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The Impact of Data-Driven Planning on Teacher Resilience: The Mediating Role of Team Collaboration

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Abstract

This study aims to examine the effect of data-driven planning on teachers' resilience through team collaboration in vocational high schools. This study addresses the limited empirical evidence linking data-driven planning to teacher resilience, particularly through collaborative mechanisms. Using quantitative research design, data were collected through a structured questionnaire administered to 482 teachers' senior high schools in West Sumatra, selected using the proportional stratified random sampling technique. The data were analyzed using Partial Least Squares–Structural Equation Modeling (PL S-SEM) to test both direct and indirect relationships among variables, with reliability assessed through Cronbach's alpha and composite reliability, and validity evaluated using Average Variance Extracted (AVE). Data-driven planning is conceptualized as the systematic use of data for instructional and managerial decision-making, team collaboration as structured professional interaction among teachers, and teacher resilience as the ability to adapt and sustain performance under challenges.The findings indicate that data-driven planning has a positive and significant effect on team collaboration, collaboration has a strong positive effect on teacher resilience, and collaboration significantly mediates the relationship between data-driven planning and resilience. These findings highlight the critical role of collaborative practices as a mechanism linking planning processes to resilience outcomes.This study contributes to the existing literature on educational management by integrating data-driven planning, collaboration, and resilience into a single empirical model. Practically, the results suggest that schools should strengthen collaborative data use to enhance teacher resilience.

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INTRODUCTION

Effective planning is one of the key factors in the success and development of an organization, as it outlines future actions while considering available resources. This is because planning serves as the initial and fundamental guide for running an organization (Fasogbon, 2010; Mallon, 2019; Mironowicz & Ciesielski, 2024) Planning serves not only to determine the direction of organizational policy but also influences all organizational members to participate in every step of change (Li et al., 2020). Previous research has shown that good planning can influence organizational effectiveness, improve program implementation, and reduce the potential for internal conflict (Fasogbon, 2010; Habeeb & Eyupoglu, 2024; Mironowicz & Ciesielski, 2024; Onyeneke & Abe, 2020).In the context of education, data-driven planning refers to the systematic use of data such as student performance, teacher feedback, and school evaluations to inform strategic and instructional decisions. Unlike traditional planning, which often relies on intuition or routine practices, data-driven planning emphasizes evidence-based decision-making to improve school effectiveness and accountability.

An organization prepared for change will demonstrate higher resilience, enabling it to respond effectively to crises and seize new opportunities, including the people within the organization (Chen et al., 2023) Then, the presence of resilience at various levels within the organization can provide ease in navigating uncertainty (Miceli et al., 2021). The presence of resilience at various levels within the organization will make it easier to navigate increasingly complex uncertainties. Individual resilience helps officers manage stress and role changes, team resilience strengthens cooperation and coordination in difficult situations, while organizational resilience ensures performance sustainability through adaptive policies and leadership.

However, many employes are still stressed and feel pressured in their jobs (Fordjour et al., 2020; Kiranashree et al., 2021; Lee, 2022). Daily work stress can deplete state resilience, but individuals with higher trait resilience can withstand and perform well (Z. Zhu et al., 2024). Daily work stress does have the potential to deplete individual resilience, but employes with higher levels of resilience or trait resilience tend to be able to manage this pressure more adaptively. Resilient individuals are able to control their emotions, use effective coping strategies, and view challenges as part of the learning and self-development process. Teacher resilience is defined as the ability of teachers to sustain commitment, adapt to challenges, and maintain effectiveness in dynamic educational environments.

The role of school leaders in strengthening teacher resilience is closely related to planning practices that involve teachers collaboratively (Kumar & Ghosh, 2025). Data-driven planning encourages interaction, shared interpretation of data, and joint decision-making, which naturally fosters team collaboration among teachers. Through collaboration, teachers exchange knowledge, align instructional strategies, and build mutual support systems.

From a theoretical perspective, collaborative practices function as a social mechanism that enhances resilience by promoting shared responsibility, trust, and collective problem-solving.] Thus, team collaboration is not only an outcome of effective planning but also a critical process that strengthens teacher resilience.

Despite the growing body of research on educational planning and teacher resilience, previous studies have largely examined these variables separately and have rarely explored the mediating role of team collaboration in linking data-driven planning to teacher resilience. This indicates a gap in understanding the mechanism through which planning influences resilience in educational settings.

Therefore, this study aims to examine the effect of data-driven planning on teacher resilience through team collaboration in vocational high schools. Specifically, this study proposes that: (1) data-driven planning positively influences team collaboration, (2) team collaboration positively influences teacher resilience, and (3) team collaboration mediates the relationship between data-driven planning and teacher resilience.

METHOD

Research Design

This study employs a quantitative

research approach aimed at examining the structural relationships among variables using Partial Least Squares Structural Equation Modeling (PLS-SEM). The study specifically investigates the effect of data-driven planning on teacher resilience, with team collaboration as a mediating variable.

Quantitative research is appropriate for testing hypotheses and analyzing causal relationships among variables through statistical procedures (Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, 2019). Data were collected through a structured questionnaire using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The variables in this study consist of data-driven planning as the independent variable (X), team collaboration as the mediating variable (M), and teacher resilience as the dependent variable (Y). PLS-SEM was selected due to its suitability for complex models, its ability to handle non-normal data, and its robustness in predictive analysis (Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, 2019).

Population and Sample

The population in this study included all public high school teachers in West Sumatra Province, totaling 7,215 people. The sample size was determined using the Slovin formula: $n = N / (1 + N(e^2))$ with a margin of error of 5%, resulting in a sample of 482 teachers. To ensure proportional representation, proportional stratified random sampling was applied based on the number of teachers in each district/city. This technique ensures that all subgroups are adequately represented in the sample.

Research Instrument

Data collection techniques were carried out using questionnaires, which allowed for statistical analysis of key variables in the study. Data were collected using a structured questionnaire developed based on relevant literature. The constructions were operationalized as follows: (1) Data-driven planning: measured through indicators of data utilization, planning evaluation, and evidence-based decision-making, (2) Team collaboration: measured through communication, coordination, and shared decision-making, (3) Teacher resilience: measured through adaptability, persistence, and emotional regulation. All items were measured using a five-point Likert scale.

The measurement model was evaluated in terms of reliability and validity. Reliability was assessed using Cronbach's alpha and composite reliability (CR). All constructs showed values above 0.70, indicating strong internal consistency. Convergent validity was assessed using Average Variance Extracted (AVE), with all values exceeding 0.50, confirming adequate convergent validity. Discriminant validity was evaluated using the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT), ensuring that each construct is empirically distinct from the others.

Table 1. Reliability Test Results

Indicator	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Collaboration	0,907	0,912	0,923	0,522
Data-Driven Planning	0,879	0,897	0,905	0,579
Resilience	0,922	0,925	0,933	0,539

The results indicate that all constructs demonstrate strong reliability, with Cronbach's alpha values ranging from 0.879 to 0.922 and composite reliability values above 0.90. These values confirm internal consistency and reliability, not validity. The AVE values ranged from 0.522 to 0.579, indicating that all constructions meet the threshold for convergent validity. Overall, the findings suggest that the measurement instruments used in this study are both reliable and valid for analyzing the relationships among data-driven planning, team collaboration, and teacher resilience.

RESULTS AND DISCUSSION

The research was processed using SEM-PLS. This image is the result of processing using SEM-PLS.

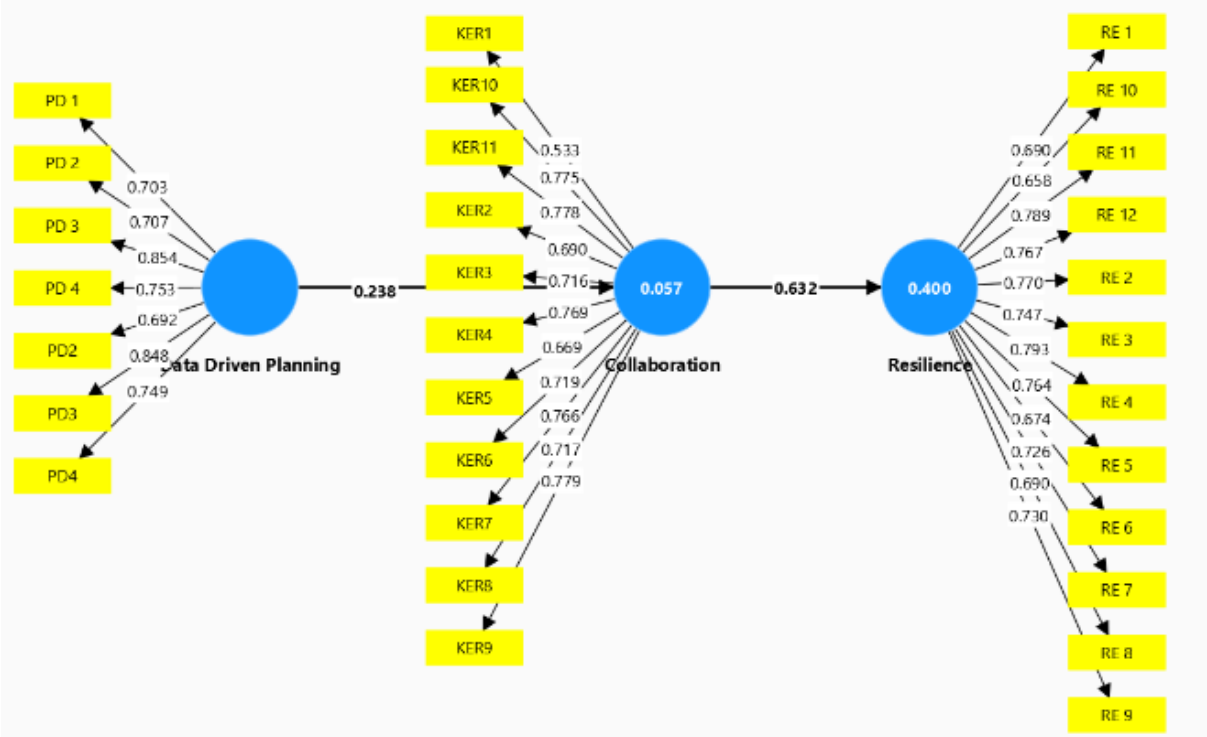

Figure 1. Results of Sem PLS Processing

The structural model was evaluated using the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). The R^2 value for collaboration is 0.057, indicating that data-driven planning explains a relatively small proportion of variance in collaboration. In contrast, the R^2 value for resilience is 0.400, suggesting a moderate level of explanatory power, meaning that collaboration substantially contributes to explaining teacher resilience.

The effect size (f^2) analysis shows that data-driven planning has a small effect on collaboration (f^2 = 0.060), whereas collaboration has a large effect on resilience (f^2 = 0.666). This indicates that collaboration plays a dominant role in influencing resilience compared to the direct contribution of planning.

Furthermore, predictive relevance (Q^2) was assessed using the blindfolding procedure. The Q^2 values for collaboration (Q^2 = 0.029) and resilience (Q^2 = 0.211) are both greater than zero, indicating that the model has predictive relevance. Specifically, the predictive relevance for resilience is moderate, while collaboration shows a relatively weak predictive capability.

The following is a description of Results of Structural Path Coefficients in the PLS-SEM Model:

Despite the relatively small effect size, the results show that data-driven planning has a positive and significant impact on collaboration (β = 0.238, $p < 0.001$). This implies that while planning helps foster teamwork, other elements might also be important.

Collaboration is a major factor in determining teacher resilience, as evidenced by its strong and significant effect on resilience (β = 0.632, $p < 0.001$) and large effect size (f^2 = 0.666).The mediating role of collaboration is confirmed by the significant indirect effect of data-driven planning on resilience through collaboration (β = 0.151, $p < 0.001$). This result suggests that collaborative processes, rather than a direct pathway, are the primary means by which planning influences resilience.

Table 2. Results of Structural Path Coefficients in the PLS-SEM Model.

Variabel	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Data-Driven Planning -> Collaboration	0.238	0.247	0.049	4.908	0.000
Collaboration -> Resilience	0.632	0.635	0.036	17.689	0.000
Data-Driven Planning -> Collaboration -> Resilience	0.151	0.157	0.034	4.457	0.000

Discussion

This study's results give us important information about how data-driven planning, collaboration, and teacher resilience are connected. Theoretically, these results can be elucidated through Organizational Resilience Theory, which posits that resilience is not merely an individual attribute but is developed through organizational processes and interactions. The substantial impact of collaboration on resilience ($\beta = 0.632$) signifies that resilience arises from collective practices, wherein educators depend on shared support systems, effective communication, and collaborative problem-solving to navigate challenges.

The results also strongly support Social Capital Theory, which says that social relationships, trust, and networks are important for improving both individual and organizational outcomes (van Wingerden & Poell, 2019; Y. Zhu & Li, 2023). When teachers work together, they build social capital in the form of trust, shared rules, and support for each other. This makes teachers more mentally and professionally strong. The substantial effect size of collaboration on resilience validates that social interaction is an essential resource in educational contexts.

This study also supports Collaborative Leadership Theory, which says that in complex organizations, leadership styles that encourage participation, shared decision-making, and collective responsibility are more effective (Gräsel, 2021; Saltos et al., 2025). The notable correlation between data-driven planning and collaboration ($\beta = 0.238$) suggests that when school leaders employ data for decision-making, they inadvertently promote more inclusive and participatory practices among educators.

From a theoretical contribution standpoint, this study enhances the current literature by amalgamating data-driven planning, collaboration, and resilience into a unified empirical model(Ripan, 2023). Previous research has predominantly analyzed these variables in isolation; however, this study illustrates that collaboration serves as a mediating mechanism elucidating the impact of planning processes on resilience outcomes. This finding enhances comprehension of the indirect mechanisms by which organizational practices influence teacher capacity in dynamic contexts.

These findings are especially important for Indonesian education. Schools, especially high schools, still mostly use data-driven planning to follow rules rather than as a strategic tool for making decisions(Amiruddin & Chardo, 2023; Mosey et al., 2025a; Mulawarman et al., 2025; Oenaimnou et al., 2023). This study demonstrates that the active utilization and collaborative discussion of data can cultivate significant engagement among educators and enhance their preparedness to confront educational challenges, such as curriculum modifications and escalating professional expectations.

From a practical point of view, the results show that school leaders should do more than just collect and report data. They should also help people work together to use the data. Regular meetings to look at data, working together to plan lessons, and evaluating student work as a group are all ways to do this(Bennett, 2020; Cosner, 2014; Schildkamp et al., 2019a; Supovitz & Morrison, 2015). School principals should also set up structured ways for teachers to work together, like professional learning communities, to make sure that working together becomes a regular part of their jobs instead of just something that

happens from time to time(Agustina et al., 2025; Kiral, 2024).

The results underscore the necessity for educational policies that foster the cultivation of collaborative cultures within schools. Policymakers should create frameworks that promote participatory planning, offer teachers training in data literacy, and make collaboration a key part of how schools are judged. Increasing institutional support for collaborative practices will make data-driven planning more effective and help teachers and educational organizations stay strong over time.

This study shows that collaboration is an important link between data-driven planning and resilience. Schools that successfully combine data use with collaborative practices are better able to help teachers build long-term resilience. So, creating a culture of planning based on data and working together should be a top strategic goal for making educational systems more flexible and long-lasting(Gummadi, 2025; Mosey et al., 2025b; Schildkamp et al., 2019b).

CONCLUSION AND SUGGESTION

This study shows that planning based on data has a big and positive effect on collaboration, and that collaboration has a big effect on teacher resilience. Collaboration also plays a very important mediating role, which means that planning affects resilience mostly through collaborative processes.

These results validate that teacher resilience is influenced not solely by individual capabilities but also by organizational practices, especially collaboration facilitated by data-informed decision-making. This study enhances the literature by amalgamating data-driven planning, collaboration, and resilience into a singular empirical model, emphasizing the mediating function of collaboration.

In practice, schools should make the data-driven culture stronger by encouraging professional learning communities, working together to plan, and doing regular activities that make them think about the data. At the policy level, it is important to support data literacy and collaborative practices to make teachers more resilient and schools more sustainable.

CRediT authorship contribution statement

Tia Ayu Ningrum: Conceptualization, methodology, formal analysis, writing, original draft.
Anisah: Methodology, data curation, investigation, writing review & editing.
Fifin Wildanah: formal analysis, validation, visualization.
Nikmah Hayati: Data collection, investigation, resources.
Irsyad: Supervision, validation, writing review & editing.
Aini Septia Rahmalita: Project administration, resources, data curation.
Mahaliza Mansor: review & editing.

Declaration of competing interests

The authors employed AI-based tools, including Grammarly and ChatGPT, for language refinement, proofreading, and enhancing clarity during the preparation of this work. The authors carefully read and edited everything that was written, and they are fully responsible for the publication's content.

Declaration of the use of AI

The authors employed AI-based tools, including Grammarly and ChatGPT, for language refinement, proofreading, and enhancing clarity during the preparation of this work. The authors carefully read and edited everything that was written, and they are fully responsible for the publication's content.

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