



Supervisory Mentoring and Sustainable School Service Improvement: A Structural Equation Modeling Partial Least Squares (SEM-PLS) Analysis

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Abstract

Sustainable improvement in school services requires supervisory mentoring that extends beyond administrative oversight toward collaborative, reflective, and continuous improvement practices. However, limited empirical evidence explains the relative contribution of different supervisory mentoring stages to sustainable school service improvement. This study examines the contribution of four stages of supervisory mentoring: mentoring planning, mentoring for school program planning, mentoring for school program implementation, and monitoring, evaluation, reflection, and follow-up. A quantitative approach was employed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) to assess the relationships among the mentoring stages and sustainable school service improvement. The findings demonstrate that all four stages have positive relationships with sustainable school service improvement. Monitoring, evaluation, reflection, and follow-up emerged as the strongest predictor, with a path coefficient of 0.484 and a large effect size ($f^2 = 0.605$), followed by mentoring for school program planning ($\beta = 0.332$; $f^2 = 0.234$), mentoring for school program implementation ($\beta = 0.209$; $f^2 = 0.094$), and mentoring planning ($\beta = 0.106$; $f^2 = 0.029$). The structural model explains 68.6% of the variance in sustainable school service improvement ($R^2 = 0.686$). These findings indicate that sustainable improvement depends substantially on translating supervisory evidence into systematic follow-up and continuous improvement actions.

Keywords: Continuous Improvement, Educational Quality, SEM-PLS, School Service Improvement, Supervisory Mentoring.



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INTRODUCTION

Improving the quality and sustainability of educational services has become an increasingly important organizational challenge as schools are expected to respond simultaneously to changing policy environments, stakeholder expectations, resource constraints, and demands for measurable performance improvement. In Indonesia, this challenge is reinforced by the national education framework, which positions educational management around autonomy, accountability, and participation, giving schools greater responsibility to manage resources and make contextually appropriate decisions (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2003). Contemporary perspectives on educational improvement increasingly view schools not simply as implementers of centrally determined policies but as organizational actors that must continuously learn, adapt, and develop their internal capacity to improve service quality. The capacity to sustain such improvement is strongly associated with effective school leadership because principals are responsible for coordinating learning, managing resources, mobilizing professional capacity, and establishing organizational conditions that support continuous improvement (Leithwood et al., 2020). This orientation is consistent with the Indonesian competency framework for school principals, which emphasizes leadership, management, and the development of school capacity as essential dimensions of effective principal performance (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2023b). School improvement consequently depends not only on the availability of policies and resources but also on organizational mechanisms capable of translating leadership capacity into sustained changes in educational services.

Within this changing landscape, the role of school supervision has increasingly shifted from administrative control toward professional assistance, collaborative problem solving, and continuous

organizational improvement. The transformation is particularly relevant under the Merdeka Belajar policy, which repositions school supervisors as professional partners who accompany principals in strengthening leadership capacity and improving educational services through evidence derived from educational reports (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2023a). This orientation is consistent with broader research showing that school improvement is more sustainable when leadership is distributed across organizational actors and supported through collaborative processes rather than concentrated exclusively in formal hierarchical authority (Bush & Ng, 2019). Supervisory mentoring therefore has the potential to connect leadership development, evidence-based reflection, program implementation, and organizational learning within a continuous improvement cycle. The relevance of this function is strengthened by research indicating that effective supervision requires interaction, professional dialogue, and meaningful post-observation engagement rather than merely documenting performance deficiencies (Gordon et al., 2025). At the organizational level, collaborative professionalism further suggests that sustainable improvement emerges when professional actors collectively examine practice, exchange knowledge, and develop shared responsibility for improvement (Hargreaves & O'Connor, 2018). Supervisory mentoring can consequently be understood as a strategic organizational process through which external professional support is converted into internal school capacity and more sustainable service improvement.

The literature on educational improvement indicates that the effectiveness of mentoring cannot be separated from the quality of organizational learning and the capacity of school leaders to reflect on evidence and translate it into action. Data use becomes consequential when educational evidence is incorporated into professional interpretation and decision-making rather than treated as an administrative reporting requirement (Schildkamp & Poortman, 2015). This perspective positions supervisory mentoring as more than a sequence of technical activities because the value of supervision depends on whether planning, implementation, monitoring, reflection, and follow-up collectively generate changes in organizational practice. Studies of supervision within the Indonesian implementation of the Merdeka Curriculum similarly emphasize the need for differentiated mentoring strategies that respond to the characteristics, conditions, and developmental needs of individual schools (Hanafiah et al., 2023). The supervisor's role is therefore increasingly conceptualized as that of a strategic partner who supports schools in determining appropriate strategies and methods rather than simply verifying compliance with predetermined requirements (Mulyanto et al., 2023). From a broader change-management perspective, sustainable organizational transformation also requires leadership processes that develop shared commitment, learning capacity, and the ability to translate improvement intentions into institutionalized practices (Fullan, 2020). These perspectives collectively indicate that the effectiveness of supervisory mentoring should be evaluated according to its capacity to strengthen the school's improvement process, rather than merely according to the completion of formal supervisory activities.

Despite these developments, an important conceptual and empirical gap remains concerning how the different stages of supervisory mentoring contribute to sustainable school service improvement. Existing studies tend to examine supervision, principal leadership, teacher professionalism, or educational quality as relatively broad constructs, leaving insufficient explanation of whether individual stages within the mentoring process generate different levels of organizational impact. Recent evidence on managerial supervision suggests that supervision can support improvements in education service quality, yet the internal mechanisms through which specific mentoring activities translate into sustained service improvement remain insufficiently differentiated (Nurachmah & Citraningsih, 2026). A related study demonstrates that academic supervision can influence learning quality through teacher professionalism, indicating that supervisory effects may operate through intermediate organizational and professional processes rather than through direct administrative intervention alone (Mailani, 2024). The problem becomes particularly important at the monitoring, evaluation, reflection, and follow-up stage because evaluation findings have limited organizational value when they are not converted into concrete decisions and subsequent improvement actions. Decision-support approaches demonstrate that structured mechanisms can help organizations connect evaluation evidence with context-specific improvement decisions, providing a useful conceptual basis for understanding follow-up as a potential mechanism of organizational change (McFerran et al., 2022). The unresolved issue is therefore not whether supervision is important, but which components of supervisory mentoring exert the strongest

contribution to sustainable school service improvement and how these components operate within an integrated improvement process.

The urgency of addressing this gap is both scientific and practical because schools require improvement mechanisms capable of producing organizational change that persists beyond individual supervisory cycles, while policymakers require evidence regarding which supervisory functions should receive greater emphasis and resources. From the perspective of instructional leadership, supervision is most valuable when it facilitates professional learning, reflection, and improvement rather than functioning primarily as an instrument of inspection (Glickman et al., 2018). This requirement is also compatible with contemporary approaches to leadership development that emphasize reflective dialogue, adult learning, professional experience, and lifelong development as foundations for strengthening leaders' capacity to respond to complex organizational problems (Scholtz, 2024). The Indonesian regulatory framework has likewise formalized supervisory assistance as a process that should accompany schools through systematic stages of mentoring and improvement rather than isolated monitoring activities (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2023c). However, the literature still provides limited empirical evidence for comparing the relative contribution of mentoring planning, school program planning, school program implementation, and monitoring, evaluation, reflection, and follow-up within a single explanatory model. Addressing this issue requires an analytical approach capable of examining several interconnected relationships simultaneously and identifying the relative strength of each contribution rather than treating supervisory mentoring as a homogeneous intervention. PLS-SEM is particularly suitable for examining complex predictive relationships among latent constructs and assessing their relative explanatory contribution in organizational and management research (Hair et al., 2022). The methodological choice therefore enables the study to move beyond descriptive assessments of supervision toward an empirically testable explanation of how supervisory mentoring stages relate to sustainable school service improvement.

Against this background, the present study positions supervisory mentoring as a continuous organizational improvement process comprising mentoring planning, mentoring for school program planning, mentoring for school program implementation, and monitoring, evaluation, reflection, and follow-up, while sustainable school service improvement is treated as the organizational outcome of that interconnected process. Rather than conceptualizing supervision as a single undifferentiated construct, the study examines the relative contribution of each mentoring stage to determine whether the stages generate comparable or differentiated effects on sustainable service improvement. This positioning responds directly to the unresolved question of how supervisory assistance is transformed from a formal policy requirement into an organizational mechanism capable of producing sustained improvements in school services. The study employs Structural Equation Modeling–Partial Least Squares (SEM-PLS) to simultaneously estimate the relationships among the dimensions of supervisory mentoring and sustainable school service improvement and to identify the relative strength of their contributions. The analysis is intended to provide empirical evidence for determining which stage of supervisory mentoring has the most dominant role in sustaining improvements and, consequently, where supervisory resources and managerial attention should be concentrated. Theoretically, the study contributes to the literature by integrating supervisory mentoring, organizational improvement, and leadership-development perspectives into a stage-based model of sustainable school service improvement, while methodologically it demonstrates the use of SEM-PLS to test differentiated contributions within a multidimensional supervisory process. Practically, the findings are expected to support the development of a more structured and evidence-based supervisory mentoring model in which planning, implementation, monitoring, reflection, and follow-up function as interconnected mechanisms for strengthening sustainable school service quality.

RESEARCH METHODS

This study is an empirical quantitative study employing Structural Equation Modeling–Partial Least Squares (SEM-PLS) to examine the contribution of supervisory mentoring stages to sustainable school service improvement, as this approach is appropriate for analyzing predictive relationships among multiple latent constructs and explaining variance in endogenous constructs (Hair et al., 2022). Data were collected from respondents involved in school management and supervisory mentoring within the research setting using a structured questionnaire developed from the conceptual dimensions of supervisory mentoring and sustainable school service improvement. The supervisory mentoring

construct was operationalized into four exogenous dimensions, namely mentoring planning (X_1), mentoring for school program planning (X_2), mentoring for school program implementation (X_3), and monitoring, evaluation, reflection, and follow-up (X_4), while sustainable school service improvement was specified as the endogenous construct in accordance with the systematic mentoring framework for school supervisors (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2023c). Each construct was measured using multiple indicators representing its respective conceptual dimension and assessed through a Likert-type scale to obtain quantitative measures of respondents' perceptions regarding supervisory mentoring and sustainable school service improvement. The operationalization of supervisory mentoring also reflects the transformation of school supervision toward a professional partnership in which supervisors support principals in developing contextually appropriate strategies for school improvement (Mulyanto et al., 2023). The population comprised respondents directly involved in school management and supervisory mentoring in the research setting, while the sample consisted of eligible members of the population who provided complete questionnaire responses, and the resulting data were used to evaluate the relationships between the four mentoring stages and sustainable school service improvement.

The data were analyzed using SmartPLS through two sequential stages, namely evaluation of the measurement model and evaluation of the structural model, following established procedures for PLS-SEM analysis (Sarstedt et al., 2020). The measurement model was assessed through convergent validity, discriminant validity, and internal consistency reliability, with indicator outer loadings and Average Variance Extracted (AVE) used to evaluate convergent validity and Cronbach's alpha and composite reliability used to assess construct reliability (Hair et al., 2022). Discriminant validity was examined to ensure that each latent construct represented a sufficiently distinct empirical concept from the other constructs in the model. The structural model was evaluated through collinearity assessment, path coefficients (β), coefficient of determination (R^2), effect size (f^2), and bootstrapping to determine the direction, magnitude, explanatory power, and statistical significance of the hypothesized relationships. Bootstrapping was used to test the significance of the direct paths from mentoring planning, mentoring for school program planning, mentoring for school program implementation, and monitoring, evaluation, reflection, and follow-up to sustainable school service improvement, consistent with recommended practices for reporting PLS-SEM results (Hair et al., 2019). The structural relationships were represented by the equation

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where Y represents sustainable school service improvement, X_1 – X_4 represent the four supervisory mentoring dimensions, β_1 – β_4 represent their respective path coefficients, and ε represents the structural error term, with the analysis ultimately used to identify the significance and relative strength of each mentoring stage.

RESULTS AND DISCUSSION

Structural Model Assessment and Explanatory Power of Supervisory Mentoring

The structural model was evaluated to determine the extent to which the four stages of supervisory mentoring explain sustainable school service improvement. The model specifies mentoring planning (X_1), mentoring for school program planning (X_2), mentoring for school program implementation (X_3), and monitoring, evaluation, reflection, and follow-up (X_4) as exogenous constructs, while sustainable school service improvement (Y) is specified as the endogenous construct. As presented in Figure 1, the SEM-PLS model illustrates the relationships between the supervisory mentoring dimensions and the endogenous construct through the proposed measurement and structural framework. This specification is consistent with the use of PLS-SEM for examining predictive relationships among latent constructs and explaining variance in endogenous variables (Hair et al., 2022). The model also reflects the transformation of school supervision toward professional mentoring, in which supervisors support school leaders in identifying needs and developing contextually relevant improvement strategies (Mulyanto et al., 2023). The structural specification therefore provides an empirical basis for assessing how different stages of supervisory mentoring are associated with sustainable improvement in school services.

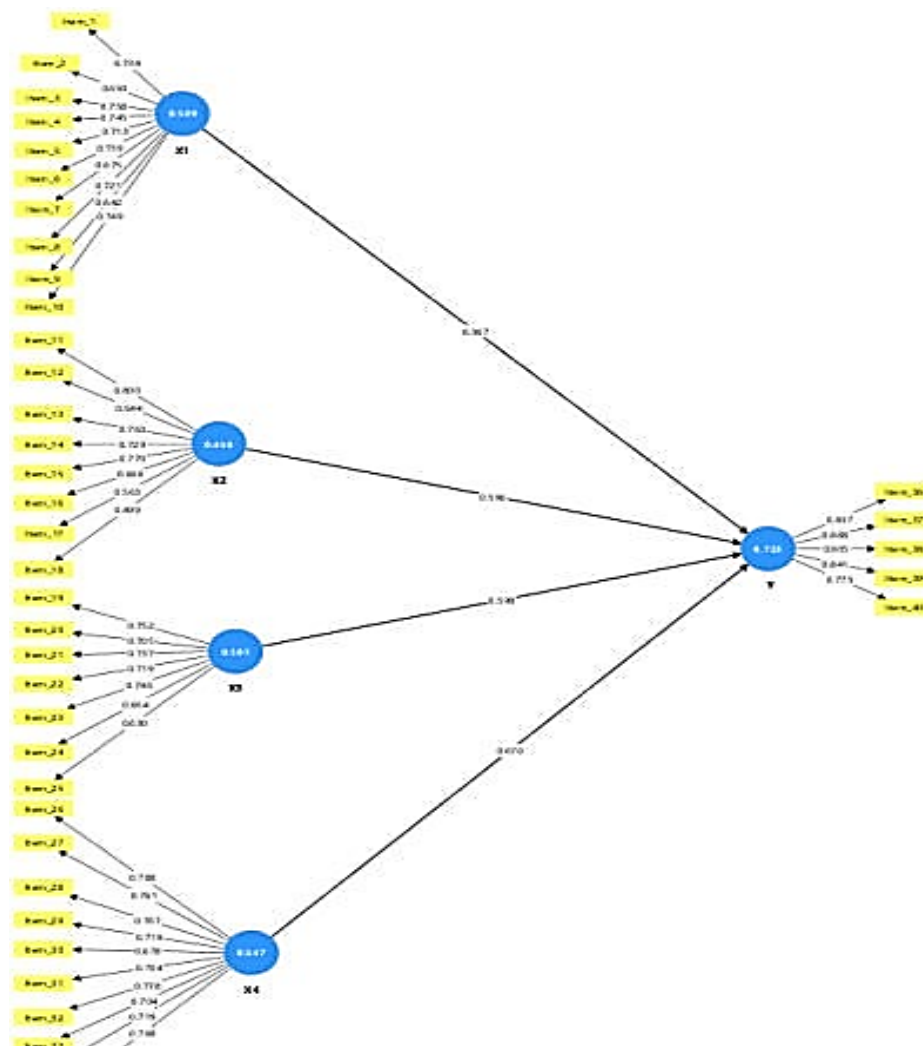


Figure 1. SEM-PLS Measurement and Structural Model of Sustainable School Service Improvement

The structural relationships shown in Figure 1 indicate that all four supervisory mentoring dimensions have positive relationships with sustainable school service improvement, although their estimated contributions differ in magnitude. Mentoring planning (X_1) has a path coefficient of 0.106, mentoring for school program planning (X_2) has a coefficient of 0.332, mentoring for school program implementation (X_3) has a coefficient of 0.209, and monitoring, evaluation, reflection, and follow-up (X_4) has the highest coefficient at 0.484. The positive coefficients indicate that stronger supervisory mentoring at each stage is associated with higher sustainable school service improvement within the empirical model. The differences in coefficient magnitude demonstrate that the mentoring process does not operate as a uniform intervention in which every stage has an equivalent contribution to the endogenous construct. This pattern is consistent with the perspective that effective school improvement involves interconnected processes of direction setting, organizational learning, implementation, and continuous adjustment (Leithwood et al., 2020). The variation in coefficients consequently provides an important basis for examining the relative role of each mentoring stage rather than interpreting supervisory mentoring as a single undifferentiated construct.

Figure 2 provides a more explicit representation of the structural model by displaying the path coefficients and the coefficient of determination for sustainable school service improvement. The model produces an R^2 value of 0.686, indicating that the four supervisory mentoring dimensions collectively explain 68.6% of the variance in sustainable school service improvement. The adjusted R^2 value of 0.665 remains relatively close to the R^2 value, indicating that the explanatory capacity of the model

remains substantial after considering the number of predictor constructs included. In PLS-SEM, the coefficient of determination represents the proportion of variance in an endogenous construct that can be explained by its predictor constructs and is therefore a central criterion for evaluating structural model performance (Hair et al., 2022). The magnitude of the obtained R^2 indicates substantial explanatory power and suggests that supervisory mentoring represents an important organizational factor associated with sustainable school service improvement. This finding is compatible with the view that school leadership and supervision can influence improvement processes by shaping how organizational needs are identified, addressed, implemented, and evaluated (Nguyen & Hallinger, 2020).

PLS-SEM algorithm	R-square - Overview		
☐ Bar chart Indirect effects ▼ Total effects		R-square	R-square adjusted
	Y	0.686	0.665

Figure 2. SEM-PLS Structural Model with Path Coefficients and R^2 Value for Sustainable School Service Improvement

The R^2 value of 0.686 also indicates that 31.4% of the variance in sustainable school service improvement is attributable to factors outside the four predictor constructs included in the model. This remaining proportion should not be interpreted as a weakness of the model because school service improvement may also be influenced by leadership capacity, teacher professionalism, organizational commitment, resources, institutional conditions, and other contextual variables. The distinction is important for interpreting the empirical contribution of supervisory mentoring, as educational outcomes are shaped not only by mentoring but also by interactions among leadership, professional learning, organizational conditions, and contextual factors (Leithwood et al., 2020). Evidence concerning managerial supervision also suggests that supervisory processes can contribute to educational service quality by strengthening the management and improvement practices of school leaders (Nurachmah & Citraningsih, 2026). The present R^2 therefore supports the relevance of supervisory mentoring while retaining analytical space for other determinants of sustainable school service improvement.

The structural model was further assessed through collinearity analysis to determine whether excessive relationships among the exogenous constructs could distort the estimated path coefficients. Figure 3 shows that the VIF values for the four supervisory mentoring constructs range from 1.234 to 1.494. These values indicate that the predictor constructs do not exhibit problematic multicollinearity and can therefore be interpreted as sufficiently distinct contributors within the structural model. The result is particularly relevant because the four mentoring stages represent interconnected activities within a broader supervisory process and may consequently share conceptual and empirical similarities. Low VIF values indicate that the estimated relationships are not substantially affected by redundancy among the predictors, supporting the reliability of structural path interpretation (Hair et al., 2019). The absence of problematic collinearity also strengthens the basis for comparing the relative contributions of mentoring planning, program planning, program implementation, and monitoring, evaluation, reflection, and follow-up.

PLS-SEM algorithm	Collinearity statistics (VIF) - Inner model - List		
☐ List ☐ Bar chart ▼ Construct reliability and validity ☐ Overview ☐ Cronbach's alpha - Bar chart ☐ Composite reliability (rho)		VIF	
	X1 -> Y	1.248	
	X2 -> Y	1.494	
	X3 -> Y	1.476	
	X4 -> Y	1.234	

Figure 3. Variance Inflation Factor (VIF) Values in the SEM-PLS Structural Model

Taken together, the structural model assessment demonstrates substantial explanatory power and acceptable predictor independence while revealing meaningful differences in the estimated contribution of the four mentoring stages. The R^2 value of 0.686 indicates that the model captures a considerable proportion of the variance in sustainable school service improvement, while the VIF range of 1.234–1.494 indicates that the structural estimates are not subject to problematic collinearity. The path coefficients further reveal a clear ordering, with monitoring, evaluation, reflection, and follow-up (X_4) showing the strongest relationship, followed by mentoring for school program planning (X_2), mentoring for school program implementation (X_3), and mentoring planning (X_1). This ordering suggests that supervisory mentoring becomes increasingly consequential when its processes move from initial preparation toward program development, implementation, and evidence-based improvement. Such an interpretation corresponds with the continuous improvement perspective, which conceptualizes improvement as an iterative process involving problem identification, action, evidence examination, reflection, and subsequent adjustment (Bryk et al., 2015). The next stage of analysis therefore focuses on the relative effect sizes of the four mentoring dimensions, with particular attention to the dominant contribution of monitoring, evaluation, reflection, and follow-up.

Monitoring, Evaluation, Reflection, and Follow-Up as the Dominant Driver of Sustainable Improvement

Monitoring, evaluation, reflection, and follow-up (X_4) demonstrated the strongest contribution to sustainable school service improvement, with a path coefficient of 0.484 and an effect size (f^2) of 0.605. The positive path coefficient indicates that stronger implementation of this mentoring stage is associated with higher levels of sustainable school service improvement. The magnitude of 0.484 represents the largest structural contribution among the four supervisory mentoring dimensions included in the model. The f^2 value of 0.605 further indicates a large effect, confirming that X_4 has substantial explanatory relevance for the endogenous construct. This finding suggests that supervisory mentoring becomes particularly influential when the process moves beyond planning and implementation toward systematic assessment and subsequent improvement actions. Such a pattern is consistent with the continuous improvement perspective, which emphasizes iterative cycles of identifying problems, testing changes, examining evidence, and determining subsequent actions (Bryk et al., 2015).

The strong contribution of X_4 can be understood from the role of monitoring and evaluation in generating feedback for organizational learning. Monitoring provides information about the extent to which school programs are implemented according to established objectives, activities, and performance indicators. Evaluation then enables supervisors and school leaders to assess the meaning and adequacy of those results in relation to identified needs and expected outcomes. Reflection adds an interpretive dimension by encouraging practitioners to examine experiences, identify barriers, and reconsider strategies that may require modification. Follow-up connects these reflective conclusions with concrete improvement actions so that supervisory findings become part of subsequent managerial processes. Reflective practice is particularly relevant to professional learning because experience contributes to development when practitioners critically examine that experience and use the resulting understanding to guide future practice (Mann et al., 2009). The combination of these processes therefore creates a feedback mechanism that allows supervisory mentoring to support continuing organizational adjustment rather than isolated supervisory interventions.

The empirical prominence of X_4 also illustrates the distinction between collecting supervisory information and using that information to produce organizational change. Monitoring activities may generate observations concerning school programs, leadership practices, teacher performance, or achievement of institutional targets, but these observations have limited managerial value when they remain as documentation. Evaluation provides a basis for determining whether observed conditions require correction, reinforcement, or strategic adjustment, while reflection enables the actors involved to interpret why particular outcomes occurred. Follow-up subsequently establishes continuity by connecting those interpretations with decisions and actions that can be examined again in the next improvement cycle. Schildkamp and Poortman (2015) emphasize that the value of data use in educational settings depends on the extent to which evidence is interpreted and translated into decisions and practices. The large effect size obtained for X_4 therefore indicates that the capacity to transform

supervisory evidence into subsequent action represents a particularly important mechanism in sustainable school service improvement. This interpretation places evidence utilization at the center of supervisory mentoring rather than treating monitoring and evaluation as administrative activities completed at the end of a program.

PLS-SEM algorithm	f-square - Matrix					
☐ Matrix ☐ List Outer weights ☐ Matrix ☐ List Latent variables ☐ Scores		X1	X2	X3	X4	Y
	X1					0.029
	X2					0.234
	X3					0.094
	X4					0.605
	Y					

Figure 4. Effect Size (f^2) of Supervisory Mentoring Stages on Sustainable School Service Improvement

Figure 4 demonstrates the substantial difference in effect size among the four supervisory mentoring stages, with X_4 producing an f^2 value of 0.605, considerably higher than X_2 at 0.234, X_3 at 0.094, and X_1 at 0.029. The comparison indicates that the contribution of X_4 is not merely a consequence of its positive path coefficient but also reflects a stronger substantive effect on the explanatory performance of the structural model. The moderate effect of mentoring for school program planning (X_2) suggests that translating identified needs into structured programs remains important, yet its influence is less pronounced than the subsequent process of evaluating and refining those programs. The small effect of implementation mentoring (X_3) indicates that program execution contributes to improvement but does not independently explain as much variation as the processes associated with evidence interpretation and follow-up. Meanwhile, the small effect of initial mentoring planning (X_1) suggests that preparatory activities have greater meaning when connected to later stages of the improvement cycle. This pattern supports the argument that sustainable improvement depends not only on initiating interventions but also on the organizational capacity to learn from their implementation and adjust subsequent actions (Bryk et al., 2015).

The dominance of X_4 is also compatible with the changing orientation of school supervision toward mentoring and professional partnership. The supervisory role is increasingly directed toward supporting school leaders in identifying contextual problems, interpreting evidence, and formulating appropriate improvement strategies rather than merely assessing compliance (Mulyanto et al., 2023). Within this orientation, monitoring and evaluation provide the empirical basis for dialogue between supervisors and school leaders, while reflection enables both parties to consider whether existing approaches remain appropriate to school conditions. The follow-up stage is particularly important because it converts supervisory dialogue into an accountable sequence of improvement actions. This orientation corresponds with the regulatory framework for supervisory mentoring, which positions supervisors as facilitators of school development and supports the implementation of mentoring as an ongoing process (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2023c). It also complements the emphasis on leadership development through reflective and contextual professional learning, in which leaders develop their capacity by critically engaging with organizational experiences and challenges (Scholtz, 2024).

The findings have direct implications for the management of sustainable school service improvement. Supervisory mentoring should allocate sufficient attention to post-implementation evaluation and structured follow-up rather than concentrating predominantly on initial planning and program execution. Supervisors can strengthen this process through clearly defined improvement priorities, measurable indicators, follow-up timelines, assigned responsibilities, and periodic reviews of corrective actions. Such arrangements would allow evaluation findings to function as managerial inputs for subsequent decisions rather than merely as evidence of program completion. Structured decision-making mechanisms can also assist schools in translating complex evaluation information into prioritized and contextually appropriate actions (McFerran et al., 2022). From an organizational

learning perspective, this process creates continuity between one improvement cycle and the next, allowing schools to accumulate knowledge from previous interventions and refine their service strategies over time. The empirical evidence of $\beta = 0.484$ and $f^2 = 0.605$ consequently positions monitoring, evaluation, reflection, and follow-up as the central mechanism through which supervisory mentoring is translated into sustainable school service improvement.

Mentoring for School Program Planning and Implementation in School Improvement

The SEM-PLS results indicate that mentoring for school program planning (X_2) has a positive relationship with sustainable school service improvement, with a path coefficient of 0.332 and an effect size of 0.234. The magnitude of this coefficient places X_2 as the second strongest predictor among the four supervisory mentoring stages. This finding indicates that assistance in translating school needs into structured programs contributes meaningfully to school improvement capacity. Effective supervision supports school leaders in identifying priorities, developing appropriate strategies, and connecting improvement plans with institutional needs (Glickman et al., 2018). The finding also shows that supervisory mentoring is not limited to administrative guidance but extends to supporting schools in developing actionable improvement programs. This orientation is consistent with the evolving role of school supervisors as facilitators of strategic improvement under the Merdeka Belajar policy (Mulyanto et al., 2023).

The positive coefficient for X_2 indicates that the quality of school program planning is an important component of sustainable service improvement. Planning provides a structured basis for determining priorities, allocating resources, and establishing expected outcomes before improvement activities are implemented. The use of relevant school data can strengthen this process by connecting program decisions with identified educational needs (Schildkamp & Poortman, 2015). Supervisory mentoring can support school leaders in interpreting such information and converting it into realistic and measurable program priorities. This process also corresponds with the competency expectations for school principals, which emphasize managerial capacity and the development of school improvement programs (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2023b). Program planning therefore represents an important mechanism linking supervisory guidance with concrete school-level improvement actions.

The effect size of 0.234 confirms that X_2 provides a meaningful contribution to sustainable school service improvement. Its larger effect compared with X_1 suggests that supervisory assistance becomes more consequential when it is translated into specific school programs and improvement priorities. This finding highlights the importance of moving from general supervisory planning toward activities that directly engage with school needs and institutional development. Collaborative professionalism emphasizes the value of collective participation in addressing educational challenges and developing shared improvement strategies (Hargreaves & O'Connor, 2018). Supervisors can facilitate this process by encouraging school leaders and teachers to participate in defining problems, selecting strategies, and establishing feasible priorities. Such collaborative planning can strengthen ownership of improvement initiatives and increase the likelihood that planned programs are implemented within the school context.

Mentoring for school program implementation (X_3) also has a positive relationship with sustainable school service improvement, with a path coefficient of 0.209 and an effect size of 0.094. Although the coefficient is lower than that of X_2 , the finding confirms that implementation remains an important component of the supervisory mentoring process. The smaller effect size indicates that implementation contributes less strongly to the endogenous construct than program planning and monitoring with subsequent follow-up. Effective implementation requires coordination, resource mobilization, communication, and the capacity to respond to challenges emerging during program execution (Leithwood et al., 2020). Supervisory mentoring can assist schools in maintaining alignment between planned activities and actual implementation conditions. This role reflects the expectation that supervisors provide professional assistance that supports schools throughout the implementation of improvement programs (Hanafiah et al., 2023).

The lower coefficient for X_3 does not imply that program implementation has limited relevance to sustainable improvement. Rather, it suggests that implementation may depend partly on the quality of planning and the organizational conditions surrounding the execution of school programs. School improvement is influenced by the interaction between leadership practices, professional capacity,

organizational processes, and contextual conditions (Nguyen & Hallinger, 2020). Mentoring during implementation can help school personnel address emerging problems and adapt activities without losing sight of established improvement objectives. Adult learning perspectives further emphasize the importance of connecting professional learning with practical experiences and problems encountered in organizational settings (Scholtz, 2024). Supervisory mentoring can therefore function as an ongoing learning process in which school personnel receive guidance while simultaneously developing their capacity to manage improvement activities.

The findings for X_2 and X_3 indicate that school improvement requires a connection between program formulation and program execution. The stronger coefficient and effect size of X_2 suggest that planning contributes more substantially to sustainable school service improvement than implementation at the structural level. Nevertheless, implementation remains indispensable because planned programs cannot produce organizational improvement without effective execution. Distributed leadership emphasizes the involvement of multiple actors in translating school improvement objectives into collective organizational action (Bush & Ng, 2019). Supervisory mentoring can strengthen this connection by positioning supervisors as facilitators who support both program development and practical implementation. This integrated relationship between planning and implementation also provides an important foundation for the monitoring, evaluation, reflection, and follow-up stage that demonstrates the strongest contribution in the structural model.

Mentoring Planning, Integrated Improvement Cycle, and Practical Implications

The SEM-PLS results show that mentoring planning (X_1) has a positive relationship with sustainable school service improvement, with a path coefficient of 0.106 and an effect size of 0.029. Although X_1 has the smallest coefficient and effect size among the four predictors, its positive direction indicates that systematic preparation remains relevant within the supervisory mentoring process. Mentoring planning establishes the initial structure through which supervisors determine objectives, approaches, priorities, and forms of assistance before engaging with schools. A structured supervision process provides an important foundation for aligning supervisory activities with school needs and professional development objectives (Glickman et al., 2018). The relatively small effect of X_1 suggests that planning supervisory activities alone does not produce substantial improvement unless it is translated into school-level actions. This interpretation is consistent with the view that sustainable change requires leadership processes that connect planning with implementation and organizational learning (Fullan, 2020).

The comparatively small effect size of X_1 also highlights the distinction between preparing a mentoring process and producing changes in school services. Supervisory planning can establish direction, but its contribution becomes more meaningful when it generates concrete program priorities and supports subsequent implementation. This relationship indicates that the stages of mentoring should be understood as interconnected rather than as isolated administrative activities. School improvement depends on coherent processes that connect problem identification, intervention, evidence, and adjustment over time (Bryk et al., 2015). The planning stage therefore functions primarily as an enabling condition for the subsequent stages of supervisory mentoring. Its contribution may become more visible when planning is directly connected to the needs, capacities, and improvement priorities of individual schools (Hanafiah et al., 2023).

The structural results can be interpreted as an integrated sequence in which mentoring planning supports school program planning, program planning supports implementation, and implementation generates information for monitoring and follow-up. The path coefficients of 0.106 for X_1 , 0.332 for X_2 , 0.209 for X_3 , and 0.484 for X_4 illustrate the increasing importance of mentoring stages as the process moves toward evidence-based follow-up. This pattern indicates that sustainable improvement is strengthened when supervisory assistance progresses from preparation toward action, reflection, and subsequent adjustment. Continuous improvement theory similarly emphasizes iterative cycles in which organizations identify problems, test changes, examine evidence, and determine subsequent actions (Bryk et al., 2015). The supervisory process can therefore be viewed as a connected improvement cycle rather than a sequence of independent supervisory tasks. Such integration is consistent with the regulatory orientation of school supervision, which positions mentoring as sustained assistance to support school improvement (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2023c).

The findings also have implications for the role of supervisors in strengthening sustainable school service improvement. Supervisors need to move beyond the preparation and delivery of recommendations by facilitating the translation of findings into school-level decisions and actions. This role requires collaboration with school leaders and other educational actors throughout the improvement process. Distributed leadership emphasizes the contribution of multiple organizational actors in advancing school improvement rather than concentrating responsibility in a single formal leader (Bush & Ng, 2019). Supervisory mentoring can support this collaborative process by strengthening the capacity of school leaders to interpret problems, coordinate responses, and sustain improvement initiatives. Such an approach is aligned with the broader transformation of school supervision toward facilitative and developmental practices within the current educational policy context (Mulyanto et al., 2023).

The empirical pattern also suggests that sustainable improvement requires organizational capacity to learn from implementation experiences. The strong contribution of X_4 indicates that monitoring, evaluation, reflection, and follow-up provide a critical mechanism for converting implementation experience into subsequent improvement actions. Data become more valuable when schools use them to identify problems, evaluate interventions, and inform decisions about future practice. Evidence on educational data use emphasizes that the impact of data depends on how information is interpreted and connected to instructional and organizational decision-making (Schildkamp & Poortman, 2015). Reflective learning can further strengthen this process by encouraging practitioners to examine their experiences and connect professional learning with practical challenges (Scholtz, 2024). The supervisory mentoring cycle therefore has greater potential for sustainability when each stage contributes information and learning to the next stage.

From a practical perspective, the findings indicate that supervisory mentoring should be designed as a continuous and interconnected improvement system rather than as a series of separate activities. Planning should establish clear objectives and priorities, program planning should translate these priorities into actionable interventions, and implementation should generate evidence for subsequent evaluation. Monitoring and reflection should then be followed by specific corrective or developmental actions that inform the next improvement cycle. Professional learning communities provide a relevant organizational context for sustaining collective learning, shared inquiry, and continuous improvement among school personnel (Stoll & Louis, 2019). The relatively strong explanatory power of the structural model, reflected in an R^2 of 0.686, reinforces the relevance of this integrated mentoring framework for explaining sustainable school service improvement. The findings ultimately position supervisory mentoring as a developmental process in which planning, action, evidence, reflection, and follow-up are connected to sustain improvement over time.

CONCLUSION

This study demonstrates that supervisory mentoring contributes meaningfully to sustainable school service improvement, with the four mentoring stages collectively explaining 68.6% of the variance in the endogenous construct. The SEM-PLS findings confirm positive relationships between mentoring planning, mentoring for school program planning, mentoring for school program implementation, and monitoring, evaluation, reflection, and follow-up with sustainable school service improvement. Among these stages, monitoring, evaluation, reflection, and follow-up emerged as the strongest predictor, with a path coefficient of 0.484 and a large effect size of 0.605. This finding indicates that the sustainability of supervisory mentoring depends not only on the preparation and implementation of improvement programs but also on the capacity to transform supervisory evidence into systematic improvement actions. Mentoring for school program planning also demonstrated a meaningful contribution, with a path coefficient of 0.332 and an effect size of 0.234, while mentoring for program implementation showed a positive contribution with a coefficient of 0.209 and an effect size of 0.094. Mentoring planning had the smallest relative contribution, with a coefficient of 0.106 and an effect size of 0.029, yet it remains an important foundation for establishing the direction and priorities of subsequent mentoring activities. The findings position supervisory mentoring as an integrated improvement process in which planning, program development, implementation, monitoring, reflection, and follow-up are connected to sustain improvements in school services.

Theoretically, this study strengthens the continuous improvement perspective by demonstrating that supervisory mentoring stages do not contribute equally to sustainable school service improvement.

The particularly strong contribution of monitoring, evaluation, reflection, and follow-up indicates that follow-up should be treated as a substantive mechanism for organizational learning rather than merely as the final administrative stage of supervision. Practically, educational authorities and school supervisors should strengthen follow-up systems by translating monitoring and evaluation findings into prioritized improvement actions with clear targets, responsible actors, timelines, and indicators. Structured decision-making mechanisms can further assist schools in selecting improvement priorities that correspond with their specific needs and organizational conditions. The study also indicates that supervisory mentoring should be implemented as a connected cycle in which each stage generates information and learning that informs subsequent actions. The findings should be interpreted within the limitation of the study's geographically limited educational context, which may constrain the generalizability of the model to other regions and educational settings. Future research should therefore examine the model across broader educational contexts and incorporate complementary methodological approaches to strengthen the evidence concerning how supervisory mentoring contributes to sustainable school service improvement.

REFERENCES

- Bryk, A. S., Gomez, L. M., Grunow, A., & LeMahieu, P. G. (2015). *Learning to improve: How America's schools can get better at getting better*. Harvard Education Press.
- Bush, T., & Ng, A. (2019). Distributed leadership and school improvement: Leading from the middle. *Educational Management Administration & Leadership*, 47(4), 590–608. <https://doi.org/10.1177/1741143217745872>
- Fullan, M. (2020). *Leading in a culture of change* (2nd ed.). Jossey-Bass.
- Gordon, S. P., Paufler, N. A., & Derrington, M. L. (2025). Supervisors, teachers, and the post-observation conference: How to improve the quality of supervision. *Journal of Educational Supervision*, 8(1), 88–109. <https://doi.org/10.69772/jes.8.1.4>
- Glickman, C. D., Gordon, S. P., & Ross-Gordon, J. M. (2018). *SuperVision and instructional leadership* (10th ed.). Pearson.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage Publications.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hanafiah, E., et al. (2023). Manajemen pendampingan pengawas sekolah terhadap kepala sekolah dalam implementasi Kurikulum Merdeka. *Journal of Education Research*, 4(4), 2219–2227. <https://doi.org/10.37985/jer.v4i4.59>
- Hargreaves, A., & O'Connor, M. T. (2018). *Collaborative professionalism: When teaching together means learning for all*. Corwin Press.
- Hidayat, A., Subagyo, A., & Yusuf, M. (2026). School Supervision And Workload On Teacher Performance: The Mediating Role Of Self-Efficacy And Organizational Commitment In JSIT Elementary Schools, Riau Province. *At-Takwin: Journal of Islamic Education Studies*, 2(1), 148–166. <https://doi.org/10.65097/at-takwin.v2i1.138>
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia. (2003). *Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional*.
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia. (2023a). *Peraturan Direktur Jenderal Guru dan Tenaga Kependidikan Nomor 4831/B/HK.03.01/2023 tentang Peran Pengawas Sekolah dalam Implementasi Kebijakan Merdeka Belajar pada Satuan Pendidikan*.
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia. (2023b). *Peraturan Direktur Jenderal Guru dan Tenaga Kependidikan Nomor 7327/B.B1/HK.03.01/2023 tentang Model Kompetensi Kepala Sekolah*.
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia. (2023c). *Peraturan Direktur Jenderal Guru dan Tenaga Kependidikan Nomor 7328/B.B1/HK.03.01/2023 tentang Pelaksanaan Pendampingan Pengawas Sekolah*.
- Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership revisited. *School Leadership & Management*, 40(1), 5–22. <https://doi.org/10.1080/13632434.2019.1596077>

- Mailani, I. (2024). The influence of school principals' academic supervision on the quality of learning through teacher professionalism as an intervening variable. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, 14(5), 826-834. <https://doi.org/10.33578/jpfkip.v14i5-p826-834>
- McFerran, K., et al. (2022). The development of a decision matrix to guide and support the provision of effective arts programs in schools. *International Journal of Educational Research Open*, 3, 100155. <https://doi.org/10.1016/j.ijedro.2022.100155>
- Mulyanto, A., Saadah, E., Suparman, & Firmansyah. (2023). Transformasi peran pengawas sekolah dalam menentukan strategi dan metode pendampingan pada Kurikulum Merdeka. *Journal of Education Research*, 4(4), 1871–1879. <https://doi.org/10.37985/jer.v4i4.566>
- Nguyen, T. D., & Hallinger, P. (2020). Leadership for learning in Asia: A systematic review of research. *Educational Management Administration & Leadership*, 48(1), 72–99. <https://doi.org/10.1177/1741143218775426>
- Nurachmah, F., & Citraningsih, D. (2026). Analysis of Managerial Supervision of School Principals in Improving the Quality of Education Services. *El-Idare: Journal of Islamic Education Management*, 12(2), 461-471. <https://doi.org/10.19109/elidare.v12i2.36966>
- Sarstedt, M., Ringle, C. M., & Hair, J. F. (2020). Partial least squares structural equation modeling. In C. Homburg, M. Klarmann, & A. Vomberg (Eds.), *Handbook of market research*. Springer. https://doi.org/10.1007/978-3-319-05542-8_15-1
- Scholtz, G. (2024). Exploratory study of the humanistic philosophy of adult learning as principal philosophy for leadership development. *The International Journal of Management Education*, 22(2), 100949. <https://doi.org/10.1016/j.ijme.2024.100949>
- Schildkamp, K., & Poortman, C. L. (2015). The impact of data use on teaching and student learning. *Educational Assessment, Evaluation and Accountability*, 27(2), 139–155. <https://doi.org/10.1007/s11092-015-9213-4>
- Stoll, L., & Louis, K. S. (2019). *Professional learning communities: Divergence, depth and dilemmas*. McGraw-Hill Education.