p-ISSN: 2809-7122
e-ISSN: 2809-7343
tadbiruna
Jurnal Manajemen Pendidikan Islam
LPPM IUQI
-KAMPUS ASWAJA-
Volume 6 Number 1 August 2026 http://jurnal.iuqibogor.ac.id

THE EFFECTS OF COLLABORATION EFFECTIVENESS, TRANSFORMATIONAL LEADERSHIP, AND ICT LITERACY ON TEACHER CREATIVITY: THE MEDIATING ROLE OF KNOWLEDGE SHARING

Fuzna Nur Aqilah[1], Soewarto Hardhienata[2], Eka Suhardi[3]
Universitas Pakuan, Bogor, Indonesia[123]
fuznanuraqilah@gmail.com

ABSTRACT

Teacher creativity plays an important role in fostering innovative and meaningful learning; however, strengthening teacher creativity remains a challenge in Private Islamic Elementary Schools (Madrasah Ibtidaiyah Swasta) in Bogor City, Indonesia. This study aims to develop and examine a model for strengthening teacher creativity through the POP-SDM (Modeling and Optimization of Management Resource Strengthening) approach. A sequential exploratory mixed-method design was employed, beginning with a qualitative phase to identify the dominant factors associated with teacher creativity, followed by a quantitative survey involving 248 teachers and path analysis, and subsequently supported by SITOREM analysis to identify priority areas for improvement. The findings indicate that collaboration effectiveness, transformational leadership, ICT literacy, and knowledge sharing contribute positively and significantly to teacher creativity. Among these factors, knowledge sharing emerges as the most influential factor and also plays an important mediating role in strengthening the contribution of collaboration effectiveness, transformational leadership, and ICT literacy to teacher creativity. SITOREM analysis further identifies several priority indicators that require systematic improvement and can serve as a foundation for developing targeted strategies. The study concludes that strengthening teacher creativity requires an integrated approach that simultaneously develops collaborative practices, transformational leadership, ICT literacy, and knowledge-sharing processes, with knowledge sharing functioning as a central mechanism for fostering a more creative and innovative teaching environment..

Keywords: *Teacher creativity; Knowledge sharing; Collaboration effectiveness; Transformational leadership; POP-SDM*

INTRODUCTION

National education has the noble goal of developing students' potential so that they become people of faith, piety, and noble character healthy, knowledgeable, skilled, creative, and independent as well as democratic and responsible citizens (Law of the Republic of Indonesia No. 20 of 2003). To achieve these goals, an educational system is needed that can create a learning process that is enjoyable, stimulating, and challenging. In this context, teachers play a central role. The success of a learning process is largely determined by the quality of teachers as professional educators tasked with educating, teaching, guiding, directing, training, assessing, and evaluating students (Law of the Republic of Indonesia No. 14 of 2005). Professional teachers are required to possess high creativity in planning and implementing quality learning, especially since they interact directly with students on a daily basis. Teacher creativity is key to realizing innovative and

adaptive learning that meets the needs of the times, as emphasized by Marie (2022), who states that creativity involves producing new works that are appropriate to the context in which they are created.

Ministry of Basic and Secondary Education Regulations No. 13 of 2025 and No. 11 of 2025 regarding curriculum structure adjustments and the reorganization of teachers' workloads provide greater flexibility for teachers to develop more creative teaching methods. However, the challenges faced by educational institutions are far from simple. The main challenges related to creativity are the level of teachers' knowledge regarding creative teaching methods, learning strategies to foster students' creativity, and an understanding of the concept of creativity itself. Creativity is a vital aspect of human development, and educational institutions play a strategic role in nurturing students' creative talents and fostering their ability to think creatively. Unfortunately, based on a preliminary survey conducted from November 30 to December 3, 2023, involving 30 teachers from 5 Madrasah Ibtidaiyah in Bogor City, it was found that teachers' creativity still needs to be significantly improved. The survey results indicate that 49% of teachers are not yet optimal in generating new ideas, 55% are not yet maximizing the use of varied learning media, 42% still struggle to serve as an inspiration for students, and 60% have not yet provided optimal learning motivation.

Previous studies have made important contributions to understanding teacher creativity. Skrbinjek, Krabonja, Abersek, and Flogie (2024) developed an innovative training model emphasizing knowledge management to enhance teacher creativity, with results showing that the model effectively encourages teachers toward innovative behavior. Gustari (2023) found that teachers' creativity in enhancing students' interest in reading can be realized through the design of instructional programs, the provision of motivation, the use of media, and the development of innovations. Research by Resti and Alizamar (2019) indicates that teachers' creativity in integrated thematic learning needs to be enhanced through an understanding of instructional models aligned with the 2013 curriculum and contemporary developments. Meanwhile, Hidayah (2020) highlights teachers' creativity in addressing learning difficulties through varied methods, simple media, and creative classroom management. Dewantara *et al*. (2022) indicate that teachers play a dominant role in utilizing IT-based learning media; however, creativity in providing media that aligns with students' learning styles remains suboptimal.

Research on the effectiveness of collaboration reveals a strong link to teacher creativity. Andriastuti (2024), in her qualitative study, found that a culture of collaboration can serve as a means to enhance teacher creativity, particularly in teaching, as various forms of collaboration enrich teachers in terms of ideas, strategies, selection of learning environments, and problem-solving approaches in the classroom. Khosiah (2021) also confirmed that collaboration between parents and teachers in fostering student creativity is achieved through intensive communication, home visits, and routine evaluations. Hidayat (2022), in his experimental study, found that there is an interaction between cooperative learning models and creativity regarding learning outcomes. These findings indicate that the effectiveness of collaboration is a crucial factor whose impact on teacher creativity warrants further in-depth examination.

Transformational leadership has also been shown to influence teacher creativity. Londongallo and Tung (2025) found that transformational leadership has a positive but

weak relationship with teacher creativity, mediated by pedagogical competence. In his correlational study, Rais (2023) demonstrated a significant positive relationship between transformational leadership and teacher creativity, suggesting that strengthening transformational leadership can enhance teacher creativity. Subekti (2023) also confirmed the existence of a significant positive relationship between transformational leadership and teacher creativity. These findings indicate that transformational leadership implemented by school principals plays a strategic role in fostering teacher creativity.

Information and communication technology (ICT) literacy is a crucial variable in the context of the current digital era. Marlinawati (2024), in her literature review, demonstrates that ICT literacy can assist teachers in developing more interactive instructional materials using technology, such as multimedia and simulations, which in turn can enhance teacher creativity. Sanggorani (2025) in his quantitative study demonstrated that ICT literacy has a positive effect on teacher creativity with at-calculated value of 7.065, which is greater than the t-table value, and a significance level of 0.001. Yuniarti (2024) also found that teachers' creativity in utilizing technology-based learning media can be observed through aspects of fluency of thought, flexibility of thought, originality, and elaboration. These findings underscore the importance of ICT literacy as a key determinant of teachers' creativity.

Knowledge sharing also plays a role that is no less important. Lee (2018) states that knowledge sharing is a means to achieve goals and can enhance an organization's sustainable competitiveness. Hikmah (2021), in her qualitative study, found that the establishment of structured and continuous forums for knowledge sharing resulted in proven increases in teacher creativity. Nursyirwan (2025) demonstrated a significant positive relationship between rewards and organizational creativity, with knowledge-sharing acting as a mediator. Khuanefa and Pratama (2024), although they found differing results regarding the impact of knowledge-sharing, still acknowledge that knowledge-sharing is a factor that must be considered in the context of enhancing teacher creativity.

In addition to direct effects, knowledge sharing also acts as a mediating variable that strengthens the relationship between independent variables and teacher creativity. Ahmed, Bajwa, and Shahzad (2016) found a significant and positive impact of trust, teamwork, and empowerment on knowledge sharing. Allameh, Sarand, and Arian (2015) demonstrated a positive relationship between transformational leadership and knowledge sharing, with a standardized coefficient of 0.96 and a significant t-value of 15.09. Prasteyaningsih, Raharjo, and Afrianty (2020) also confirmed that transformational leadership significantly influences knowledge sharing with a path coefficient of 0.430. Meanwhile, Afifah (2019) indicated that the use of ICT in knowledge sharing is at a good level, and Saragih (2015) demonstrated that the use of information technology significantly influences students' knowledge sharing. These findings suggest that knowledge sharing functions as a crucial mechanism that mediates the influence of other variables on teacher creativity.

The five previous studies on teacher creativity have several shortcomings or gaps that have not been comprehensively explored. First, research focusing on the mechanisms of Human Resource Management development programs as triggers for creativity remains very limited. Second, the holistic integration of teacher creativity with school management resources has not been extensively examined. Third, there is minimal discussion regarding

a continuous competency system that views the outcomes of teacher creativity as part of a human resource development ecosystem. Fourth, there has been no research that systematically examines the mediating effect of knowledge sharing in the relationship between collaboration effectiveness, transformational leadership, and ICT literacy on teacher creativity within an integrated model. Thus, research examining teacher creativity from the perspective of strengthening management resources has become highly urgent.

The POP-SDM (Modeling and Optimization of Management Resource Strengthening) method offers a holistic approach that can address this gap. This method combines qualitative and quantitative approaches to analyze and optimize variables in human resource management (Setyaningsih, 2022). POP-SDM enables researchers to explore the factors that have a positive and dominant influence on teacher creativity at the research locus through a qualitative approach, then test the constructed constellation model through a quantitative approach, and finally determine the optimal solution through SITOREM analysis (Setyaningsih & Hardhienata, 2022). Hardhienata (2017) explains that SITOREM is a scientific method used to identify variables for conducting operations research in the field of educational management. Previous studies, such as those conducted by Nelfuad (2021) on teacher performance innovation, Gunadi (2024) on supervisory oversight, and Heriyanto (2024) on teacher motivation, have demonstrated the effectiveness of this method in the context of educational management.

This study aims to develop a model of the constellation of influences among variables in enhancing teacher creativity, identify strategies for enhancing teacher creativity, determine how to implement these strategies, and determine the optimal solution for enhancing teacher creativity using SITOREM analysis. Operationally, this study also aims to test the direct influence of the effectiveness of collaboration, transformational leadership, information and communication technology literacy, and knowledge sharing on teacher creativity. Additionally, this study examines the indirect influence of these three variables on teacher creativity through knowledge sharing. Thus, the research questions to be addressed are: (1) What is the model of the inter-variable influence constellation in enhancing teacher creativity? (2) What are the strategies for enhancing teacher creativity? (3) How can these strategies for enhancing teacher creativity be implemented? (4) What is the optimal solution for enhancing teacher creativity using SITOREM analysis?

This study is expected to provide theoretical contributions through the development of a theory of teacher creativity and the factors influencing it, as well as practical contributions to the Ministry of Education, madrasah principals, and teachers in efforts to enhance creativity within the madrasah environment. The novelty of this study lies in the development of a model of the constellation of influences among variables related to enhancing teacher creativity using the POP-SDM method, strategies for enhancing teacher creativity, methods for implementing these strategies, and optimal solutions for enhancing teacher creativity. Thus, this study is expected to serve as a basis for further research on other variables that have a positive and dominant influence on enhancing teacher creativity in various educational contexts.

RESEARCH METHODOLOGY

This study employs the POP-SDM (Human Resource Management Strengthening Modeling and Optimization) method, which is a *sequential* exploratory method that integrates qualitative and quantitative approaches within a single, comprehensive research framework (Setyaningsih, 2022). This method is specifically designed to address the limitations of conventional research, which typically stops at identifying relationships or influences between variables without providing specific operational recommendations. POP-SDM consists of seven main stages, namely: (1) determination of the *research* theme, (2) pre-modeling through qualitative exploration, (3) modeling in the form of variable constellation development, (4) *pre-model testing* through expert verification, (5) model *testing* through quantitative research, (6) model *optimization* through SITOREM analysis, and (7) *optimal* recommendations in the form of an action plan (Setyaningsih & Hardhienata, 2022). This approach allows researchers not only to test hypotheses statistically but also to generate strategies and methods for improving the dependent variable based on a comprehensive analysis of indicators.

The study began with a qualitative research phase conducted at five private elementary madrasahs in the city of Bogor, namely MIS Nurul Yaqin in North Bogor District, MIS Manba'ul Ihsan in Tanah Sereal District, MIS Al Falak in West Bogor District, MIS Plus Al Ihsan in West Bogor District, and MIS Al Falak in South Bogor District. This qualitative research involved 23 teachers as informants, selected based on criteria of competence and a minimum of five years of teaching experience. Data collection was conducted through in-depth interviews and documentation during the period from November 2023 to November 2025. The data obtained were analyzed through data reduction, coding, and tabulation to identify the dominant variables influencing teacher creativity. From this coding process, four most dominant variables were identified: effectiveness of collaboration, transformational leadership, information and communication technology literacy, and knowledge sharing. These variables were then organized into a research constellation model verified by experts to ensure construct validity before proceeding to the quantitative research phase.

The quantitative research was conducted among permanent teachers at private elementary madrasahs throughout the city of Bogor, spread across 55 madrasahs with a total population of 652 teachers. This population was determined based on data from the Bogor City Ministry of Religious Affairs' Madrasah Operator as of May 19, 2025. The sample size was calculated using the Taro Yamane formula with a precision level of 5% and a confidence level of 95%, resulting in a minimum sample size of 248 teachers. The sampling technique used *multistage random sampling* with the following stages: first, determining the sample proportion per subdistrict based on the number of teachers in each subdistrict; second, determining the sample proportion per madrasah proportionally; and third, selecting respondents using simple random sampling from each madrasah. Proportional sample determination was performed using the formula n = (number of teachers per madrasah/total population) × total sample, thereby obtaining a representative sample size from each madrasah. For instrument pilot testing, 30 teachers were selected from outside the research sample to test the validity and reliability of the instrument before its use on the main sample.

The research instrument was developed based on the operational definitions of each

variable. The variable of teacher creativity (Y) was measured using four indicators: generating new ideas, using varied learning media, serving as an inspiration for students, and providing learning motivation. The collaborative effectiveness variable (X1) was measured using six indicators: effective communication, coordination in lesson planning, mutual support and assistance, commitment to improving educational quality, joint decision-making, and job satisfaction and motivation. The transformational leadership variable (X2) is measured using five indicators: exemplary conduct and work ethic, serving as a role model for members, fostering hope and optimism in achieving goals, fostering critical thinking and innovation, and supporting members' personal development. The ICT literacy variable (X3) is measured using six indicators via a multiple-choice proficiency test covering basic ICT understanding, software usage, hardware usage, ICT integration into the learning process, the use of the internet as an information source, and the use of ICT to enhance teaching effectiveness. The knowledge sharing variable (X4) is measured using six indicators: willingness to share knowledge, frequency of interaction in knowledge sharing, use of technology in knowledge sharing, collaboration in developing instructional materials, openness to new ideas, and the impact of knowledge sharing on teacher performance.

Validity testing of the instrument for variables measured using behavioral scales (teacher creativity, collaboration effectiveness, transformational leadership, and knowledge sharing) employed the Pearson Product-Moment correlation technique, with items deemed valid if the calculated r > the table r (0.361) or the significance level < 0.05. The validity test results showed that out of 40 items for teacher creativity, 37 items were deemed valid; out of 40 items for collaboration effectiveness, 36 items were valid; out of 40 items for transformational leadership, 36 items were valid; and out of 40 items for knowledge sharing, 37 items were valid. The reliability test using Cronbach's Alpha yielded reliability coefficients of 0.917 for teacher creativity, 0.907 for collaboration effectiveness, 0.922 for transformational leadership, and 0.919 for knowledge sharing. For the ICT literacy variable, measured via a proficiency test, the validity test using the point-biserial correlation technique yielded 34 valid items out of the 40 tested, and the reliability test using the Kuder-Richardson 21 (KR-21) formula resulted in a reliability value of 0.917. All reliability coefficients were above 0.70, so the instrument was deemed reliable and suitable for use in collecting research data.

The data analysis techniques in this study consisted of three main stages: descriptive statistical analysis, analysis of prerequisites, and inferential statistics. Descriptive statistical analysis was conducted to describe the data for each variable, including the maximum value, minimum value, mean, median, mode, standard deviation, variance, score range, and frequency distribution, presented in the form of tables and histograms. Prerequisite tests for analysis include a normality test of errors using the Liliefors technique, with the criterion that data are normally distributed if the significance value is > 0.05; a homogeneity of variance test using Bartlett's method, with the criterion that data are homogeneous if the calculated χ^2 is < the table χ^2; and a linearity and regression significance test using ANOVA, with the criterion for a linear relationship if the significance value *for deviation from linearity* is > 0.05. All of these prerequisite tests were conducted to ensure that the data met the classical assumptions before hypothesis testing

was performed using parametric statistics.

Hypothesis testing was performed using *path* analysis with the assistance of SPSS 21.0 for Windows. Path analysis was used to test the direct and indirect effects between variables in the constructed structural equation model. The path analysis model is divided into two substructures: Substructure 1 illustrates the effects of collaboration effectiveness (X1), transformational leadership (X2), ICT literacy (X3), and knowledge sharing (X4) on teacher creativity (Y); Substructure 2 describes the influence of collaboration effectiveness (X1), transformational leadership (X2), and ICT literacy (X3) on knowledge sharing (X4). The significance of direct effects was tested by comparing the calculated t-value with the critical t-value at a significance level of α = 0.05. Indirect effects were tested using *the Sob*el *test* to determine whether the knowledge sharing variable acted as a significant mediator in the relationship between the independent variables and teacher creativity.

The final stage of data analysis involved the use of the SITOREM method (*Scientific Identification Theory to Conduct Operation Research in Education Management*) developed by Hardhienata (2017). The SITOREM analysis aims to identify indicators for each variable that need improvement (priority) and those that need to be maintained or developed, based on three main criteria: (1) the strength of the influence between variables obtained from the path analysis results, (2) expert-based weighting of indicators according to *the cost*, *benefit*, *urgency*, and *importance* (CBUI) aspects, and (3) the average score of indicators from field research. The indicator weighting was conducted by a professor of educational management who assigned scores to each indicator on a 1–5 scale for the four CBUI aspects. The results of the SITOREM analysis were then used to formulate a priority order for addressing weak indicators as the basis for developing *an action plan* to enhance teacher creativity in private elementary madrasahs in Bogor City.

RESULTS AND DISCUSSION

This study was conducted among 248 permanent teachers at private elementary schools in Bogor City. The results of the descriptive statistical analysis indicate that the teacher creativity variable (Y) has a mean score of 140.68 with a standard deviation of 20.276, a minimum score of 99, and a maximum score of 185. The frequency distribution showed that 97 teachers (39%) fell into the high creativity category, 61 (25%) into the moderate category, and 90 (36%) into the low category. Analysis by indicator shows that the indicator "serving as an inspiration for students" had the highest mean score (4.18), followed by "generating new ideas" (4.08) and "providing learning motivation" (4.07), while the indicator "varied learning media" had the lowest score (2.96).

Table 1. Average Scores of Teacher Creativity Indicators

Indicator	Average Score
Serving as an Inspiration for Students	4.18
Generating New Ideas	4.08
Providing Motivation to Learn	4.07
Varied Learning Media	2.96

The cooperation effectiveness variable (X1) has an average score of 141.03 with a standard deviation of 19.385. Analysis by indicator shows that the indicator of satisfaction

with work motivation has the highest score (4.43), followed by coordination in learning planning (4.30) and effective communication (4.16), while the indicator of support and mutual assistance has the lowest score (3.09). The transformational leadership variable (X2) has a mean score of 139.68 with a standard deviation of 20.139. The role model for members indicator has the highest score (4.56), followed by exemplary behavior and work ethic (4.46), while the critical thinking and innovation facilitation indicator has the lowest score (3.10). The ICT literacy variable (X3), measured through a proficiency test, has a mean score of 77.97 with a standard deviation of 11.116. The basic ICT understanding indicator had the highest score (94.3), followed by software usage (81.4) and hardware usage (80.1), while the indicator for using the internet as an information source had the lowest score (58.7). The knowledge sharing variable (X4) had a mean score of 142.77 with a standard deviation of 19.773. The willingness to share knowledge indicator had the highest score (4.60), followed by the frequency of interaction in knowledge sharing (4.27) and openness to new ideas (4.11), while the indicator of collaboration in instructional materials had the lowest score (3.05).

Prerequisite tests for the analysis showed that all data met the assumptions of normality, homogeneity, and linearity. The results of the normality test using *the Kolmogorov-Smirnov test* showed significance values for all variable pairs ranging from 0.053 to 0.200 (> 0.05), indicating that the data are normally distributed. The homogeneity test using Bartlett's method yielded calculated χ^2 values smaller than the table χ^2 values for all data sets, thus confirming the data's homogeneity. The linearity test showed significance values for *deviation from linearity* in all regression equations ranging from 0.055 to 0.721 (> 0.05), indicating that the relationships among variables are linear.

The results *of the path analysis* on substructure 1 indicate that all independent variables have a positive and significant effect on teacher creativity. The path coefficient for the effectiveness of cooperation (X1) on teacher creativity (Y) is $\beta y1 = 0.202$ (t = 2.681; p = 0.008). The path coefficient of transformational leadership (X2) on teacher creativity (Y) is $\beta y2 = 0.120$ (t = 2.057; p = 0.041). The path coefficient of ICT literacy (X3) on teacher creativity (Y) is $\beta y3 = 0.153$ (t = 2.722; p = 0.007). The path coefficient of knowledge sharing (X4) on teacher creativity (Y) is $\beta y4 = 0.483$ (t = 6.409; p = 0.000). The coefficient of determination (R^2) for substructure 1 is 0.857, meaning that the four independent variables collectively account for 85.7% of the variation in teacher creativity.

Table 2. Direct Effect Path Coefficients

Effect	Path Coefficient	Std. Error	T	Sig.
X1 → Y	0.202	0.079	2.681	0.008
X2 → Y	0.120	0.059	2.057	0.041
X3 → Y	0.153	0.103	2.722	0.007
X4 → Y	0.483	0.082	6.008	0.000

The results of the path analysis on substructure 2 indicate that cooperation effectiveness (X1), transformational leadership (X2), and ICT literacy (X3) have a positive and significant effect on knowledge sharing (X4). The path coefficient of X1 on X4 is βx41 = 0.441 (t = 8.327; p = 0.000). The path coefficient of X2 on X4 is βx42 = 0.261 (t = 6.013; p = 0.000). The path coefficient of X3 on X4 is βx43 = 0.295 (t = 7.251; p = 0.000). The coefficient of determination (R^2) for substructure 2 is 0.909, meaning that the three independent variables collectively contribute 90.9% to the variation in knowledge sharing.

The results of the indirect effect test indicate that knowledge sharing (X4) mediates the effect of collaboration effectiveness (X1) on teacher creativity (Y) with an indirect effect of 0.213, which is greater than the direct effect (0.202). The results of the Sobel test yielded a t-value of 4.865 (p < 0.05), indicating significant mediation. Knowledge sharing also mediates the effect of transformational leadership (X2) on teacher creativity (Y) with an indirect effect of 0.126, which is greater than the direct effect (0.120). The Sobel test yielded a t-value of 4.209 (p < 0.05), indicating significant mediation. Meanwhile, knowledge sharing mediates the effect of ICT literacy (X3) on teacher creativity (Y) with an indirect effect of 0.142, slightly smaller than its direct effect (0.153). The Sobel test yielded a t-value of 4.624 (p < 0.05), indicating that mediation remains significant even though it is partial.

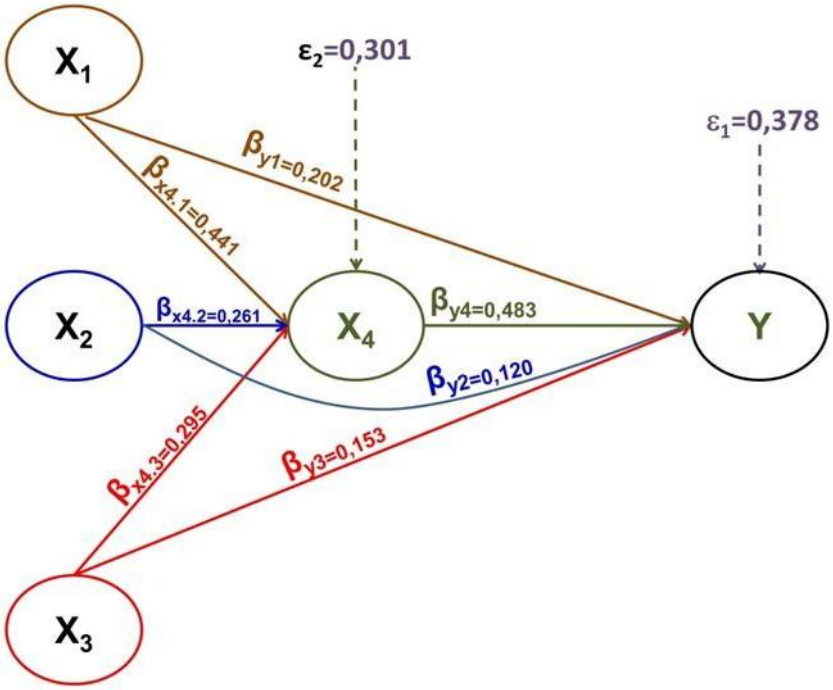

Figure 1. Path Analysis Model of Intervariable Effects

Based on the results of the path analysis conducted, a path diagram was constructed as presented in Figure 1. This diagram illustrates the causal relationships among the research variables along with the standard path coefficients and residual coefficients. The exogenous variables consist of collaboration effectiveness (X_1), transformational leadership (X_2), and ICT literacy (X_3), while the endogenous variables are *knowledge*

sharing (X_4) and teacher creativity (Y). The residual coefficient (ε_1) in the structural model of teacher creativity is 0.378, meaning that 37.8% of the variation in teacher creativity is explained by other variables outside the model. The residual coefficient (ε_2) in the structural model of *knowledge sharing* is 0.301, indicating that 30.1% of the variation in *knowledge sharing* is influenced by factors outside the four independent variables.

Test results indicate that all path coefficients are significant at the $\alpha = 0.05$ level. *Knowledge sharing* (X_4) has the strongest direct effect on teacher creativity ($\beta = 0.483$; $p < 0.001$). Collaboration effectiveness (X_1) exerts a direct effect of 0.202 ($p = 0.008$) and an indirect effect through X_4 of $0.441 \times 0.483 = 0.213$. Transformational leadership (X_2) has a direct effect of 0.120 ($p = 0.041$) and an indirect effect through X_4 of $0.261 \times 0.483 = 0.126$. ICT literacy ($X_3$) has a direct effect of 0.153 ($p = 0.007$) and an indirect effect through X_4 of $0.295 \times 0.483 = 0.142$. Thus, *knowledge sharing* acts as a mediating variable that strengthens the influence of the three independent variables on teacher creativity, particularly for the effectiveness of cooperation and transformational leadership, whose indirect effects are greater than their direct effects.

Visually, this model confirms that improvements in teacher creativity depend not only on the direct influence of each variable but also on how strongly these variables can foster *knowledge sharing* within the madrasah's environment. The established path structure indicates that efforts to strengthen the effectiveness of collaboration, transformational leadership, and ICT literacy must be directed toward enhancing the quality of knowledge sharing as a primary prerequisite for improving teacher creativity.

The SITOREM analysis yields a prioritized sequence of indicators that need improvement and those that need to be maintained or developed. The ten indicators prioritized for immediate improvement are: (1) collaboration on instructional content, (2) the impact of knowledge sharing on teacher performance, (3) support and mutual assistance, (4) joint decision-making, (5) use of the internet as an information source, (6) integration of ICT into the learning process, (7) use of ICT to enhance teaching effectiveness, (8) strengthening of hope and optimism in achieving goals, (9) fostering critical thinking and innovation, and (10) diverse learning media. Meanwhile, the other 17 indicators were deemed necessary to retain or develop because they already had high average scores and were considered important by the experts.

The first finding of this study indicates that knowledge sharing has the most dominant influence on teacher creativity, with a path coefficient of 0.483 and a contribution of 83.8%. The implication of this finding is that the more intensively teachers share knowledge, experiences, and learning innovations with their peers, the higher the creativity demonstrated in the learning process. This finding aligns with the results of Hikmah's (2021) study, which demonstrated that the implementation of structured and sustained knowledge-sharing forums led to a significant increase in teacher creativity over a two-month period. This also reinforces Lee's (2018) view that knowledge sharing is a means to achieve organizational goals and can enhance sustainable competitiveness. In the context of madrasahs, knowledge sharing serves as a crucial mechanism enabling teachers to learn from each other's best practices, thereby allowing new ideas and learning innovations to develop organically. Consequently, madrasah principals must create structured time and space for teachers to share knowledge, whether through formal forums such as *lesson study* or informal ones like professional learning communities.

The second finding indicates that the effectiveness of collaboration significantly influences teacher creativity both directly (β = 0.202) and indirectly through knowledge sharing (0.213). This finding confirms that effective collaboration among teachers, parents, and students not only has a direct impact on enhancing creativity but is also reinforced through the mechanism of knowledge sharing. These results align with Andriastuti's (2024) research, which found that a culture of collaboration can serve as a means to enhance teachers' creativity in teaching, as collaboration enriches teachers in terms of ideas, strategies, selection of learning environments, and approaches to problem-solving in the classroom. Khosiah (2021) also confirms that parent-teacher collaboration in fostering student creativity is achieved through intensive communication and routine evaluation. This finding enriches the theory of collaboration effectiveness by demonstrating that collaboration is not merely instrumental in achieving shared goals but also functions as a vehicle for collective learning that stimulates individual creativity. In the context of madrasahs, the effectiveness of collaboration indicated by high scores in work motivation (4.43) and coordination in lesson planning (4.30) needs to be maintained, while indicators of support and mutual assistance (3.09) and joint decision-making (3.39) require prioritized improvement.

The third finding reveals that transformational leadership has a significant effect on teacher creativity (β = 0.120) and this effect is strengthened through the mediation of knowledge sharing (0.126). This finding aligns with Rais's (2023) research, which demonstrated a significant positive relationship between transformational leadership and teacher creativity. Londongallo and Tung (2025) also found that although the influence of transformational leadership on creativity is relatively weak, it remains present and serves as a crucial factor in the context of enhancing pedagogical competence. These findings also support the assertion by Bass and Riggio (2005: 68) that transformational leaders inspire their followers to achieve higher performance, transcend personal interests, and work toward organizational goals. In this study, the indicators of serving as a role model for members (4.56) and exemplary conduct and work ethic (4.46) emerged as the primary strengths of transformational leadership in madrasahs. However, the indicators of fostering hope and optimism in achieving goals (3.11) as well as facilitating critical thinking and innovation (3.10) remain weaknesses requiring improvement. This indicates that madrasah principals need to be more proactive in providing inspirational motivation and encouraging teachers to think critically and innovatively in developing instruction.

The fourth finding indicates that ICT literacy has a significant effect on teacher creativity (β = 0.153) and also through the mediation of knowledge sharing (0.142). This finding aligns with Sanggorani's (2025) research, which demonstrated that ICT literacy positively influences teacher creativity with a calculated t-value of 7.065, which is greater than the critical t-value. Marlinawati (2024) also emphasizes that technological literacy enables teachers to access various digital tools and resources that can be used to develop more innovative teaching methods, thereby enhancing teacher creativity. In this study, the indicator of basic ICT understanding (94.3) indicates that madrasah teachers possess good theoretical knowledge of ICT. However, the indicators for utilizing the internet as an information source (58.7), integrating ICT into the learning process (3.56), and using ICT to enhance teaching effectiveness (3.33) remain low. This gap indicates the presence of *a knowing-doing gap*, meaning that teachers know about ICT but are not yet able to apply it

optimally in learning. This aligns with the findings of Dewantara *et al*. (2022) that teachers' creativity in providing varied teaching media appropriate to students' needs is still not optimal because teachers do not yet possess in-depth pedagogical knowledge regarding the selection of learning media.

The fifth and most significant finding is the role of knowledge sharing as a mediating variable that strengthens the influence of collaboration effectiveness, transformational leadership, and ICT literacy on teacher creativity. The Sobel test results indicate that mediation is significant for all three pathways. This finding enriches knowledge-sharing theory by demonstrating that knowledge sharing functions not only as an independent variable but also as a mechanism that transforms organizational inputs into outputs of teacher creativity. This finding aligns with the research by Ahmed, Bajwa, and Shahzad (2016), who found a significant and positive impact of teamwork on knowledge sharing. Allameh, Sarand, and Arian (2015) also demonstrated a positive relationship between transformational leadership and knowledge sharing with a standardized coefficient of 0.96. Prasteyaningsih, Raharjo, and Afrianty (2020) confirmed that transformational leadership significantly influences knowledge sharing with a path coefficient of 0.430. Meanwhile, Afifah (2019) indicated that the use of ICT in knowledge sharing is at a good level. This finding confirms that knowledge sharing functions as *an engine* that transforms various organizational capitals into teacher creativity.

The findings of the SITOREM analysis provide significant practical contributions. The first priority that needs improvement is the collaboration indicator regarding instructional materials. This indicates that madrasah teachers still face difficulties in developing instructional materials collaboratively. This finding is relevant to the conditions in madrasahs, which generally have limited resources, making collaboration the key to the efficiency and effectiveness of learning development. The second priority is the impact of knowledge sharing on teacher performance, which shows that although knowledge sharing is practiced, its impact on performance improvement is not yet optimal. The third priority is support and mutual assistance, indicating that individualistic attitudes still persist among madrasah teachers. This finding aligns with the results of a preliminary survey showing that 55% of teachers are not yet optimal in using varied learning media and 60% are not yet maximizing their efforts in providing learning motivation. Thus, teacher creativity enhancement programs need to focus on improving these priority indicators.

Theoretically, this study develops a teacher creativity model that integrates the effectiveness of collaboration, transformational leadership, ICT literacy, and knowledge sharing into a single, cohesive framework. This model has a very high explanatory power (R^2 = 0.857), meaning that nearly 86% of the variation in teacher creativity can be explained by these four variables. This finding also indicates that knowledge sharing is not only an independent variable but also an important mediating variable, making the developed model more complex than previous models that only tested direct relationships between variables. Practically, this research provides guidance for madrasah principals and education administrators to design targeted interventions. Prioritizing improvements in the indicators identified through the SITOREM analysis enables more efficient resource allocation, as efforts are focused on the weakest indicators that carry the highest weight.

The implications of this study highlight the need for a cultural transformation in

schools from an individualistic culture toward a collaborative one through the strengthening of knowledge sharing. Madrasah principals need to adopt a transformational leadership style that not only serves as a role model but also provides intellectual stimulation and inspirational motivation. ICT literacy improvement programs are not sufficient if they merely provide technical training; they must also equip teachers with the ability to integrate ICT into learning in a creative and contextual manner. This study has a limitation in that only four independent variables were examined, whereas the initial identification identified ten variables suspected of influencing teacher creativity. Furthermore, this study was conducted exclusively among teachers at private elementary madrasahs in Bogor City; therefore, generalizing the findings to different contexts requires caution. Future research could test this model across different educational levels and incorporate additional variables such as organizational culture, teacher empowerment, and work motivation to gain a more comprehensive understanding of the determinants of teacher creativity.

CONCLUSION

This study successfully developed and tested a model for enhancing the creativity of teachers at private elementary madrasahs in Bogor City using the POP-SDM approach. The results of the model testing indicate that the effectiveness of collaboration, transformational leadership, information and communication technology literacy, and *knowledge sharing* simultaneously have a positive and significant effect on teacher creativity, contributing 85.7% to the total effect. A key finding of this study is that *knowledge sharing* has the most dominant influence on teacher creativity, both directly ($\beta = 0.483$) and as a mediating variable that strengthens the influence of the effectiveness of collaboration (indirect effect 0.213 > direct effect 0.202), transformational leadership (indirect effect 0.126 > direct effect 0.120), and ICT literacy (indirect effect 0.142) on teacher creativity. This model confirms that enhancing teacher creativity cannot be achieved in isolation but requires the integrated strengthening of these four variables, with *knowledge sharing* serving as the central mechanism that transforms various organizational capitals into creative outputs.

Based on the SITOREM analysis, ten indicators were identified as priorities for improvement to enhance teacher creativity, namely collaboration in instructional content, the impact of *knowledge sharing* on teacher performance, support and mutual assistance, joint decision-making, the use of the internet as an information source, the integration of ICT into the learning process, the use of ICT to enhance teaching effectiveness, the reinforcement of hope and optimism in achieving goals, the fostering of critical thinking and innovation, and the use of diverse learning media. Meanwhile, the key indicators that need to be maintained and developed include willingness to share knowledge, frequency of interaction in knowledge sharing, openness to new ideas, use of technology in *knowledge sharing*, job satisfaction and motivation, coordination of lesson planning, effective communication, commitment to improving educational quality, basic understanding of ICT, as well as the exemplary leadership and work ethic of the madrasah principal.

The follow-up recommendation based on this research is the need to implement a structured intervention program focused on improving the priority indicators as identified

by the SITOREM analysis. Such programs could include collaborative training in instructional material development, workshops on enhancing the impact of *knowledge sharing* on performance, transformational leadership training emphasizing the reinforcement of expectations and the facilitation of critical thinking, and ICT literacy training oriented toward the integration of technology in learning and the utilization of the internet as an information source. Further research is needed to test the effectiveness of these intervention models through experimental research or *action research*. Additionally, further research is needed to test this model at different educational levels, integrate other variables identified in the preliminary study such as organizational culture, teacher empowerment, and work motivation and expand the scope of the research to test the model's generalizability in broader contexts.

BIBLIOGRAPHY

Afifah, F. U. (2019). Penggunaan teknologi informasi dan komunikasi (TIK) dalam *knowledge sharing* pada PT. Indonesia Villa Jaya Batam. *Journal of Applied Informatics and Computing*, 3 (2), 58–62. https://doi.org/10.30871/jaic.v3i2.1688

Ahmed, F., Bajwa, S. H., & Shahzad, K. (2016). The role of collaborative culture in knowledge sharing and creativity among employees. *Journal of Commerce and Social Science*, 10 (2), 335–358. https://doi.org/10.13140/RG.2.2.17274.31687

Allameh, S. M., Sarand, F. T., & Arian, A. (2015). Assessing the impact of transformational leadership on knowledge sharing. *International Research Journal of Management Science*, 3 (5), 213–220.

Andriastuti, A. (2024). Budaya kolaborasi sebagai cara untuk mengembangkan kreativitas guru dalam mengajar. *Jurnal Tahsinia*, 5 (8). https://doi.org/10.57171/jt.v5i8.461

Bass, B. M., & Riggio, R. R. (2005). *Transformational leadership* (2nd ed.). Lawrence Erlbaum Associates.

Dewantara, A. H., *et al*. (2022). *Laporan evaluasi diri Kementerian Agama RI akreditasi program studi pendidikan guru madrasah ibtidaiyah (PGMI)*. Kementerian Agama RI.

Gunadi, G. (2024). Modeling and optimization of principal supervision (Empirical study using the POP-SDM approach at vocational high schools in Bogor Regency). *Edunity: Social and Educational Studies Journal*, 3 (9). https://doi.org/10.57096/edunity.v3i9.306

Gustari, N. (2023). Kreativitas guru kelas dalam meningkatkan minat belajar membaca siswa kelas III di Madrasah Ibtidaiyah. *Awwaliyah: Jurnal PGMI*, 6 (1). https://doi.org/10.58518/awwaliyah.v6i1.1713

Hardhienata, S. (2017). The development of scientific identification theory to conduct operation research in education management. *IOP Conference Series: Materials Science and Engineering*, 166 (1), 012007. https://doi.org/10.1088/1757-899X/166/1/012007

Heriyanto. (2024). Modeling and optimization of teacher professional commitment strengthening. *Asian Journal of Management Entrepreneurship and Social Science*, 4 (2). https://doi.org/10.63922/ajmesc.v4i02.776

Hidayah, C. N. (2020). *Kreativitas guru dalam mengatasi kesulitan belajar pada pembelajaran tematik di kelas V Madrasah Ibtidaiyah Negeri 1 Tulungagung* (Skripsi S1). IAIN Sayyid Ali Rahmatullah.

Hidayat, D. (2022). Pengaruh model pembelajaran kooperatif dan kreativitas terhadap hasil belajar IPS di sekolah dasar. *Jurnal Basicedu*, 6 (5). https://doi.org/10.31004/basicedu.v6i5.3587

Hikmah, N. (2021). Metode agile untuk meningkatkan kreativitas guru melalui berbagi pengetahuan (*knowledge sharing*). *Jurnal Instruksional*, 3(1). https://doi.org/10.24853/instruksional.3.1.30-39

Khosiah, N. (2021). Kerja sama orang tua dan guru dalam membangun kreativitas siswa Madrasah Ibtidaiyah melalui pembelajaran online. *Jurnal Penelitian Ipteks*, 6(1), 62–71. https://doi.org/10.32528/ipteks.v6i1.5252

Khuanefa, T., & Pratama, M. P. (2024). Pengaruh *knowledge sharing*, *selfefficacy* dan *reward* terhadap kreativitas guru pada SMK Batik Sakti 1 Kebumen. *Jurnal Ilmiah Mahasiswa Manajemen, Bisnis, Akuntansi*, 6 (1). https://doi.org/10.32639/8cbp1841

Lee, J. (2018). The effects of knowledge sharing on individual creativity in higher education institutions: Socio-technical view. *Administrative Sciences*, 8(2), 21. https://doi.org/10.3390/admsci8020021

Londongallo, A., & Tung, K. Y. (2025). Pengaruh kepemimpinan transformasional dan budaya organisasi terhadap kompetensi pedagogik guru dengan variabel mediator kreativitas guru. *JIIP: Jurnal Ilmiah Ilmu Pendidikan*, 8 (3). https://doi.org/10.54371/jiip.v8i3.7201

Marie, M. H. (2022). Teacher creativity: When professional coherence supports beautiful risks. *Journal Intelligence*, 10 (62). 10.3390/jintelligence10030062

Marlinawati, R. (2024). Peningkatan kreativitas guru berbasis literasi teknologi dan kearifan lokal. *Jurnal Pendidikan: Kajian dan Implementasi*, 6 (3).

Nelfuad, N. (2021). Modeling and optimization teacher work innovation: An empirical study using POP-SDM approach on vocational teachers of private vocational schools in Depok. *Journal of Industrial Engineering & Management Research*, 4(4), 92. https://doi.org/10.7777/jiemar.v2i4.166

Nursyirwan, V. I. (2025). Rewards & organizational creativity: Knowledge sharing as a mediator in the creative industry in Indonesia. *Jurnal Mahasiswa Ekonomi & Bisnis*, 5 (1). https://doi.org/10.37481/jmeb.v5i1.1147

Prasteyaningsih, S. W., Raharjo, K., & Afrianty, T. W. (2020). Pengaruh kepemimpinan transformasional dan budaya organisasi terhadap *knowledge sharing* dan kepuasan kerja. *Jurnal Ekonomi dan Bisnis*, 23 (2), 379–399. https://doi.org/10.24914/jeb.v23i2.3049

Rais, S. (2023). Penguatan kepemimpinan transformasional dan keterlibatan kerja untuk peningkatan kreativitas guru. *Jurnal Madinasika*, 5 (1). 10.31949/madinasika.v5i1.6949

Resti, K. Y., & Alizamar. (2019). Kreativitas guru dalam meningkatkan hasil belajar siswa pada pembelajaran tematik terpadu kurikulum 2013 di Madrasah Ibtidaiyah Negeri Bayang Pesisir Selatan. *Jurnal Basicedu*, 3 (2). https://doi.org/10.31004/basicedu.v3i2.43

Sanggorani, A. (2025). Pengaruh keterampilan literasi TIK, berpikir kritis dan efikasi diri terhadap kreativitas guru di SMK Kecamatan Pringsewu. *Jurnal Pendidikan Manajemen Al Multazam*, 7 (1). 10.54892/jmpa.v7i1.62

Saragih, S. P. (2015). Pengaruh penggunaan teknologi informasi terhadap *knowledge sharing* siswa di SMK Putra Jaya School. *CBIS Journal*, 3 (2).

Setyaningsih, S. (2022). *POP-SDM: Suatu penelitian komprehensif dalam penguatan sumber daya manajemen*. Universitas Pakuan.

Setyaningsih, S., & Hardhienata, S. (2022). *Pemodelan dan optimasi penguatan sumber daya manajemen*. Alfabeta.

Skrbinjek, V., Krabonja, M. V., Abersek, B., & Flogie, A. (2024). Enhancing teachers' creativity with an innovative training model and knowledge management. *Education Sciences*, 14 (12), 1381. https://doi.org/10.3390/educsci14121381

Subekti, P. (2023). Improving teacher creativity through strengthening self-efficacy, knowledge sharing, and transformational leadership. *Journal of Industrial Engineering & Management*, 4 (2).

Undang-Undang Republik Indonesia Nomor 14 Tahun 2005 tentang Guru dan Dosen.

Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional.

Yuniarti. (2024). Kreativitas guru pendidikan agama Islam dalam pemanfaatan media pembelajaran berbasis teknologi informasi dan komunikasi. *Journal of Science Education*, 3 (1). https://doi.org/10.56436/mijose.v3i1.311