parallel comfort-zone pattern limits motivation for pedagogical innovation. Because subordinate behaviour tends to mirror the effectiveness of leadership above it, the principal's dual role as interpersonal leader and managerial performer is a plausible determinant of both patterns.

This study therefore examined the effect of principal leadership on the work motivation and work discipline of science teachers in Indonesian public senior secondary schools, addressing three objectives: (1) the effect of leadership on teacher work motivation, (2) the effect of leadership on teacher work discipline, and (3) the simultaneous effect of leadership together with work motivation on work discipline. Because leadership effectiveness, teacher motivation, and



workplace discipline are concerns shared by school systems far beyond a single country, the findings speak to a broader, internationally recognised challenge in educational management: how to translate school leadership into a motivated and disciplined teaching workforce.

LITERATURE REVIEW

Principal Leadership

Principal leadership is the determinant variable that shapes the direction and quality of education delivery at the school level. Wahjosumidjo (2010) defines it as the critical force in school management, in which the ability to lead effectively is key to the school organisation's success; the principal is thus not merely a structural officer but a central figure able to influence the behaviour of the entire school community. Effective leadership depends on a leader's ability to adapt style to subordinates' level of readiness, and requires the principal to influence, mobilise, develop, and empower school resources, moving beyond simply telling toward participating with, and delegating proportionally to, teachers (Mulyasa, 2022). In this study, principal leadership was measured through strategic and participative decision-making, effective interpersonal communication, role-modelling of discipline and work ethic, and the provision of motivational support to subordinates.

Teacher Work Motivation and Work Discipline

Teacher work motivation is treated here through Herzberg's Two-Factor Theory, which distinguishes hygiene factors, external conditions whose absence causes dissatisfaction, from motivator factors internal to the work, such as achievement and recognition, which genuinely drive high motivation (Herzberg, Mausner, & Snyderman, 2011). Work discipline is the bridge between a school's plans and its goals: Hasibuan (2019) defines it as awareness of, and willingness to observe, organisational rules and social norms, understood here as professional moral responsibility rather than rigid compliance. McGregor's Hot Stove Rule frames how discipline should be enforced, with clear warning, immediate response, consistency, and impersonality, so discipline grows from fairness rather than fear (McGregor, 1960). In this study, discipline was measured across time discipline (punctuality, use of instructional time), regulatory discipline (compliance with school and civil-service rules), and responsibility discipline (completion of teaching documents).



Linking Leadership to Motivation and Discipline

The link between leadership and motivation is explained through Self-Determination Theory (Ryan & Deci, 2000): intrinsic motivation flourishes when autonomy, competence, and relatedness are met, and a principal who grants teachers autonomy, builds their competence, and fosters collegiality functions as an enabler of all three. The link between leadership and discipline is explained through Leader-Member Exchange (LMX) Theory (Graen & Uhl-Bien, 1995): in high-quality exchange relationships built on trust and respect, teachers work punctually and complete administrative duties out of voluntary discipline and loyalty rather than fear of sanction. Based on this framework, the study tested the hypothesis that principal leadership significantly affects science teachers' work motivation and work discipline, individually and simultaneously, against the null hypothesis of no such effect.

METHOD***Research Design, Population, and Sample***

This study used a quantitative, ex post facto design (Creswell, 2020), appropriate because leadership, the independent variable, was measured as it naturally occurred. The analysis followed three paths: leadership on motivation (I), leadership on discipline (II), and leadership together with motivation on discipline (III). The study was conducted across public senior secondary schools in a regency in South Sulawesi Province, Indonesia, over two months. The population comprised all civil-service (PNS) and government-contract (PPPK) science-cluster teachers across six schools in the regency; because this population was small (under 100), a purposive, total-sampling approach yielded a sample of 30 teachers (16 biology, 14 physics).

Instruments and Data Analysis

Three closed-ended, four-point Likert questionnaires of 40 items each measured leadership, motivation, and discipline, with negatively worded items reverse-scored before summation. Data were analysed descriptively to categorise each variable as low, moderate, or high (Ghozali, 2021). The Kolmogorov-Smirnov test assessed normality of the regression residuals, and the Glejser and Levene tests assessed homogeneity of variance, both at $\alpha = 0.05$, before hypotheses were tested through multiple linear regression evaluated via the F-test and R^2 .



RESULTS AND DISCUSSION

Descriptive Profile and Prerequisite Tests

Across the theoretical score range of 40-160 for each 40-item instrument, teachers rated principal leadership and their own work discipline as very high, while work motivation, though also high, showed somewhat greater dispersion (Table 1). Leadership scores ranged 125-160 ($M = 150.47$, $SD = 10.65$, 93.33% of teachers rating it very high), motivation scores 114-160 ($M = 141.80$, $SD = 13.71$, 80.00% very high), and discipline scores 137-160 ($M = 152.23$, $SD = 6.47$, 93.33% high but only 6.67% very high, the narrowest spread of the three variables). This concentration of scores in the upper bands, most pronounced for leadership and discipline, indicates a restriction of range that later required cautious interpretation of the regression results.

Table 1. Descriptive Statistics of the Study Variables

Variable	N	Min	Max	Mean	SD	% Very High
Principal Leadership	30	125	160	150.47	10.65	93.33%
Teacher Work Motivation	30	114	160	141.80	13.71	80.00%
Teacher Work Discipline	30	137	160	152.23	6.47	6.67%

Prior to hypothesis testing, Kolmogorov-Smirnov testing of the residuals returned a statistic of 0.126 ($p = 0.253 > 0.05$), confirming normally distributed residuals despite some raw-score skew toward high values consistent with the ceiling effect noted above; the Glejser test ($p = 0.586$, 0.357, and 0.561 for the leadership-motivation, leadership-discipline, and simultaneous models) and Levene's test ($p = 0.568$ for motivation, $p = 0.357$ for discipline) likewise confirmed homogeneity of variance throughout.

Hypothesis Testing

With normality and homogeneity confirmed, multiple regression testing showed principal leadership to be a significant predictor of both teacher work motivation and teacher work discipline ($p < .001$ for both paths), and, in the combined model, principal leadership together with work motivation explained 99.6% of the variance in work discipline (Table 2).



Table 2. Summary of Regression and Simultaneous (ANOVA) Test Results

Model	R	R ²	F	df	Sig. (p)	Conclusion
Leadership -> Motivation (Path I)	-	-	-	-	0.000	Significant
Leadership -> Discipline (Path II)	-	-	-	-	0.000	Significant
Leadership + Motivation -> Discipline (Path III)	0.998	0.996	3750.632	2	0.000	Significant

The Path III model's sum of squares for regression was 674.373 with mean square 337.186 (df = 2), yielding $F = 3750.632$ at $p = 0.000$, well below the 0.05 threshold; the null hypothesis of no effect is therefore rejected for all three paths, and the study's hypothesis that principal leadership significantly affects science teachers' work motivation and work discipline, individually and simultaneously, is accepted.

DISCUSSION

Leadership emerged as a significant predictor of teacher work motivation ($p < .001$), consistent with prior evidence that communicative, exemplary, transformational principals cultivate teachers' work enthusiasm and institutional commitment, and with Self-Determination Theory's account of leaders as enablers of autonomy, competence, and relatedness. The regression coefficient for this path was, however, unexpectedly negative, contrary to the positive relationship theory and most prior studies predict. Given the pronounced restriction of range in the leadership variable (93.33% of teachers rating it very high) and the small sample size ($n = 30$), this sign reversal is interpreted as a statistical artefact rather than a genuine adverse effect. Leadership also significantly predicted work discipline ($p < .001$), reinforcing prior findings on leadership's role in shaping teacher discipline (Harahap et al., 2023) and consistent with Leader-Member Exchange theory, under which compliance grows from trust and moral commitment rather than external pressure. Discipline showed the narrowest score spread of the three variables ($SD = 6.47$), limiting the variable's statistical room to detect leadership's contribution; this modest effect is compatible with Priyatno's (2022) observation that discipline is shaped by multiple factors beyond leadership alone, such as ongoing supervision and school work culture. In the combined model, leadership together with motivation explained 99.6% of the variance in discipline ($F(2,27) = 3750.63$, $p < .001$), echoing evidence that leadership rarely operates alone in



shaping teacher behaviour (Jarir et al., 2022) and broadly consistent with other Indonesian studies reporting large combined contributions of leadership-related variables to teacher outcomes, of similar magnitude to the 66.4% reported by Bernia (2024). Even so, an R^2 this close to 1.0 in a small sample ($n = 30$) is flagged, following Ghazali (2021), as a probable sign of multicollinearity or overfitting, particularly because both predictors were measured through the same teachers' self-report at a single point in time (common-method variance) and both were concentrated in the high-to-very-high range. The model's strong fit should therefore be read as broadly supportive of, rather than a precise quantification of, leadership's role in shaping discipline. Taken together, these results affirm principal leadership as a central lever for cultivating a motivated and disciplined science-teaching workforce, a conclusion with plausible relevance to public school systems internationally that share Indonesia's structural challenge of building strong instructional leadership in decentralised, resource-constrained settings, while illustrating the analytic caution that small, single-source samples in educational-leadership research generally demand.

CONCLUSION

Principal leadership significantly predicted science teachers' work motivation and work discipline, both individually and in combination. Leadership significantly affected motivation, though with a counter-intuitive negative coefficient attributed to restricted score range rather than a genuine adverse relationship, and significantly affected discipline, consistent with Leader-Member Exchange and Hot-Stove-Rule accounts of voluntary, trust-based compliance. In the combined model, leadership together with motivation explained 99.6% of the variance in discipline, a near-perfect fit read cautiously as reflecting probable common-method variance and multicollinearity in a small, single-source sample rather than as a precise effect size. Overall, the findings affirm principal leadership as a central, internationally salient lever for building a motivated and disciplined science teaching workforce, while underscoring the methodological caution such small-sample, self-report designs require.

RECOMMENDATIONS

Principals are encouraged to prioritise motivation-building practices, recognition of achievement, and teacher involvement in decisions, since motivation appeared to be the more powerful lever on discipline than compliance monitoring alone. Authorities should direct



principal capacity-building toward motivational leadership alongside administrative supervision. Future research should employ larger, more heterogeneous samples to reduce restriction of range, test motivation as a mediating variable through path analysis or structural equation modelling, and include multicollinearity diagnostics when predictors are measured concurrently from a single source.

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