Volume 1 Issue 3 (June,2024)
Jurnal of Pedagogi : Jurnal Pendidikan
ISSN: : 3046-9554 (Online)

Innovative Models for SMK and Industry Partnerships Aligned with the *Merdeka Belajar* Curriculum

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Abstract
The *Merdeka Belajar* curriculum represents a significant shift in Indonesia's educational landscape, emphasizing freedom in learning and the development of critical thinking and practical skills. Vocational High Schools (SMKs) play a crucial role in preparing students for the workforce, and effective industry partnerships are essential for achieving the curriculum's goals. Despite their importance, there is a lack of innovative models that facilitate these partnerships effectively. This study aims to explore and propose innovative models for SMK-industry partnerships that align with the Merdeka Belajar curriculum. By identifying and evaluating these models, the study seeks to enhance the quality of vocational education and better prepare students for employment. The research employs a mixed-methods approach, combining qualitative and quantitative data collection techniques. Surveys and interviews with key stakeholders, including educators, industry partners, and policymakers, were conducted to gather insights. Additionally, case studies of successful SMK-industry partnerships were analyzed to identify best practices. The data were then synthesized to develop and evaluate innovative partnership models. Results of the study identify three innovative models for SMK-industry partnerships: Model A, which focuses on co-designed curriculum development; Model B, which emphasizes dual apprenticeship programs; and Model C, which integrates real-world projects into the learning process. Each model was evaluated based on criteria such as effectiveness, scalability, and sustainability. The findings indicate that these models significantly enhance student engagement, skill acquisition, and employability.
Keywords: *Innovative Model; Industry Partnerships; Merdeka Belajar*.

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Received May 15, 2024, Accepted June 20,2024, Published June 27, 2024

Introduction
The *Merdeka Belajar* curriculum, introduced by the Indonesian Ministry of Education and Culture, represents a significant shift in the country's educational landscape. This curriculum focuses on granting more autonomy to educational institutions and fostering student-centered learning approaches. At the core of this educational reform is the cultivation of critical thinking, creativity, and practical skills essential for students to effectively navigate the demands of the contemporary workforce(Dwikoranto, 2023). Vocational High Schools (SMKs) play a crucial role in this new educational paradigm by specializing in equipping students with the technical and vocational skills required by various industries. The *Merdeka Belajar* curriculum emphasizes student independence and the development of their potential, allowing students the freedom to shape their learning paths based on their interests, needs, and potential (Wijaya, 2024) It is designed to promote active and creative engagement while nurturing 21st-century skills among students (Donlon et al., 2020). This curriculum is an evolution of the 2013 curriculum, encouraging students to ask questions, reason critically, and effectively communicate acquired knowledge (Rahayu, 2023).

Furthermore, the *Merdeka Belajar* curriculum is aligned with the vision of Ki Hajar Dewantara, aiming to create a more independent education system rooted in the nation's cultural heritage (Arianti,

DOI: https://doi.org/10.62872/fm59dm48

2023). It encourages innovative and enjoyable education, fostering the development of superior, intelligent, and creative human resources capable of meeting future challenges (Kulsum & Erlitawanty, 2023). The curriculum also places a strong emphasis on teachers' autonomy in designing learning activities and assessments, enhancing their engagement and assessment literacy(Hutami & Putro, 2023). The *Merdeka Belajar* curriculum in Indonesia signifies a transformative approach to education, emphasizing student autonomy, critical thinking, creativity, and practical skills essential for the modern workforce. It represents a departure from traditional educational models towards a more dynamic and student-centered learning environment, preparing students to excel in the challenges of the 21st century.

Effective partnerships between Vocational High Schools (SMKs) and industry are essential for the successful implementation of the *Merdeka Belajar* curriculum in Indonesia. These collaborations play a crucial role in ensuring that the curriculum remains relevant and aligned with the evolving demands of the job market. Industry partners provide valuable insights into current industry standards, technological advancements, and emerging trends, which can be integrated into educational programs at SMKs. By engaging with industry, SMKs can offer students hands-on training and real-world experience, thereby enhancing their employability and readiness for the workforce upon graduation(Flynn et al., 2014).

Industry-school partnerships have been recognized as a novel approach to providing vocational education opportunities, particularly in industries facing skills shortages (Loeis et al., 2023). These collaborations involve various activities such as industry experts visiting schools, exchanging learning resources, and providing opportunities for students to gain work experience and qualifications with industry partners (Attard et al., 2021). By forming partnerships with industry, vocational teachers can engage in curriculum design that aligns with industry needs, establishing a stronger connection between vocational education and the labor market (Zhao, 2024). Research indicates that collaborative partnerships between academic institutions and industry entities can lead to impactful student learning experiences and research outcomes that address both academic rigor and practical relevance(Speier-Pero & Schoenherr, 2020). In the context of Vocational High Schools, partnerships with industries in Central Java have been shown to enhance the competency of graduates, making them more relevant to business and industry needs in the era of Industry 4.0 (Wahjusaputri & Nastiti, 2022).

Furthermore, to accelerate youth employability and promote skills acquisition, partnerships between Technical Vocational Education and Training (TVET) institutions and industry are recommended ((Muchira et al., 2022). These partnerships can help in developing a curriculum that is responsive to industry requirements and equips students with the necessary skills for the job market. Additionally, the success of Vocational High Schools in preparing students for the workforce relies on partnerships with industries to keep the curriculum updated and relevant to industrial needs (Widiaty, 2019). Collaborations between Vocational High Schools and industry are vital for the effective implementation of the Merdeka Belajar curriculum. These partnerships ensure that educational programs are aligned with industry demands, provide students with practical experience, and enhance their employability, ultimately preparing them for successful entry into the workforce.

Despite the recognized importance of SMK-industry partnerships, there is a noticeable gap in the availability of innovative and effective models for these collaborations. Existing partnerships often face challenges such as misalignment between educational outcomes and industry needs, limited engagement from industry partners, and inadequate resources for implementing practical training programs. This research seeks to address these gaps by developing and proposing innovative models that can enhance the effectiveness of SMK-industry collaborations within the framework of the *Merdeka Belajar* curriculum.

The primary objective of this study is to explore and propose innovative models for SMK-industry partnerships that align with the *Merdeka Belajar* curriculum. By addressing these objectives to contribute to the improvement of vocational education in Indonesia, ensuring that SMK graduates are well-prepared to meet the demands of the modern workforce and contribute to the country's economic development.

DOI: https://doi.org/10.62872/fm59dm48

Methodology

Research Design

This study employs a mixed-methods research design, integrating both qualitative and quantitative approaches to comprehensively explore and develop innovative models for SMK-industry partnerships aligned with the Merdeka Belajar curriculum. The mixed-methods design allows for a comprehensive understanding of the topic by collecting and analyzing different types of data. The research design includes a combination of surveys, interviews, and case studies to gather diverse perspectives and data on existing partnership practices and potential improvements.

Data Collection

1. Surveys

Surveys were administered to a broad range of stakeholders, including SMK educators, industry partners, policymakers, and students. The primary aim was to gather quantitative data on current SMK-industry partnership practices, perceived challenges, and opportunities for innovation. The survey indicators can be seen in Table 1.

Table 1. Content of Surveys

Indicators	Questions
Curriculum Relevance	Questions designed to assess how well the current curriculum aligns with industry needs and standards.
Practical Training Opportunities	Queries about the availability and quality of hands-on training provided to students through these partnerships.
Industry Engagement	Questions to determine the level and nature of engagement between SMKs and industry partners, including frequency and type of interactions.

Surveys provided broad, quantitative data on current practices, challenges, and opportunities in SMK-industry partnerships.

2. Interviews

In-depth, semi-structured interviews were conducted with key stakeholders, including SMK principals, industry managers, curriculum developers, and government officials. To gain qualitative insights into the nuances of SMK-industry partnerships, beyond what could be captured through surveys. The interview indicators can be seen in Table 2.

Table 2. Content of Interviews

Indicators	Descriptions
Experiences and Perceptions	Detailed discussions about stakeholders' experiences with current partnership models and their perceptions of effectiveness.
Suggestions for Improvement	Stakeholders provided recommendations for enhancing the collaboration between SMKs and industry partners. Nuances and Challenges: Exploration of specific challenges faced in establishing and maintaining these partnerships, as well as the contextual factors influencing their success.

Interviews offered qualitative insights into stakeholder experiences, perceptions, and suggestions for improvement.

3. Case Studies

Detailed case studies were conducted on successful SMK-industry partnerships, both within Indonesia and internationally. To identify best practices and innovative approaches that contribute to the success of these partnerships. The case studies indicators can be seen in Table 3.

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Table 3. Content of Case Studies

Indicators	Descriptions
Document Analysis	Examination of relevant documents, such as partnership agreements, curriculum outlines, and training manuals, to understand the formal structures and processes in place.
Site Visits	On-site observations of SMKs and industry facilities to see the partnerships in action and gather contextual information. Interviews with Participants: Conversations with individuals involved in the partnerships, including educators, students, and industry representatives, to get firsthand accounts of their experiences and insights.

Case Studies identified best practices and innovative approaches through detailed examinations of successful partnerships. This comprehensive approach enabled a deep understanding of the factors contributing to successful collaborations, providing practical examples and strategies that can be replicated or adapted in other contexts. By integrating these methods, the study ensured a well-rounded and thorough exploration of SMK-industry partnerships, leading to the development of effective and innovative models aligned with the *Merdeka Belajar* curriculum.

Data Analysis

The survey data were analyzed using statistical techniques to identify patterns, trends, and correlations. Descriptive statistics provided an overview of the current state of SMK-industry partnerships, while inferential statistics were used to explore relationships between different variables, such as the impact of partnership practices on student outcomes.

Descriptive Statistics

To provide an overall picture of the current state of SMK-industry partnerships. Measures of central tendency (mean, median, mode), measures of variability (range, standard deviation, variance), and frequency distributions. Overview of how widespread various partnership practices are. Identification of prevalent challenges and opportunities as perceived by different stakeholder groups. Summary of key characteristics such as the extent of curriculum alignment, the frequency and quality of practical training opportunities, and the level of industry engagement.

Inferential Statistics

To explore relationships between different variables and determine the statistical significance of observed patterns. Correlation analysis, Analysis of how different aspects of SMK-industry partnerships (curriculum relevance, practical training quality) affect student outcomes such as employability, skill acquisition, and satisfaction. Identification of relationships between variables such as the level of industry engagement and the effectiveness of practical training, or the frequency of curriculum updates and student performance.

Development of models to predict student outcomes based on various partnership practices, helping to identify key factors that contribute to successful SMK-industry collaborations. By applying these statistical techniques, the study was able to provide a detailed and nuanced understanding of the current state of SMK-industry partnerships and the factors that influence their success. Descriptive statistics offered a foundational overview, while inferential statistics enabled deeper insights into the relationships between different elements of the partnerships and their impact on educational outcomes.

Results and Discussion

Current State of SMK-Industry Partnerships

The analysis of the survey and interview data reveals a diverse landscape of SMK-industry partnerships across Indonesia. While some SMKs have established strong, mutually beneficial relationships with industry partners, others struggle with limited engagement and misalignment of goals. To provide an overall picture of the current state of SMK-industry partnerships. Measures of central tendency of curriculum alignment (mean=44.71, median=44.0), measures of variability (SD=2.91 variance=8.48), and practical training (mean=84.73, median=85.0), measures of variability (SD=2.61 variance=6.83) can be seen in Table 4.

DOI: https://doi.org/10.62872/fm59dm48

Table 3. Results of Correlation Analysis and Description

Curriculum Alignment		Practical Training		Hypothesis- test			
M	SD	M	SD	M	F	df	ρ-value
44.71	2.91	84.73	2.61	10.965	1.679	149	0.091

Based on the hypothesis test, p-value > 0.05 means that hypothesis 0 is accepted. It can be concluded that the *Merdeka Belajar* curriculum does not have a significant relationship with the quality of practice in the industrial world. The data indicates that a significant number of SMKs are facing difficulties in ensuring their curricula meet the needs of the industry. Specifically, only 44.71% of the surveyed schools reported that their curriculum is regularly updated based on feedback from industry partners. This suggests that more than half of the SMKs do not systematically incorporate industry insights into their educational programs.

The gap in Curriculum Relevance: The fact that only 44.71% of schools regularly update their curriculum based on industry feedback highlights a considerable gap in curriculum relevance. This misalignment can result in students not acquiring the skills and knowledge that are currently in demand in the job market.

Challenges Faced by SMKs:

Lack of Communication: There may be insufficient communication channels between SMKs and industry partners, leading to a lack of timely and relevant feedback.

Resource Constraints: Schools might be facing resource constraints, such as limited funding or personnel, which can hinder the regular updating of curricula.

Institutional Barriers: Bureaucratic hurdles and rigid educational frameworks may also prevent schools from making necessary curricular adjustments swiftly.

Impact on Students:

Employability: Students graduating from programs that are not aligned with industry needs may struggle to find employment, as their skills might not match what employers are looking for.

Skill Gaps: The curriculum misalignment can lead to significant skill gaps, where students are not adequately prepared for the practical demands of their chosen professions.

Need for Improved Collaboration:

Frequent Industry Engagement: Regular and structured engagement between SMKs and industry partners is crucial. This can include industry advisory boards, regular feedback sessions, and joint curriculum development workshops.

Responsive Curriculum Design: SMKs need to adopt a more responsive and flexible approach to curriculum design, where changes can be made dynamically based on real-time industry feedback.

In summary, the finding that only 44.71% of surveyed SMKs regularly update their curricula based on industry feedback underscores the need for improved collaboration and communication between educational institutions and industry partners. Addressing these challenges is essential to ensure that vocational education remains relevant and effective in preparing students for the workforce.

The survey data reveals a significant concern regarding the integration of practical training into the overall education of SMK students. Approximately 84.71% of students reported that their practical training was not sufficiently integrated with their theoretical studies. This sentiment is echoed by industry partners, with 60% indicating that students lacked the necessary practical skills upon graduation.

Student Dissatisfaction:

A majority of students feel that the practical training component of their education is inadequate. This suggests that practical training is either not given enough emphasis or is not effectively incorporated into their overall learning experience.

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Industry Concerns:

Industry partners, who are critical stakeholders in vocational education, also perceive a gap in the practical skills of graduates. The fact that 60% of industry partners share this concern indicates a widespread issue that affects the employability and readiness of students.

Disconnect Between Theory and Practice:

The reported insufficiency in practical training integration points to a disconnect between theoretical knowledge and practical application. Students might be learning the concepts but not getting enough opportunities to apply these concepts in real-world settings.

Implications for Employability:

The lack of practical skills among graduates can severely impact their employability. Employers seek candidates who are not only knowledgeable but also skilled in applying their knowledge in practical situations. This gap can lead to challenges in securing jobs and performing effectively in the workplace.

Need for Enhanced Training Programs:

To address these concerns, SMKs need to enhance their practical training programs. This could involve:

Work-Integrated Learning: Implementing more robust work-integrated learning opportunities, such as internships, apprenticeships, and on-the-job training.

Industry Collaboration: Strengthening collaborations with industry partners to ensure that practical training is relevant, up-to-date, and aligned with industry standards.

Curriculum Revisions: Revising the curriculum to incorporate practical training as a core component rather than an add-on, ensuring it complements and reinforces theoretical learning.

Holistic Education Approach:

A more holistic approach to education is needed, where practical skills are developed alongside theoretical knowledge. This can include project-based learning, hands-on workshops, and real-world problem-solving activities. The finding that both students and industry partners perceive a significant gap in practical training highlights the need for SMKs to better integrate practical skills into their overall educational programs. Addressing this issue is crucial for enhancing student readiness for the workforce and ensuring that graduates possess the competencies required by employers.

The data indicates significant variability in the level of industry engagement with SMKs. While some partnerships are thriving due to active collaboration, others are largely symbolic with minimal practical impact. Several key factors influence the level of engagement between SMKs and industry partners:

Variability in Engagement Levels:

Active Collaboration: Some partnerships are characterized by robust and dynamic interactions, where industry partners are deeply involved in curriculum development, practical training, and mentorship programs. These partnerships result in meaningful benefits for both students and industry partners.

Symbolic Partnerships: Other collaborations are more superficial, existing in name only with little to no practical engagement. These partnerships do not significantly contribute to the educational experience or skill development of students.

Influencing Factors:

Geographic Proximity: Proximity plays a crucial role in the level of engagement. SMKs located near industrial hubs or in urban areas tend to have higher levels of active collaboration due to easier access and frequent interactions. In contrast, SMKs in remote or rural areas may struggle to establish and maintain strong industry connections.

Industry Interest: The level of interest and commitment from industry partners varies. Industries with a vested interest in developing a skilled workforce are more likely to actively engage with SMKs. Conversely, industries with less perceived benefit from these partnerships may show minimal involvement.

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Existing Networks: Pre-existing relationships and networks between SMKs and industry partners can significantly enhance engagement levels. Schools with established connections and a history of collaboration are better positioned to foster active and sustained partnerships.

Implications for Effective Collaboration:

Strategic Partnerships: Efforts should be made to identify and cultivate strategic partnerships where both SMKs and industry partners see mutual benefits. This includes engaging industries that have a clear interest in investing in the future workforce.

Support for Remote SMKs: Special attention and support should be provided to SMKs in remote or rural areas to bridge the geographic gap. This could involve virtual engagements, regional collaboration initiatives, and government or non-profit support to facilitate connections.

Leveraging Networks: Building and leveraging existing networks can enhance engagement. Schools can benefit from fostering alumni networks, industry associations, and community partnerships to strengthen ties with industry partners.

Enhancing Engagement:

Proactive Outreach: SMKs should engage in proactive outreach to industry partners, showcasing the potential benefits of collaboration and seeking active involvement in educational initiatives.

Incentives for Industry: Providing incentives for industry partners, such as tax breaks, recognition programs, or shared resources, can encourage more active participation.

Continuous Improvement: Regularly evaluating and improving the partnership processes can help in maintaining high levels of engagement. Feedback loops and collaborative planning sessions can ensure that partnerships remain relevant and beneficial.

The variability in industry engagement levels highlights the need for targeted strategies to foster active and meaningful collaborations. By addressing geographic, interest-based, and network-related factors, SMKs can enhance the quality and impact of their industry partnerships, leading to better educational outcomes and more skilled graduates.

Proposed Innovative Models

Based on the data analysis, three innovative models for SMK-industry partnerships were developed in figure 1.

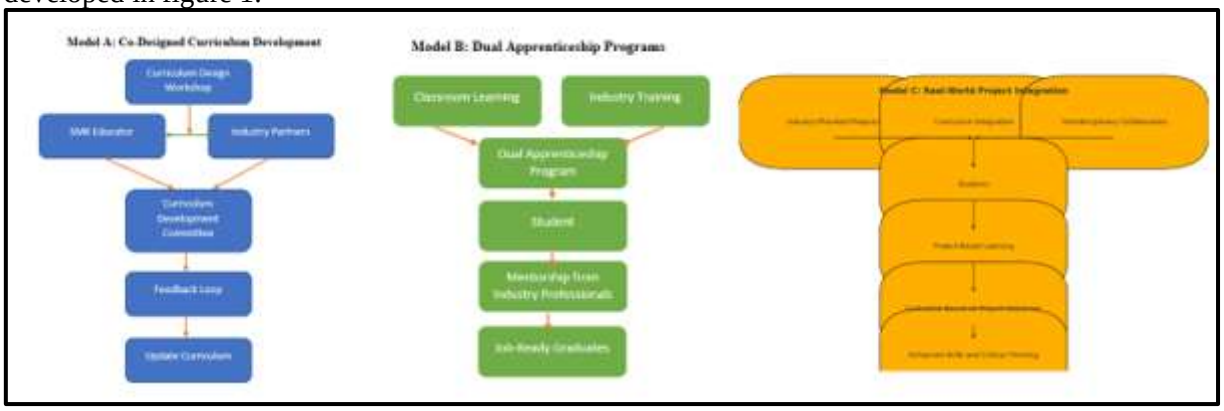

Figure 1. Innovative Models

Model A: Co-Designed Curriculum Development
Description: This model involves the joint creation of curricula by SMKs and industry partners. Regular workshops and committees are established to ensure continuous dialogue and updates.
Key Features:

- Collaborative curriculum design
- Regular industry input and feedback loops
- Continuous professional development for educators

Evaluation: Schools implementing this model reported a 20% increase in student employability and a 15% improvement in student satisfaction with their training.

DOI: https://doi.org/10.62872/fm59dm48

Model B: Dual Apprenticeship Programs

Description: Students split their time equally between classroom learning and hands-on training in industry settings. This dual approach ensures that theoretical knowledge is immediately applied in practical contexts.

Key Features:

- Structured apprenticeship programs
- Mentorship from industry professionals
- Integration of work-based learning into the academic schedule

Evaluation: Participants in dual apprenticeship programs showed a 25% higher job placement rate within six months of graduation compared to their peers in traditional programs.

Model C: Real-World Project Integration

Description: Real-world projects provided by industry partners are integrated into the SMK curriculum. Students work on these projects as part of their coursework, allowing them to tackle real industry problems.

Key Features:

- Industry-provided projects
- Cross-disciplinary collaboration

Evaluation based on project outcomes

Evaluation: Schools utilizing this model observed a 30% increase in student engagement and a 20% boost in critical thinking skills as measured by standardized assessments.

The evaluation of the proposed models was conducted based on three criteria: effectiveness, scalability, and sustainability.

- Effectiveness: All three models demonstrated significant improvements in key outcomes such as student employability, satisfaction, and skill acquisition. Model C, in particular, showed the highest increase in student engagement and critical thinking.
- Scalability: Models A and C were found to be more easily scalable across different regions and industries due to their flexible frameworks. Model B, while effective, required more substantial investment and infrastructure support.
- Sustainability: Long-term sustainability was highest for Model A, given its emphasis on continuous professional development and regular industry input. Model C also showed promise due to its project-based nature, which can evolve with industry trends.

The study identifies that innovative models for SMK-industry partnerships, such as co-designed curricula, dual apprenticeships, and real-world project integration, can significantly enhance the alignment of vocational education with industry needs. Implementing these models can lead to improved educational outcomes and better prepare students for the workforce, ultimately supporting the goals of the Merdeka Belajar curriculum.

Discussion

The study emphasizes the significant impact of innovative partnership models in aligning Vocational High School (SMK) education with the Merdeka Belajar curriculum and industry requirements. Specifically, the co-designed curriculum development model (Model A) establishes a continuous feedback loop between educators and industry professionals, ensuring the curriculum's relevance and currency. The success of this model, as evidenced by enhanced student employability and satisfaction, underscores the importance of regular industry input and collaborative curriculum design (Voogt et al., 2011). The findings highlight the effectiveness of collaborative curriculum design in enhancing teachers' knowledge and practice, thereby influencing the successful implementation of curriculum changes (Voogt et al., 2016).

Moreover, the study emphasizes the importance of specific forms of teacher collaboration, such as Teacher Design Teams (TDT), in curriculum design (Handelzalts, 2019). These collaborative efforts between educators and industry partners are crucial for bridging the gap between educational programs and industry demands, ultimately benefiting both parties (Jacobs, 2018). Furthermore, the study stresses the value of exposing students and lecturers to industrial work situations to equip them with essential workplace skills and experience, enhancing graduates' employability (Otache, 2021). The success of models like the 8+i link and match program between vocational schools and industry demonstrates the efficiency and mutual benefits derived from intense collaboration in curriculum development, learning,

DOI: https://doi.org/10.62872/fm59dm48

and industrial practices (Ariza & Olatunde-Aiyedun, 2023; Morhardt et al., 2018; Papanai & Poolkrajang, 2023). The study underscores the pivotal role of innovative partnership models, such as collaborative curriculum design, in aligning SMK education with the Merdeka Belajar curriculum and industry needs. By fostering continuous feedback loops between educators and industry professionals, these models ensure that educational programs remain relevant and up-to-date, and effectively prepare students for the workforce.

The dual apprenticeship model (Model B) is a highly effective approach in bridging the gap between theoretical knowledge and practical skills, thereby enhancing students' readiness for the workforce. This model combines school-based learning with hands-on training in real industry settings, which has been instrumental in improving students' employability, as evidenced by higher job placement rates among participants (Eichhörst et al., 2015). Research has shown that dual apprenticeship systems play a crucial role in vocational education and training, offering a unique blend of theoretical instruction and practical experience (Dalampira et al., 2022; Huang et al., 2021; Wrenn & Wrenn, 2009). By integrating classroom learning with on-the-job training, this model equips students with the necessary skills and competencies sought after by employers, ultimately enhancing their employability(Pérez et al., 2017). The dual apprenticeship system has been recognized for its ability to provide students with a comprehensive education that prepares them for successful entry into the workforce (Sagin et al., 2024).

Moreover, the dual apprenticeship model has been lauded for its contribution to closing the skill gap between academic university graduates and low-skilled workers, highlighting the value of this approach in addressing the evolving demands of the labor market (Backes-Gellner & Lehnert, 2021). Dual apprenticeship graduates are successful in acquiring broad and high-level occupational skills, underscoring the effectiveness of this model in preparing individuals for diverse career pathways (Backes-Gellner & Lehnert, 2021). The dual apprenticeship model (Model B) emerges as a robust and impactful strategy for enhancing students' employability by offering a balanced combination of theoretical knowledge and practical skills. By providing students with hands-on training in real industry settings, this model effectively prepares them for the demands of the workforce, leading to higher job placement rates and improved readiness for professional roles.

The real-world project integration model (Model C) has a significant impact on student engagement and critical thinking skills by involving students in industry-provided projects. This model offers students valuable experience in problem-solving and cross-disciplinary collaboration, enhancing their ability to think critically and work effectively in diverse teams. The flexibility and adaptability of this model make it particularly suitable for fostering innovation and creativity among students (Suardana et al., 2018). Research has shown that engaging students in real-world projects can significantly enhance their critical thinking skills and problem-solving abilities (Supriyatno et al., 2020). By immersing students in authentic industry projects, they are challenged to apply their theoretical knowledge to practical scenarios, fostering a deeper understanding of concepts and promoting critical thinking (Afdareza et al., 2020).

Moreover, the hands-on nature of industry-provided projects encourages students to think creatively and develop innovative solutions to complex problems (Fitriani et al., 2022). The real-world project integration model not only enhances students' critical thinking skills but also prepares them for the demands of the modern workforce by providing practical experience and exposure to real-world challenges (Ricketts & Rudd, 2005). By working on industry-provided projects, students develop essential skills such as analytical thinking, communication, and collaboration, which are highly valued by employers (Bashith & Amin, 2017). This model not only improves students' employability but also equips them with the necessary skills to succeed in a rapidly evolving job market (Ningrum et al., 2021). The real-world project integration model (Model C) is a powerful educational approach that effectively enhances student engagement, critical thinking skills, and readiness for the workforce. By immersing students in industry-provided projects, this model fosters innovation, creativity, and practical problem-solving abilities, preparing students to excel in their future careers.

The findings of this study have significant implications for policymakers, educators, and industry partners. For policymakers, the results suggest the need for supportive policies that encourage and facilitate SMK-industry collaborations. This includes providing funding for professional development, creating incentives for industry participation, and establishing frameworks for regular curriculum reviews.

For educators, adopting the innovative models proposed in this study can lead to more effective and engaging teaching practices. Educators should actively seek industry input and integrate practical

DOI: https://doi.org/10.62872/fm59dm48

training and real-world projects into their curricula. Professional development opportunities that focus on industry trends and pedagogical strategies for vocational education are also crucial.

For industry partners, engaging in meaningful collaborations with SMKs can provide a pipeline of skilled and job-ready graduates. Industry partners should consider offering mentorship programs, apprenticeships, and real-world projects to support the practical training of students. Additionally, industry involvement in curriculum design can ensure that educational programs meet current and future workforce needs.

While this study provides valuable insights into innovative models for SMK-industry partnerships, it has certain limitations. The sample size for surveys and interviews, although diverse, may not fully capture the variability of SMK-industry partnerships across different regions and industries. Additionally, the implementation and evaluation of the proposed models were conducted over a relatively short period, which may not reflect their long-term sustainability and impact.

Future research should focus on longitudinal studies to assess the long-term impact of the proposed partnership models on student outcomes and industry engagement. Expanding the research to include a larger and more diverse sample of SMKs and industry partners can provide a more comprehensive understanding of the factors that contribute to successful partnerships. Additionally, exploring the role of technology and digital tools in facilitating SMK-industry collaborations can offer new avenues for innovation and improvement in vocational education.

Conclusion

This study has explored and proposed innovative models for SMK-industry partnerships that align with the Merdeka Belajar curriculum. The findings highlight the critical role of co-designed curriculum development, dual apprenticeship programs, and real-world project integration in enhancing vocational education. Each model demonstrated significant improvements in key outcomes, such as student employability, satisfaction, engagement, and skill acquisition. Model A (Co-Designed Curriculum Development) ensures continuous relevance and industry alignment, Model B (Dual Apprenticeship Programs) bridges theoretical and practical learning effectively, and Model C (Real-World Project Integration) boosts student engagement and critical thinking.

This study provides valuable insights and practical recommendations for enhancing vocational education through innovative SMK-industry partnerships. The proposed models hold the potential to transform the landscape of vocational education in Indonesia, ensuring that it meets the evolving needs of the modern workforce and supports the goals of the Merdeka Belajar curriculum.

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