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Evaluation of the Pintar Bersama Daihatsu (PBD) Program in Enhancing Students' Hard Skills

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Abstract

The skills mismatch between vocational school graduates and industry demands remains a persistent issue in Indonesia, particularly in the automotive sector, where technological advancements require students to master increasingly complex competencies. This study evaluates the effectiveness of the Pintar Bersama Daihatsu (PBD) Program in enhancing the hard skills of students in the Light Vehicle Engineering (LVE/TKR) program at SMK Negeri 1 Sukorejo. Using a descriptive evaluative design with a qualitative approach, data were collected through observations, semi-structured interviews, questionnaires, and document analysis to assess program implementation, workshop practices, and competency outcomes. The findings reveal that the PBD Program significantly improved students' technical abilities in diagnostics, periodic maintenance, and repair work, as evidenced by their increased proficiency in operating industry-standard tools and adhering to Daihatsu's Standard Operating Procedures (SOPs). The structured hands-on training environment and instructor guidance played a crucial role in shaping these outcomes. However, several constraints were identified, including limited practice time, insufficient training vehicles, and high student-to-instructor ratios, which restricted opportunities for deeper skill mastery. Despite these challenges, the program effectively aligned school-based learning with industrial expectations and contributed to reducing the skills gap commonly observed among vocational graduates. The results underscore the importance of sustained school–industry collaboration, Teaching Factory–based learning, and investment in up-to-date workshop facilities to support vocational education reform. This study provides empirical evidence that manufacturer-standard workshop programs can serve as a viable model for enhancing technical competence and strengthening work readiness in the automotive vocational sector.

Keywords: hard skills, vocational education, automotive engineering, industry collaboration, Teaching Factory

Introduction

Vocational education and training (VET) has increasingly become a strategic priority in many countries as economies transform under the pressures of digitalization, automation, and Industry 4.0. In Indonesia, the rapid expansion of the automotive sector, driven by major manufacturers such as Daihatsu and Astra, has intensified the demand for a skilled workforce in Light Vehicle Engineering (LVE/TKR) (Nawi et al., 2024). However, this growing demand is not yet matched by the competencies of many vocational graduates. A persistent skills mismatch remains evident, where the technical abilities and work readiness of graduates frequently fall short of industry standards, contributing to unemployment and underemployment among SMK alumni ("Competency and Readiness of Trainers in Integrating the Employability Skills Into the TVET Training Program," 2022). This situation signals the need for more effective models of vocational training that integrate authentic industry practices into school-based learning.

At the policy level, Indonesia has promoted the Link and Match agenda as a key strategy to strengthen the alignment between vocational schools and the world of work. Within this framework, vocational education is not only expected to provide theoretical knowledge but also to produce graduates who possess concrete technical competencies that are directly applicable in industrial settings (Varma & Malik, 2024). In this context, Program Pintar Bersama Daihatsu (PBD) represents a concrete form of collaboration between PT Astra Daihatsu Motor and partner vocational schools, including SMK Negeri 1 Sukorejo. Through the establishment of an industry-standard workshop, use of manufacturer-approved equipment, and application of industrial Standard Operating Procedures (SOPs), the PBD program is explicitly designed to strengthen students' hard skills in the automotive field and to bring the realities of the workplace into the school environment.

Recent studies in the field of TVET have extensively discussed the purposes and outcomes of vocational education, particularly regarding employability and the integration of practical skills into curricula. Varma and Malik (2024) emphasize that the core mandate of vocational education is to equip students with labor-market-relevant skills that enhance their employability and adaptability in dynamic work environments. Similarly, in the Indonesian context, Wagiran et al. (2023) highlight that the success of Link and Match policies depends on the depth and quality of school–industry collaboration, including co-designed curricula, shared facilities, and joint assessment mechanisms. When these collaborations function effectively, they can reduce the skills gap by ensuring that what is taught in schools reflects the evolving demands of industry (Legg-Jack & Ndebele, 2022).

Within the discourse on vocational competence, scholars have also underscored the importance of differentiating between hard skills and soft skills. Hard skills refer to job-specific technical abilities, such as mechanical diagnostics, operation of workshop equipment, and application of automotive technologies, which are critical in LVE/TKR programs (Poláková et al., 2023). Soft skills, on the other hand, encompass communication, teamwork, problem-solving, and work ethic, which are equally important for sustainable employability in Industry 4.0 (Kasim et al., 2024). While recent literature recognizes the need for a balanced development of both skill domains, it also acknowledges that in many vocational contexts the acquisition of hard skills remains suboptimal due to limitations in facilities, instructor capacity, and opportunities for authentic practice (Poláková et al., 2023; Kasim et al., 2024).

To address these challenges, work-based learning approaches and Teaching Factory models have been widely proposed as effective pedagogical frameworks. These approaches advocate for learning environments that replicate or directly integrate real industrial workflows, enabling students to apply theoretical knowledge to authentic tasks (Thapa, 2024). Stephen and Festus (2022) argue that Teaching Factory settings where production, service, and learning occur simultaneously can significantly enhance students' technical mastery and professional behavior. In the automotive sector, Rachmawati et al. (2024) show that collaboration with brand-specific workshops and adherence to manufacturer SOPs contribute to improved diagnostic skills, maintenance competence, and familiarity with modern equipment among vocational students.

Despite these promising developments, empirical evidence indicates that many Indonesian vocational schools still struggle with inadequate industrial exposure, limited practice facilities, and outdated equipment (Varma & Malik, 2024). These constraints hinder students' work readiness and weaken the impact of vocational education on employment outcomes (Legg-Jack & Ndebele, 2022). Although several studies have examined school–industry cooperation and the implementation of Teaching Factory or work-based learning models, relatively few have conducted systematic evaluations of specific branded industry programs such as Pintar Bersama Daihatsu at the level of individual schools and particular competencies. In particular,

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there is a lack of detailed empirical analysis on how such programs influence the hard skills of students in Light Vehicle Engineering within authentic, manufacturer-standard workshop environments.

The existing literature therefore reveals a clear gap. While prior studies have highlighted the importance of Link and Match policies, the role of hard and soft skills in TVET, and the potential of Teaching Factory and work-based learning in enhancing vocational competencies, limited attention has been given to evaluating the concrete implementation and outcomes of industry-branded partnership programs in Indonesian SMKs. Few studies have systematically examined how programs like PBD operate within specific institutional contexts—such as SMK Negeri 1 Sukorejo—and to what extent they effectively strengthen students' technical competencies, align school-based training with industrial SOPs, and address the persistent skills mismatch in the automotive sector. Moreover, the enabling and constraining factors that affect the effectiveness of such programs remain underexplored from both empirical and theoretical perspectives.

Responding to this gap, the present study evaluates the implementation of the Pintar Bersama Daihatsu (PBD) Workshop Program at SMK Negeri 1 Sukorejo, with a particular focus on the Light Vehicle Engineering (LVE/TKR) competence. Specifically, this study seeks to answer the following research questions: (1) To what extent does the PBD program enhance the hard skills of LVE/TKR students at SMK Negeri 1 Sukorejo? (2) How is the program planned, implemented, monitored, and evaluated in relation to industry training standards and Teaching Factory principles? and (3) What supporting and inhibiting factors influence the effectiveness of the program in strengthening students' technical competencies? The novelty of this study lies in its systematic, school-level evaluation of a branded industry partnership program using an integrated perspective of hard-skill development, work-based learning, and Link and Match policy. By focusing on the concrete practices and outcomes of the PBD workshop, this research extends existing theoretical and empirical work on industry–school collaboration and offers context-specific insights that can inform future reforms in Indonesia's automotive vocational education.

To address the persistent skills mismatch between vocational education graduates and industry requirements, particularly in the automotive sector, various school–industry collaboration models have been implemented in Indonesia. While prior studies have broadly examined Link and Match policies, Teaching Factory approaches, and work-based learning in vocational education, empirical evaluations of branded industry partnership programs implemented at the school level remain limited. Most existing research focuses on general collaboration frameworks or multi-school comparisons, often overlooking how manufacturer-specific programs operate within a single institutional context and influence concrete technical competencies.

In this regard, the Pintar Bersama Daihatsu (PBD) Program represents a distinctive form of school–industry collaboration. Unlike conventional partnerships, the PBD program is a branded and standardized manufacturer-led initiative, integrating Daihatsu-certified workshop infrastructure, industrial Standard Operating Procedures (SOPs), and industry-aligned instructional practices directly into the school environment. This structure positions the PBD program not merely as an enrichment activity, but as a systemic intervention designed to replicate authentic automotive service workflows within vocational schools.

Furthermore, this study deliberately focuses on automotive-specific hard skills, such as diagnostics, periodic maintenance, and repair competencies in the Light Vehicle Engineering (LVE/TKR) program. While previous TVET research has emphasized employability skills in general, fewer studies have examined job-specific technical competencies aligned with particular industrial brands and technologies. By centering on hard-skill mastery within a

Daihatsu-standard workshop, this research responds to the need for more granular, competency-focused evaluations in vocational education.

Importantly, this study is conducted through an in-depth evaluation at the school level, namely SMK Negeri 1 Sukorejo. This micro-level focus enables a detailed examination of program planning, implementation, learning processes, and outcomes within a real institutional setting. Such depth is rarely achieved in broader survey-based studies, yet it is crucial for understanding how industry programs function operationally and pedagogically. Therefore, the novelty of this research lies in its integrated evaluation of a branded automotive partnership program, its explicit focus on automotive hard skills, and its school-level empirical depth, contributing new insights to vocational education research and practice.

Method

This study employed a descriptive evaluative research design with a qualitative approach, which was selected to accurately answer the research questions concerning the implementation and effectiveness of the Pintar Bersama Daihatsu (PBD) Program in improving students' hard skills. The descriptive evaluative design was appropriate because it allowed the researcher to examine the alignment between program implementation and industry training standards, while qualitatively capturing experiences, perceptions, and contextual factors influencing the program. This design further enabled a systematic assessment of planning, execution, monitoring, and outcomes within an authentic school–industry collaboration setting.

The subjects of the research consisted of students enrolled in the Light Vehicle Engineering (LVE/TKR) expertise program at SMK Negeri 1 Sukorejo who participated in the PBD workshop activities, teachers responsible for supervising the program, and industry instructors affiliated with PT Astra Daihatsu Motor. The population included all students involved in the PBD program during the implementation period, while the sample was determined purposively to involve respondents who had direct experience with program activities. Additional informants, such as school administrators and workshop coordinators, were also included to provide complementary insights into managerial and operational aspects of the program.

Data were collected through multiple techniques to ensure depth, validity, and triangulation. First, direct observation was conducted in the PBD workshop to document learning activities, use of equipment, adherence to Standard Operating Procedures (SOPs), and students' performance during practical sessions. Second, semi-structured interviews were administered to supervising teachers, industry instructors, and student participants to explore their perspectives on the effectiveness of the program, challenges encountered, and perceived impacts on skill development. Third, questionnaires were distributed to gather quantitative and qualitative feedback regarding students' experiences, competency gains, and program implementation quality. Fourth, document analysis was performed on curriculum materials, activity reports, workshop SOPs, and partnership documentation between the school and PT Astra Daihatsu Motor. Together, these techniques provided comprehensive and triangulated data relevant to the evaluation.

To ensure the accuracy and credibility of findings, data collection instruments were developed based on program indicators aligned with industry standards, such as facility readiness, instructional procedures, competency attainment, and adherence to Teaching Factory principles. Observation checklists were structured to capture procedural compliance, while interview guides were designed to probe deeper into stakeholders' experiences and reflections. Questionnaire items were constructed to assess students' perceptions of their hard-skill

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development and the quality of learning processes. All instruments underwent expert validation prior to use to ensure clarity, relevance, and alignment with research objectives.

The data analysis process followed an interactive qualitative framework consisting of data reduction, data display, and conclusion drawing. Initially, all data obtained from observations, interviews, questionnaires, and documents were organized, coded, and categorized based on emerging themes related to program planning, implementation, evaluation, and outcomes. Patterns were identified to compare actual practices with industry standards and theoretical frameworks such as work-based learning and Teaching Factory models. Thematic analysis was used to interpret students' skill improvements, challenges in program implementation, and the contributing or inhibiting factors that shaped the program's effectiveness. These findings were then synthesized into evaluative conclusions that addressed the research questions and highlighted the program's implications for vocational education development.

Overall, the methodological procedures used in this study were systematically structured and sufficiently detailed to allow replication by future researchers. The combination of purposive sampling, multiple data-collection methods, validated instruments, and rigorous thematic analysis ensured that the study accurately captured the complexity of the PBD program and provided robust evidence for evaluating its impact on hard-skill development.

Results

Implementation of the PBD Program at SMK Negeri 1 Sukorejo

The evaluation revealed that the Pintar Bersama Daihatsu (PBD) Program was implemented according to the planned structure, covering preparation, orientation, core workshop activities, monitoring, and final assessment. Observational data indicated that students consistently participated in workshop routines following Daihatsu's Standard Operating Procedures (SOPs), including 5R/5S practices, safety protocols, and structured maintenance tasks. Documentation confirmed that the school provided an industry-standard workshop environment equipped with essential tools, diagnostic devices, and supporting learning resources.

Additionally, interviews with supervising teachers and industry instructors showed that teaching and learning activities followed a Teaching Factory-oriented workflow. Students engaged in real service tasks such as vehicle inspection, periodic maintenance, and minor repair procedures. Industry instructors validated that the procedures used during student practice were aligned with Daihatsu service guidelines.

Students' Hard Skill Achievement in Automotive Competencies

Data from competency assessments, workshop logbooks, and instructor evaluations indicate that the PBD program contributed to the improvement of students' technical abilities. Students demonstrated increased proficiency in diagnostic procedures, repair tasks, and operation of workshop tools. Table 1 summarizes key skill domains and the number of students achieving each competency category.

Table 1. Students' Hard Skill Performance in Key Technical Domains

Competency Domain	Number of Students Achieving Standard	Number of Students Below Standard
Vehicle Inspection	27	6
Periodic Maintenance Procedures	25	8

Diagnostic Tool Operation (OBD Scan)	22	11
Minor Repair Tasks	24	9
Application of SOPs and Safety Rules	29	4
Total	127	38

These findings show that most students reached the expected level of competency in core automotive tasks after participating in the PBD workshop activities.

Workshop Infrastructure and Learning Support

Observational and documentation data indicated that the workshop facilities generally met Daihatsu's operational standards. The workshop was equipped with essential tools, though several units of practice vehicles were noted as insufficient to support simultaneous group practice. Learning support from industry instructors was available, though limited in frequency due to scheduling constraints.

The school provided structured learning modules and logbooks that guided students' activities. Students reported that access to diagnostic tools, special tools, and real vehicle units significantly supported the development of their technical skills.

Factors Supporting and Hindering Program Implementation

Data from interviews highlight several enabling factors during program implementation. Supportive factors included the availability of industry-standard tools, Daihatsu-certified workshop procedures, and the involvement of industry instructors. Students also expressed that direct exposure to real vehicle cases enhanced their understanding of automotive systems.

Conversely, hindering factors were identified. Limited practice time and an imbalance between the number of students and available practice vehicles were frequently reported. Teachers and industry instructors noted that these limitations reduced students' opportunities to deepen certain competencies, especially diagnostic skills requiring repeated hands-on practice.

Student Perspectives on Skill Improvement

Based on student questionnaires, most participants acknowledged improvements in their technical abilities, confidence, and familiarity with industrial work culture. Students indicated that tasks such as engine inspection, OBD scanning, and vehicle maintenance were clearer and easier to perform after repeated industry-based practice sessions. Many also noted that the structured workflow used in the PBD workshop helped them understand real automotive service processes.

Discussion

From a theoretical perspective, this study contributes to the vocational education literature by extending the application of Teaching Factory and work-based learning theories into the context of branded manufacturer partnerships. While Teaching Factory models traditionally emphasize production-based learning and industry simulation, this research demonstrates that manufacturer-standard workshops function as an advanced form of Teaching Factory, where learning is governed not only by pedagogical objectives but also by brand-specific industrial norms, SOPs, and technological standards. This finding refines existing theory by illustrating that effective vocational learning environments are strengthened when industrial identity and operational discipline are explicitly embedded in instructional design. Consequently, this study

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advances theoretical understanding by positioning branded industry programs as a distinct and empirically grounded variant of Teaching Factory implementation, particularly relevant for competency-based vocational education in technologically intensive sectors such as automotive engineering.

The findings of this study demonstrate that the Pintar Bersama Daihatsu (PBD) Program significantly strengthened students' hard skills in vehicle diagnostics, periodic maintenance, and repair within the Light Vehicle Engineering (LVE/TKR) expertise at SMK Negeri 1 Sukorejo. The notable improvement in students' adherence to Standard Operating Procedures (SOPs) reflects the effectiveness of structured, industry-based learning environments. This aligns with the research objective, as the PBD program explicitly aims to transfer workplace-standard competencies into school-based settings. Quantitative performance data show that most students achieved competency standards in core automotive skills after participating in the program, confirming that hands-on practice plays a central role in enhancing vocational skill mastery. These results suggest that the presence of industrial-grade tools, standardized workflows, and guided mentoring creates a learning ecosystem conducive to the development of technical proficiency, thereby fulfilling the fundamental requirements of vocational training in the automotive sector.

The findings corroborate previous studies emphasizing the value of work-based learning and Teaching Factory approaches in strengthening students' technical competence. Poláková et al. (2023) highlighted that practical learning settings enable deeper mastery of both hard and soft skills, while Thapa (2024) noted that exposure to real work processes accelerates student readiness for professional environments. Similarly, this study reinforces Muslim et al. (2020), who argued that the alignment of educational activities with industry standards significantly elevates student performance. However, consistent with Varma and Malik (2024) and Legg-Jack & Ndebele (2022), this research also reveals ongoing challenges such as insufficient equipment, limited practice opportunities, and constrained instructor capacity within vocational schools. The PBD initiative demonstrates how branded industry partnerships can partially overcome these systemic gaps, yet limiting conditions remain. Thus, the results both support existing literature and extend it by offering empirical insights into the implementation of a manufacturer-standard workshop model in a technical and vocational education setting.

The observed improvements in students' hard skills carry important theoretical and practical implications. From a theoretical perspective, the study strengthens the argument that effective vocational education must integrate structured industrial practices, thereby affirming the principles of the Link and Match policy and Teaching Factory models. Practically, the results suggest that consistent involvement of industry partners can significantly elevate the quality of school-based workshops, ensuring that students receive relevant, up-to-date training aligned with real-world expectations. This has direct implications for curriculum development, school–industry cooperation mechanisms, and teacher professional development within SMKs. For the automotive sector, the findings highlight a viable pathway for producing work-ready graduates capable of contributing to technological demands in the era of Industry 4.0. The PBD model thus serves as a replicable framework that could inform nationwide vocational reform strategies.

Despite the promising results, this study is not without limitations. The primary constraint lies in the limited duration of the PBD program, which restricted students' opportunities for deeper skill specialization, particularly in advanced diagnostics and repair tasks. The availability of practice vehicles and diagnostic equipment was also limited relative to the number of participants, reducing the frequency of hands-on engagement for some students. Methodologically, the sample size was confined to a single school context, which may limit the generalizability of findings to other institutions with different resources or industry partnerships.

Additionally, data collection relied partly on self-reported perceptions, which may introduce subjective bias. These limitations should be considered when interpreting the overall effectiveness of the program.

Future studies could explore longitudinal evaluations of PBD or similar industry-based programs to determine long-term impacts on graduate employability and workplace performance. Comparative research across multiple vocational schools with varying levels of industry collaboration would provide a broader understanding of factors influencing program effectiveness. Future research should also examine the integration of soft skill development within hard-skill-focused programs, given the increasing demand for hybrid competencies in Industry 4.0. Methodological improvements may include mixed-methods designs incorporating more extensive quantitative measures, such as skill performance scores, time-on-task analyses, or competency progression tracking. Finally, research into optimizing instructor-to-student ratios and expanding automotive training technologies could inform policy decisions aiming to strengthen vocational education quality nationwide.

The findings of this study provide empirical evidence that the Pintar Bersama Daihatsu (PBD) Program effectively enhances automotive-specific hard skills among Light Vehicle Engineering students at the school level. Unlike previous studies that discuss vocational–industry collaboration in general terms, this research demonstrates how a branded manufacturer partnership concretely translates industrial standards into daily learning practices. Students' improved performance in diagnostics, maintenance, and repair tasks indicates that alignment with Daihatsu's SOPs and service workflows plays a decisive role in shaping technical competence.

This study extends existing work on Teaching Factory and work-based learning by showing that brand-based standardization strengthens skill transfer beyond conventional industry simulations. Prior research has emphasized the importance of authentic practice environments; however, the present findings suggest that manufacturer-certified procedures and tools provide a higher level of authenticity, leading to more consistent competency attainment. The structured nature of the PBD workshop minimizes variability in instructional quality and reinforces procedural discipline, which is essential in automotive service contexts.

Moreover, the school-level depth of this evaluation reveals both enabling and constraining factors that are often overlooked in broader studies. While the PBD program successfully bridges the gap between school learning and industrial expectations, limitations related to practice duration, equipment availability, and instructor ratios persist. These findings highlight that even highly structured industry programs require institutional support and resource optimization to achieve maximal impact. By identifying these dynamics, this study contributes nuanced insights into how branded partnerships function in real vocational school settings, offering practical implications for policymakers and educators seeking scalable and sustainable vocational training models.

Conclusion

This study concludes that the implementation of the Pintar Bersama Daihatsu (PBD) Program at SMK Negeri 1 Sukorejo has made a substantial contribution to the improvement of students' hard skills in the Light Vehicle Engineering (LVE/TKR) program. The structured integration of industry-standard tools, Standard Operating Procedures (SOPs), and real-world service workflows provided students with meaningful hands-on learning experiences that significantly strengthened their competencies in diagnostics, periodic maintenance, and repair tasks. The findings demonstrate that the PBD model effectively bridges the gap between school-based

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learning and industry expectations by fostering an environment that mirrors professional automotive service operations.

Moreover, the study confirms that industry partnerships play a critical role in enhancing the relevance and quality of vocational education. The PBD Program serves as a mechanism through which vocational schools can align their curriculum and training processes with contemporary automotive technologies and workplace requirements. Although the program achieved substantial outcomes, several challenges—such as limited practice time, insufficient vehicle units, and high student-to-instructor ratios—indicate the need for further optimization. Nonetheless, the results clearly show that the PBD Program positively contributes to reducing the skills mismatch commonly faced by vocational graduates in Indonesia.

Overall, this research provides empirical evidence supporting the value of manufacturer-standard workshop programs in strengthening technical skill acquisition in vocational education. It highlights the importance of operational alignment between schools and industry to ensure that students graduate with the competencies needed to thrive in the evolving automotive sector, particularly within the context of Industry 4.0.

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