Data-Based Planning In Vocational High School 1 Manado

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Abstract.

This study aims to describe and analyze the data-driven planning process implemented at Vocational High School (SMK) Negeri 1 Manado. Using a qualitative case study approach, data were collected through observation, interviews, and documentation from February to April 2025. The study focuses on three main stages: data-based identification of educational problems, root cause reflection, and the improvement of school programs and activities. The findings reveal that SMK Negeri 1 Manado systematically conducts problem identification using Education Report Card data and other internal data, involving various stakeholders. The root cause reflection is conducted collectively and systematically using gap analysis and data triangulation methods. Program improvements are designed based on identification and reflection results, with specific goals and measurable indicators, which are then incorporated into the Annual Work Plan and School Activity and Budget Plan. These stages form a sustainable data-driven planning cycle supported by proactive leadership and a collaborative culture within the school. This study contributes as a best practice model of evidence-based educational planning for school quality improvement.

Keywords: *Data-driven planning; SMK Negeri 1 Manado, problem identification; root cause reflection; program improvement and case study.*

I. INTRODUCTION

The development of high-quality human resources is fundamental to the advancement of any nation. Education plays a central role in shaping individuals who are competent, adaptive, and responsive to the ever-evolving demands of the global economy. Within this framework, vocational education has emerged as a strategic priority, particularly in developing countries like Indonesia, where the alignment between educational outputs and labor market needs remains a pressing concern. Vocational schools are expected to equip students with practical skills and professional competencies that are directly relevant to industry requirements (Ministry of Education and Culture, 2018; World Bank, 2020).In Indonesia, vocational education is regulated under the National Education System Law (Law No. 20 of 2003), which designates vocational high schools (Sekolah Menengah Kejuruan or SMK) as formal institutions at the secondary level aimed at preparing students for specific occupations. Furthermore, Ministerial Regulation No. 34 of 2018 on National Standards for SMKs emphasizes that the primary goal of vocational education is to produce graduates who are ready to work, innovate, and compete globally. Despite this strong legal foundation, the actual implementation of vocational education still faces numerous challenges, such as outdated curricula, limited industry collaboration, insufficient practical training, and uneven quality across schools (OECD, 2021; Hadromi, 2020).Vocational High School 1 Manado (SMKN 1 Manado) represents a compelling case within this landscape.

Accredited with the highest rating and recognized as a *Center of Excellence*, the school has demonstrated strong managerial practices and compliance with national standards. However, these formal achievements do not necessarily reflect the school's readiness to respond effectively to industry demands or the real challenges faced by students and teachers in daily practice. Preliminary observations indicate that while the school possesses comprehensive planning documents and administrative structures, the planning process itself may not always be grounded in actual data analysis or problem-based reflection. To address these gaps, the Indonesian Ministry of Education, Culture, Research, and Technology has promoted a policy of data-based planning as part of its broader "Merdeka Belajar" (Freedom to Learn) initiative (Kemendikbudristek, 2022). This approach encourages schools to move beyond compliance and adopt a

culture of evidence-based decision-making. Data-based planning is defined as a systematic process that uses educational data—such as student performance, attendance rates, teacher competencies, and stakeholder feedback—to identify problems, analyze root causes, and design targeted programs for improvement (Schildkamp, Poortman, & Handelzalts, 2016). The concept aligns with the global movement toward Data-Driven Decision Making (DDDM), which posits that effective school improvement requires accurate, relevant, and timely information to guide leadership and planning (Mandinach & Gummer, 2016).

While the policy provides a framework, the success of data-based planning largely depends on how it is interpreted and implemented at the school level. Studies have shown that many schools struggle with this process due to a lack of data literacy, fragmented systems, and a tendency to treat planning as a bureaucratic task rather than a strategic function (Herwanti, Suryadi, & Soetjipto, 2022; Lengkong, 2024). In this context, investigating how SMKN 1 Manado—an institution with a reputation for excellence—implements data-based planning offers valuable insights. It provides an opportunity to examine how data is used to identify priority issues, how stakeholders engage in reflective analysis, and how planning outcomes are translated into actionable programs and activities.This research seeks to explore and describe the process of data-based planning at SMKN 1 Manado. By focusing on the mechanisms of problem identification, root cause reflection, and program improvement, the study aims to understand how data-driven practices are embedded within the school's planning cycle. The findings are expected to inform both theoretical discourse and practical strategies in educational management, particularly in the context of vocational education where responsiveness to industry dynamics and student outcomes is critical.

II. METHODS

This study employed a qualitative case study approach (Creswell, 2014; Sugiyono, 2013) to explore data-based planning as both a process and an outcome, focusing on SMK Negeri 1 Manado. The research was conducted from February to April 2025 using the researcher as the primary instrument, supported by experienced thesis advisors. Qualitative data were collected through non-participant observation, unstructured interviews, and document analysis. The primary data source was the school principal, with secondary data triangulated from the vice principal, teachers, and school committee members. Observations focused on school environments and relevant activities, interviews followed ethical qualitative practices to explore informant perspectives deeply, and document analysis involved structured yet adaptive examination of planning-related documents. Data analysis followed Miles, Huberman, and Saldana's (2014) interactive model of data reduction, display, and conclusion drawing. Trustworthiness of the data was ensured through triangulation for credibility, detailed reporting for transferability, internal and external audits for dependability, and adherence to objective research procedures for confirmability.

III. RESULT AND DISCISSION

Result

The implementation of data-driven planning at SMK Negeri 1 Manado represents a structured and systematic approach aimed at improving school performance through evidence-based decision-making. This process encompasses four key stages: problem identification, root cause reflection, program and activity refinement, and monitoring and evaluation. The entire planning cycle is grounded in educational data, particularly the Education Report Card (Rapor Pendidikan), which provides quantitative indicators of school performance across areas such as student learning outcomes, teaching quality, and school environment.

The first stage, *problem identification*, involves analyzing both external (national) and internal school data. The school leadership team, including the principal and vice principals, engages collaboratively with teaching staff and the school committee to interpret data trends. Key issues such as declining literacy and numeracy levels, low student discipline, and a mismatch between graduates' skills and industry needs were identified as major challenges. These findings were supported by focus group discussions, observation notes, and a review of internal documents like exam scores, classroom assessments, and graduate tracer studies.

The second stage, *root cause analysis*, is conducted through reflective meetings where stakeholders examine underlying factors contributing to the identified problems. A gap analysis approach is used to compare current performance with expected standards. For instance, the low literacy score was traced to inadequate reading culture among students and limited teacher capacity in applying differentiated instruction. The school also noted ineffective anti-drug campaigns and insufficient industry-standard practice equipment as contributing to broader issues of student behavior and vocational readiness.

These reflections are triangulated with qualitative data from interviews, teacher evaluations, and student feedback.In the third stage, *program and activity refinement*, the school develops specific interventions based on the prioritized problems and their root causes. Planning documents such as the School Work Plan (RKT) and the School Budget Activity Plan (RKAS) are revised to include targeted programs with clearly defined objectives, measurable indicators, and realistic timelines. For example, in response to declining literacy rates, the school launched a structured reading program, enhanced library resources, and conducted teacher training on literacy instruction strategies. To address gaps in technical skills, the school implemented the Teaching Factory model, which allows students to engage in real-world production and services in collaboration with industry partners. Resource allocation is a crucial component of this planning stage. Budgetary support is aligned with program priorities to ensure maximum impact. Document analysis of the 2024/2025 RKAS showed significant allocations for professional development, digital learning tools, and procurement of equipment for industrial technology. Human resources are also mobilized strategically: teachers are assigned roles based on their expertise, and collaborative working groups are established to implement and monitor programs. Infrastructure improvements are prioritized to support hands-on learning, including the upgrading of workshop facilities.The final stage, *monitoring and evaluation (M&E)*, is conducted continuously to track the implementation and impact of programs. M&E activities include lesson observations, feedback collection, student performance tracking, and analysis of periodic assessment results. The school uses performance indicators such as student achievement scores, attendance rates, and behavioral reports to assess progress.

Adjustments are made accordingly; programs that are not achieving intended outcomes are reviewed and modified. School leadership emphasizes transparency and accountability, involving all stakeholders in reviewing M&E results through regular meetings and reports.Findings from interviews with the principal, vice principals, and teachers affirm that the success of data-driven planning depends heavily on leadership commitment, collaboration among stakeholders, and a culture of continuous improvement. The principal plays a pivotal role in leading the process, fostering open dialogue, and ensuring that data is used not just for compliance but for transformation. Teachers reported feeling more involved and empowered, as their insights and classroom experiences directly inform planning decisions.Observational data and document reviews support the alignment between planning and practice. For example, programs listed in the RKAS are traceable to issues documented in the Rapor Pendidikan and are implemented with reference to the defined objectives and indicators. The evidence shows a coherent cycle where data informs reflection, reflection drives action, and action is continuously evaluated for improvement.In conclusion, the implementation of data-driven planning at SMK Negeri 1 Manado has proven to be a transformative process that enhances the relevance, quality, and effectiveness of educational programs. The school has successfully integrated national policy directives with local realities, making data not only a tool for reporting but a catalyst for innovation. This model of planning has improved instructional quality, strengthened school-industry linkages, and contributed to better student outcomes. It serves as a replicable best practice for other vocational schools seeking to embrace a culture of data-informed leadership and sustainable school improvement.

Discussion

1. Discussion on the Data-Based Problem Identification Process

a. Analysis of the Effectiveness of the Problem Identification Mechanism

The data-based problem identification process at SMK Negeri 1 Manado demonstrates a high level of effectiveness in utilizing various data sources, particularly the Education Report Card (*Rapor Pendidikan*).

The school does not rely merely on subjective perceptions or assumptions, but instead employs quantitative data as the foundation for recognizing the educational issues it faces. This process is carried out systematically through formal forums such as school management team meetings, departmental discussions, and teacher forums.The Identify–Reflect–Improve cycle, as recommended in the *General Guidelines for Utilizing the Education Report Card*, has been consistently implemented. It begins with problem identification based on available data, followed by reflection on root causes, and continues with the planning of corrective actions. Its effectiveness is evident in the school's ability to detect significant indicator declines—such as in literacy and numeracy—at an early stage and address them through subsequent stages.

b. Discussion on Data Sources Used and Their Development Potential

The primary data source used is the Education Report Card, especially data from the National Assessment (*Asesmen Nasional*), which includes indicators such as literacy, numeracy, safety climate, diversity, and the quality of vocational learning. In addition, the school also utilizes internal data such as daily grades, student attendance records, supervision results of teachers, and documentation from counseling guidance services. This indicates a combination of external (centralized) and local (school-level) data in the identification process.Nonetheless, there remains potential for development, especially in expanding the use of qualitative data such as student interview results, parental feedback, and classroom observations. Strengthening data triangulation would enable the school to gain a deeper understanding of the learning process and educational management conditions.

c. Stakeholder Involvement in Problem Identification

Findings reveal that the problem identification process involves various stakeholders: the principal as the primary leader, vice principals in their respective areas, subject teachers, homeroom teachers, and support units such as the library and laboratory. This multi-stakeholder involvement aligns with the principle of *distributed leadership* in educational management, which encourages collective participation in data-based decision-making.The involvement of teachers and staff shows that the identification process is not purely top-down but rather inclusive. Interview data reveal that teachers are actively engaged in analyzing school exam results and learning data as part of the reflection on instructional issues. This demonstrates the emergence of a *data-informed culture* within the school environment.

d. Relationship of Findings with Relevant Theories and Literature

The problem identification process at SMK Negeri 1 Manado closely aligns with the framework of *Data-Driven Decision Making (DDDM)*, which emphasizes the importance of using objective data to enhance educational performance (Mandinach & Gummer, 2016). DDDM focuses on data utilization as a basis for reflection and decision-making, which is evident in the way the school analyzes literacy and numeracy scores from the National Assessment.From the perspective of educational management, this process reflects the function of strategic planning based on situational data. Problem identification becomes the initial stage in developing school strategic policies, where data is used to map real conditions, identify weaknesses, and direct improvement efforts. This approach also supports the principle of *school-based management*, which promotes school autonomy in designing context-specific solutions.

2. Discussion on the Process of Root Cause Reflection Based on Data

a. Analysis of the Depth and Accuracy of the Reflection Process

The root cause reflection process at SMK Negeri 1 Manado demonstrates a commendable level of depth and precision. The process goes beyond merely identifying symptoms of problems and seeks to understand the underlying factors influencing learning outcomes, school climate, and overall school performance. Reflection is conducted collectively and systematically, involving all key elements of school management, including the principal, vice principals, teachers, and heads of vocational programs.The depth of reflection is indicated by cross-validation steps between data from the Education Report Card and internal school data, such as daily grades, teacher performance evaluations, and classroom supervision data. The school also seeks to uncover secondary root causes by reviewing data from counseling services to confirm findings from the Education Report Card. This approach aligns with the principle of data triangulation in educational evaluation.

b. Effectiveness of Reflection Methods and Techniques

The reflection methods used are functional and contextually appropriate. The school adopts semi-formal approaches such as guided discussions in management team meetings and curriculum forums. In addition, the document titled "PBD Priority Recommendations" serves as an initial guide that directs the reflection process, which can be likened to a simplified root cause analysis approach. This technique is quite effective at the school level because it provides a systematic list of potential root causes that can be re-examined based on internal data.By combining gap analysis, validation through group discussions, and comparisons between qualitative and quantitative data, the reflection process occurs in multiple layers. This indicates that the school is not merely following centralized recommendations passively, but actively verifies and contextualizes them based on local conditions.

c. The Role of Data in Facilitating Understanding of Root Causes

Data plays a central role in the root cause reflection process at SMK Negeri 1 Manado. In line with the principles of evidence-based decision making, data not only directs the identification of issues but also strengthens the rationale for determining the root causes. For example, a decline in literacy scores is not immediately attributed solely to teacher performance, but is further investigated using supervision data, teacher evaluations, and parental involvement.Furthermore, by comparing data from the Education Report Card with internal data (student grades, attendance records, and classroom observations), the school avoids making incorrect generalizations. This enables the school to prioritize improvement efforts based on a more accurate understanding of the field context.

d. Relation to Relevant Literature and Theoretical Frameworks

These findings align with the theory of root cause analysis in educational planning, which emphasizes the importance of systematically investigating the factors behind problems to ensure that the formulated solutions are targeted and sustainable (Parkay & Stanford, 2010). Reflection must go beyond superficial symptoms and instead delve into the systemic context that underlies the issues.Moreover, the involvement of multiple stakeholders in the reflection process illustrates the application of participatory principles in educational management. This is consistent with the *Collaborative Inquiry* model (Nelson et al., 2012), which emphasizes the importance of stakeholder dialogue in understanding and solving problems based on data evidence. Involving teachers, school leaders, and even the school committee reflects a *distributed leadership* approach that prioritizes collaboration and empowerment in decision-making processes.

3. Discussion on the Data-Based Program and Activity Improvement Process

The improvement process of programs and activities at SMK Negeri 1 Manado demonstrates a strong integration of data-driven principles, particularly in formulating goals, indicators, and program targets. Data from the Education Report Card (Rapor Pendidikan) and internal school analyses serve as the primary reference in developing strategic programs. For instance, program objectives are set with specificity and relevance to the identified problems—such as the formulation of a goal to increase literacy scores by 5% within an academic year, which was directly derived from the data highlighting a decline in literacy performance. Success indicators are also grounded in measurable metrics, including improvements in National Assessment scores and an increased number of students achieving the "proficient" literacy category. Moreover, program targets are established realistically and quantitatively, adjusted according to previous achievements and the available resources of the school. These practices align closely with the SMART Goals framework (Specific, Measurable, Achievable, Relevant, and Time-bound), as proposed by Doran (1981), which emphasizes clarity and feasibility in educational planning.A notable strength of SMK Negeri 1 Manado's approach lies in its logical consistency between the identified problems, the root causes, and the solutions designed in the form of targeted programs and activities.

For example, the issue of declining literacy was traced back to underlying causes such as limited teacher reflection, lack of teaching materials, and insufficient professional development. The school responded by designing programs including literacy-focused teacher training, provision of relevant learning resources, and targeted supervisory initiatives. This coherence demonstrates the school's effective

application of the problem-solution fit model, ensuring that the solutions directly address the root causes rather than merely treating superficial symptoms. Such an approach reflects the concept of needs-based planning in education, as advocated by Kaufman and Herman (1991), which prioritizes actual needs over assumptions in the design of educational interventions.Decision-making processes, particularly those related to program prioritization and resource allocation, are also structured around data analysis. Review of RKAS (School Budget Plans) and RKT (Annual Work Plans) documents shows that key programs—such as improving teacher competence, procuring practical tools for vocational training, and fostering reading habits—are given larger budget allocations. Human resources, including productive subject teachers, the Vice Principal of Human Resources, and external trainers, are appointed based on specific needs identified through data analysis.

Additionally, the allocation of facilities and infrastructure, such as teaching factories, is determined by the specific needs of each department and performance indicators (e.g., D.17 and D.19) found in the Education Report Card. This demonstrates an application of strategic resource allocation, where funds and personnel are channeled toward initiatives with the greatest potential impact on educational quality, echoing the principles of evidence-informed budgeting as described by Odden and Picus (2014).Finally, the findings align with the broader literature on strategic planning in education. SMK Negeri 1 Manado exhibits key elements of strategic planning, as outlined by Bryson (2011), such as conducting environmental scanning through national and internal data, identifying strategic issues through root cause analysis, formulating strategic responses through tailored programs, and aligning resources accordingly. Furthermore, the school's approach is consistent with the School Improvement Planning (SIP) model, which emphasizes the use of learning outcome data, active stakeholder involvement, and sustained evaluation in school planning. Through this structured, data-informed, and collaborative process, SMK Negeri 1 Manado exemplifies a comprehensive approach to continuous educational improvement grounded in both empirical data and theoretical frameworks.

4. Interrelationship Between Stages in the Data-Based Planning Process

a. Information Flow Between Stages: Identification → Reflection → Improvement

The findings reveal that the three stages of data-based planning at SMK Negeri 1 Manado—identification, reflection, and improvement—form an integrated and interdependent planning cycle. The identification stage serves as the entry point by mapping the school's objective condition using data from the Education Report Card and internal sources. This is followed by the reflection stage, in which the findings are analyzed to uncover root causes, involving key stakeholders such as school leaders, teachers, and vice principals. The improvement stage translates the results of reflection into concrete programs, where processed data is used to design initiatives, define indicators, and allocate resources. The relationship between these stages is both sequential and iterative, meaning that the outcomes of one cycle serve as inputs for the next, in line with the principle of continuous improvement in educational quality management (Deming, 1986).

b. Feedback and Data Integration in the Planning Cycle

The research also indicates the presence of a feedback loop that strengthens the linkage between stages. Evaluation data from implemented programs is fed back into the next identification phase. Reflection on the effectiveness of these programs also informs the accuracy and validity of the initially identified root causes. Activities such as staff performance evaluations, satisfaction surveys, and instructional supervision act as data bridges between the reflection and improvement stages. Formal forums such as management meetings, work plan discussions, and professional learning communities serve as crucial platforms for ensuring integration and consistency throughout the process.

c. Barriers to Integration

Despite the systematic implementation of data-based planning, several barriers hinder optimal integration of the three stages. First, limited data analysis capacity persists, as some stakeholders lack sufficient skills in interpreting both quantitative and qualitative data to diagnose root problems. Second, time constraints and the absence of a dedicated technical team challenge the depth and quality of reflection and

program design processes. Third, concerns regarding data quality arise due to the Education Report Card's reliance on limited samples (e.g., only grade XI), which sometimes undermines confidence in the validity of conclusions and complicates targeted decision-making.

d. Enabling Factors for Integration

Several enabling factors support the integration of data-based planning at SMK Negeri 1 Manado. Strong leadership commitment is evident, with the principal and management team consistently using data to guide decisions. The school also utilizes official guidance documents and recommendations from the Ministry of Education (e.g., PBD Priority Recommendations) in each stage of planning. Moreover, collective involvement of teachers, vice principals, and education staff fosters a sense of ownership over both the data and the programs developed.

e. Connection with Data-Based Planning Literature

The interrelationship between planning stages reflects the principles of Data-Driven Decision Making (DDDM) in education—a systematic process involving data collection, analysis, reflection, and utilization to enhance teaching and school management (Marsh, Pane, & Hamilton, 2006). Additionally, the process aligns with the cyclical model of school improvement, which emphasizes continuous, collaborative data reflection and planned intervention (Fullan, 2001).

5. Summary of Findings and Discussion

This study explored the implementation of data-based planning at SMK Negeri 1 Manado by focusing on three main stages: problem identification, root cause reflection, and program and activity improvement. These stages were examined using a qualitative approach, supported by field data from observations, interviews, and document analysis, and interpreted through the theoretical frameworks of DDDM, educational management, and strategic planning.In the first stage, the data-based problem identification process demonstrates that the school relies primarily on the Education Report Card, complemented by internal data such as student academic performance, attendance, and teacher supervision. The identification mechanism is structured through management meetings and subject forums involving school leadership and teachers. This practice illustrates the core principle of DDDM, where educational decisions are made based on concrete evidence and stakeholder participation. The identification process effectively maps school conditions in the form of achievement indicators and priority recommendations.

The second stage, root cause reflection, is also conducted systematically. The school does not merely accept the root causes stated in the Report Card; it verifies them using internal data such as teacher performance evaluations, supervision records, and pre- and post-test results.

Reflection is carried out through focused discussions in management meetings and instructional evaluation forums, applying methods such as gap analysis and data triangulation. This stage highlights active stakeholder involvement and aligns with reflective quality management and root cause analysis in education.In the third stage, program and activity improvement, the school translates identification and reflection results into concrete actions. Every initiative included in the Annual Work Plan (RKT) and School Budget Plan (RKAS) targets specific root causes. Program objectives are clearly defined, success indicators are quantitatively measured, and targets are established based on baseline data. This process illustrates a needs-based strategic planning approach and effective resource management.These three stages are interconnected, forming a comprehensive data-based planning cycle. Identification guides reflection, reflection deepens understanding of the root causes, and improvement provides tangible solutions. This process creates a feedback loop that supports sustained quality improvement in the school. Key enablers of successful integration include proactive school leadership, collective stakeholder participation, and the availability of supporting documents from the Ministry.

However, some challenges remain, including limited time for in-depth reflection and technical capacity in data analysis.The findings are supported by qualitative data, including interview excerpts, observation notes, and school documents. Interviews with school leaders reveal a strong awareness of the importance of data in decision-making. Observations of teacher training schedules, practical equipment use, and school budgeting illustrate the concrete implementation of planned programs. Documents such as PBD

Priority Recommendations and operational plans from the Vice Principal of Human Resources provide further evidence of the integration of data, reflection, and action. Overall, data-based planning at SMK Negeri 1 Manado is functioning effectively and may serve as a model of good practice in evidence-based educational management.

IV. CONCLUSION

Based on the findings and discussion regarding the data-based planning process at SMK Negeri 1 Manado, it can be concluded that the school has implemented a structured approach to identifying educational problems by utilizing the Education Report Card as the primary data source, complemented by internal data such as academic performance, attendance records, teacher performance evaluations, and facility data. This identification process is carried out collaboratively, involving school principals, vice principals, department heads, and subject teachers, with priority given to indicators showing the lowest achievement scores or significant declines, in accordance with Data-Driven Decision Making (DDDM) principles.

The reflection stage is conducted in a structured and participatory manner through management forums and working unit discussions. The school uses the "PBD Priority Recommendations" as an initial reference, which is then validated and deepened using internal data such as classroom observations, supervision records, and teacher evaluations. This shows that SMK Negeri 1 Manado is capable of conducting meaningful root cause analysis by actively involving multiple stakeholders. Lastly, the improvement of programs and activities is directly formulated from the results of the identification and reflection stages. Data is utilized to define clear objectives, measurable success indicators, and realistic targets. The preparation of the Annual Work Plan (RKT) and School Budget and Activity Plan (RKAS) demonstrates that the school's improvement efforts are grounded in actual needs and priority results derived from data analysis**.**

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