

School partnership strategies with business and industry to enhance the employability

Irfan Ahmad 1 ^{a,1,*}, Emay Mastiani 2 ^{b,2}

^{*ab} 1 Universitas Islam Nusantara, Indonesia.

¹ funahmed@gmail.com; ² emay.mastiani@gmail.com.

*Correspondent Author

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ABSTRACT

This study analyzes the strategies of Vocational High Schools (SMK) in partnering with the Business and Industrial World (DUDI) through the Plan-Do-Check-Act (PDCA) framework. It responds to the persistent issue of high unemployment among SMK graduates in Indonesia, which reflects a gap between school competencies and industry demands. Using a qualitative comparative case study method, the research explores two institutions with different characteristics: SMKN 1 Karangtengah and SMKN Pertanian Pembangunan (PP) Cianjur. Data were collected through observation, interviews, and document analysis involving principals, vice principals, and industry partners. The findings show that both schools implemented PDCA systematically but with distinct emphases. SMKN 1 Karangtengah pursued large-scale, multi-sectoral partnerships supported by ±80 industrial partners, highlighting programs such as long-term internships, teaching factories, industrial classes, and international networks. In contrast, SMKN PP Cianjur specialized in agribusiness and fisheries, focusing on laboratory-based practices, local industry collaboration, and the Open Day program with Polbangtan. Both schools successfully improved graduate absorption rates, reaching 100% by 2024, yet evaluation still centered more on hard skills than on soft skills. The study concludes that PDCA serves not only as a quality management tool but also as a strategic framework for sustaining vocational partnerships. While SMKN 1 Karangtengah demonstrates the effectiveness of broad-scale networking, SMKN PP Cianjur illustrates the strength of specialization. This comparative analysis highlights that effective partnership strategies must align with institutional capacity, identity, and labor market needs. The study's novelty lies in presenting a cross-case perspective that identifies replicable best practices for strengthening vocational education partnerships in Indonesia.

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Introduction

Vocational High Schools (SMK) have a strategic role in preparing a skilled workforce in the midst of the dynamics and challenges of the industrial world. However, reality shows that the highest unemployment rate in Indonesia actually comes from vocational school graduates, which indicates that there is a gap between the competencies possessed by graduates and the needs of the business and industrial world (DUDI) (Misbahudin and Asmaul 2022). This gap includes limitations in technical skills (hard skills) and non-technical skills (soft skills), so that cooperation between SMK and DUDI is crucial in ensuring curriculum suitability with the demands of the job market (Asri et al. 2021). Proper training in competency

development has been proven to strengthen the readiness of vocational school graduates while increasing their competitiveness in the job market (Irawan and Suharyati 2023; Irfan et al. 2022). Therefore, vocational education reform and the implementation of contextual curricula are key to producing a competitive workforce (Dahlia et al. 2024; Kardiyem, Mukoyimah, and Arsyad 2023).

Global changes marked by the Industrial Revolution 4.0 and digital transformation have further emphasized the challenges for vocational school graduates. The workforce is required to have adaptive skills and global understanding in order to be able to keep up with rapid technological developments and industry trends (Misbahudin and Asmaul 2022). If this is not anticipated, the consequence will be an increase in the unemployment rate among young people as well as a decrease in national competitiveness (Asri et al. 2021). Data shows that strategic sectors, such as information and communication technology, face difficulties in absorbing graduates due to the limitation of new skills that meet industry standards (Saraswati et al. 2024). This condition not only causes employment problems, but also has the potential to exacerbate social and economic inequality (Irawan and Suharyati 2023). Therefore, educational institutions and the government need to formulate relevant strategies and policies so that vocational school graduates have skills according to the expectations of the industrial world (Irfan et al. 2022; Kardiyem et al. 2023).

In response, the government has launched a vocational education revitalization policy contained in Presidential Regulation Number 68 of 2022. This policy emphasizes the importance of strengthening cooperation between SMK and DUDI to ensure the link and match of the curriculum with industry needs. This effort is strengthened by Permendikbud Number 9 of 2016 and Number 34 of 2018 which affirm the role of field work practices (PKL), competency certification, and teaching factory programs in preparing graduates who are ready to work (Hidayat and Saputra 2023; Maulina and Yoenanto 2022; Suparyati and Habsya 2024). This synergy is aimed at ensuring that graduates not only have technical skills, but also soft skills needed by the global market (Mukhlason, Winanti, and Yundra 2020; Suroto et al. 2023). Empirical evidence shows that the optimal implementation of teaching factories and street vendors can reduce the unemployment rate of vocational school graduates (Maulina and Yoenanto 2022; Tessa and Humaedi 2024). In addition, the active involvement of industry in the formulation of curriculum and training programs increases the relevance of vocational education, as students gain significant real-world experience (Sobari, Wahyudin, and Dewi 2023).

However, the effectiveness of vocational education is also influenced by various internal and external factors. From an internal perspective, the limited practice facilities are one of the main obstacles in developing students' skills. In addition, teachers' readiness to implement relevant curriculum also affects the quality of learning, while many teachers still face limited experience and training. Optimization of the teaching factory model is seen as a potential solution to increase student engagement in real practice in the industry. From the external side, the low involvement of industry in vocational education programs is a challenge in itself, because this limits students' opportunities to gain relevant experience (Ramadhani and Rahayu 2021). Rapid changes in competency needs due to industry dynamics and technological developments also demand a more adaptive and responsive curriculum. The mismatch between education and industry needs has the potential to cause graduates to be unprepared to compete in the job market. Therefore, closer cooperation is needed between vocational schools and industry to create an adaptive curriculum that meets the needs of the world of work.

Previous Research, Gap, and Novelty

Pratiwi, Lestari, and Januardi (2024) stated that the partnership between Vocational High Schools (SMK) and the Industrial World Business (DUDI), especially through curriculum synchronization, field work practices (PKL), and competency certification, makes a real contribution to improving student work readiness. The same thing was conveyed by Yusadinata, Machmud, and Santoso (2021) and Nisrina, Karyaningsih, and Suherdi (2023) who emphasized that this kind of collaboration is able to strengthen the relevance of vocational education to the needs of the labor market. Ali et al. (2023) added that the sustainable quality management approach through the Plan-Do-Check-Act (PDCA) cycle is an effective instrument in strengthening industry-based training programs, as it encourages schools to make systematic and continuous improvements to curriculum and practices. Tentama, Sudarsono, and Ghozali (2024) also support this view by showing the effectiveness of PDCA in maintaining consistency in quality improvement.

Nevertheless, Sari and Wahyono (2020) reminded that previous research still focused a lot on the scope of certain educational units or highlighted one specific aspect of the SMK-DUDI partnership. This is also emphasized by Harnety and Almasdi (2022) who assess that a comprehensive understanding of partnership management strategies, especially with the PDCA framework, has not been fully articulated. Thus, the existing literature is still not able to comprehensively integrate the internal and external dimensions of the school and the industry that affect the success of partnerships, including comprehensive and comparative cross-school studies. This kind of analysis is believed to provide a more complete understanding of how the synergy between vocational education and industry can be designed in a sustainable manner to strengthen students' job readiness.

The novelty of this research is present through the analysis of PDCA-based partnership strategies which were carried out comparatively in two educational units with different characteristics, namely SMKN 1 Karangtengah Cianjur and SMKN Pertanian Pembangunan (SMKN PP) Cianjur. Although both have the status of SMK Centers of Excellence, they both have significantly different regional profiles, expertise programs, and industry partners. This condition opens up opportunities to identify best practices that have the potential to be replicated by other vocational schools as a strategy to strengthen partnerships that are sustainable and adaptive to industry dynamics.

This study aims to comparatively analyze the partnership strategy between Vocational High Schools (SMK) and the Industrial World Business (DUDI) based on the Plan-Do-Check-Act (PDCA) cycle, focusing on two educational units, namely SMKN 1 Karangtengah and SMKN Pertanian Pembangunan (SMKN PP) Cianjur. This analysis is expected to be able to provide an in-depth picture of the effectiveness of PDCA implementation in the context of vocational partnerships. In addition, this research is also aimed at identifying best practices that emerge from the experiences of the two schools. The results of this identification are expected to be a reference for other vocational schools in strengthening cooperation with the industrial world, so that graduates have more optimal job readiness and are able to compete in a dynamic labor market.

Method

This study uses a qualitative approach with a comparative case study method. The qualitative approach was chosen because it was able to explore in depth the partnership strategy between Vocational High Schools (SMK) and the Industrial World Business (DUDI), as well as identify factors that affect the effectiveness of partnership implementation (Creswell 2018). The comparative case study method is used because this study compares two schools with different characteristics, namely SMKN 1 Karangtengah Cianjur and SMKN Pertanian

Pembangunan (SMKN PP) Cianjur, thus allowing a sharper analysis of the similarities and differences in the implementation of partnership strategies (Stake 2017; Yin 2018).

The subjects of the study include the stakeholders directly involved in the partnership process. The principal plays the role of policy maker and main manager, while the vice principal for curriculum and industrial relations plays a role in developing the curriculum as well as bridging cooperation with industry. Industrial partners, consisting of representatives of companies or agencies, are involved because they have a real contribution to field work practice (PKL) programs, industrial classes, teaching factories, guest teacher attendance, internship programs, and graduate recruitment.

Data was collected through three main techniques, namely observation, interviews, and document analysis. Observations were made on various partnership activities in schools and industries, including internships, teaching factories, joint evaluations, and forms of industry involvement in the learning process. In-depth interviews were conducted with principals, vice principals for curriculum and industrial relations, and industry partners to gather information on the planning, implementation, evaluation, and follow-up of partnerships (Kvale and Brinkmann 2019). Meanwhile, document analysis was carried out on various official files such as memorandum of understanding (MoU) or cooperation agreements (PKS), curriculum, internship reports, industry evaluation results, graduate tracer studies, and cooperation follow-up documents (Bowen 2009).

The research process begins with the preparation stage which includes the preparation of proposals, the design of research instruments in the form of observation and interview guidelines, the preparation of a list of documents to be analyzed, and the submission of research permits to schools and industry partners. Data collection is then carried out through field observations, interviews, and document review according to predetermined procedures. Furthermore, the data were analyzed using reduction, presentation, and conclusion drawing techniques through a thematic approach based on the PDCA model (Miles, Huberman, and Saldaña 2014). The data obtained was then grouped and coded into four main themes, namely Plan (curriculum planning and partnership), Do (implementation of internships, teaching factory, certification), Check (partnership evaluation and tracer study), and Act (follow-up of continuous improvement). This analysis allows researchers to identify best practices and challenges faced in the partnership process.

Result

Based on the results of observations, interviews, and documentation studies, a number of field findings related to the planning, implementation, evaluation, and follow-up of school partnerships with the Business and Industry World (DUDI) were obtained at SMKN 1 Karangtengah and SMKN PP Cianjur.

In general, the two schools have developed partnership plans involving industry partners. The principal emphasized that the status as a Center of Excellence Vocational School encourages the school to regularly hold curriculum synchronization meetings with industry partners. This statement was reinforced by the deputy principal for industrial relations, who mentioned the existence of formal documents in the form of a memorandum of understanding (MoU) or cooperation agreement (PKS). The document regulates the division of tasks between schools and partners, including curriculum development, implementation of field work practices (PKL), development of teaching factories (TEFA), the implementation of industrial classes, and the absorption of graduates.

To clarify the condition of the school, the profile of each institution is summarized in the following table:

Table 1.1: Demographic Sample

Aspects	SMKN 1 Karangtengah	SMKN PP Cianjur
Number of students	1.412	651
Number of PTK	80	63
Number of rombels	42	24
Classroom	33	-
Total building space	98	-
Laboratory	1	3

These differences in school profiles affect partnership planning strategies. SMKN 1 Karangtengah, with a large number of students, emphasizes cross-sector programs such as street vendors, Job Fair/Edu Fair, Expo Karya, and international networking. Meanwhile, SMKN PP Cianjur focuses more on synchronizing the agribusiness and fisheries curriculum with local partners such as CV Dejeefish, the Fisheries Office, BBAT Sukabumi, and IPB Pasir Sarongge.

At the implementation stage (Do), both schools managed to establish active collaboration with partners, although the strategies and scopes differed. SMKN 1 Karangtengah, with a network of ±80 partners, was able to carry out street vendors for six months, develop TEFA, open industrial classes, and hold regular job fairs. Meanwhile, SMKN PP Cianjur emphasizes more on the relevance of the field, focusing on teaching factories agribusiness, street vendors in the fisheries sector, and Open Day with Polbangtan through the YESS program. This comparison is summarized in the following table:

Table 2. Partnership Implementation (Do)

Activities/ Programs	SMKN 1 Karangtengah	SMKN PP Cianjur
Street vendors	Minimum 6 months, ±80 partners	Focus on agriculture and fisheries sector
Teaching Factory	Agribusiness & fisheries (field-based TEFA)	Agribusiness (lab & production)
Industrial Grade	Exist	Limited, according to the agribusiness field
Job/Edu Fair	Routine, international networking	±20 partner companies, Open Day (YESS)
Dedicated partners	Copyright © 2019 Gamelab. All Rights Reserved.	CV Dejeefish, Fisheries Service, BBAT, IPB

The evaluation stage (*Check*) shows that the two schools are increasingly systematic in assessing the effectiveness of the partnership. Tracer studies are an important instrument to measure the absorption of graduates. SMKN 1 Karangtengah has experienced a significant increase from 9.3% in 2023 to 100% in 2024. Meanwhile, SMKN PP Cianjur is more stable, from 74.5% in 2023 to 100% in 2024.

Table 3. Partnership Evaluation (Check)

Tracer Study Indicator	2023	2024
SMKN 1 Karangtengah	9.3% (269 students)	100% (395 students)
SMKN PP Cianjur	74.5% (145 students)	100% (169 students)

In addition to tracer studies, the two schools monitored street vendors, collected reports from supervisors, and received feedback from the industry. However, evaluation still predominantly emphasizes the technical aspect, while *soft skills* such as communication, discipline, and adaptability have not been the main focus.

The follow-up stage (*Action*) shows strategy differentiation. SMKN 1 Karangtengah seeks to expand its international network, update the curriculum, and expand cross-sector recruitment channels for large numbers of graduates. On the contrary, SMKN PP Cianjur emphasizes more on updating the specialist curriculum, strengthening the teaching factory, and the role of a reference school in the agribusiness sector in Cianjur.

Discussion

The results of this study show that the SMK-DUDI partnership strategy at SMKN 1 Karangtengah and SMKN PP Cianjur runs through the Plan-Do-Check-Act (PDCA) cycle with their respective characteristics and differentiations. At the planning stage, the two schools have developed a partnership through curriculum synchronization forums, MoU/PKS documents, and integration into the Annual Work Plan (RKT). This is in line with the findings of Pratiwi et al. (2024), Yusadinata et al. (2021), and Nisrina et al. (2023) who emphasized that curriculum synchronization, field work practices (PKL), and competency certification are important elements in improving student work readiness. The difference lies in the scope and focus: SMKN 1 Karangtengah prioritizes large-scale and cross-industry sectors, while SMKN PP Cianjur emphasizes agribusiness and fisheries specialization. This differentiation is in line with the principles of strategic management that demand the alignment of strategies with the identity and capacity of the organization (Porter, 1985 in Dhita & Sofyan, 2023).

At the implementation stage (*Do*), the research findings showed significant variations. SMKN 1 Karangtengah, with the support of 80 industry partners, was able to organize six-month street vendors, industrial classes, teaching factories, and international networks through collaborative programs with foreign institutions. SMKN PP Cianjur, on the other hand, emphasizes intensive laboratory-based practices and specialist partnerships with the agriculture and fisheries sectors, including the Open Day program with Polbangtan. This pattern expands on the studies of Yusadinata et al. (2021) and Ali et al. (2023) which highlight the effectiveness of street vendors and PDCA-based training. The findings of this study provide additional evidence that innovations such as international networking, direct recruitment, and cross-sector teaching factories can be strategies to strengthen the graduate job market, a dimension that has not been widely described in the previous literature.

The evaluation stage (*Check*) is shown through the implementation of tracer studies, street vendor monitoring, and industry feedback. The increase in tracer study participation from 9.3% to 100% at SMKN 1 Karangtengah and from 74.5% to 100% at SMKN PP Cianjur shows a significant strengthening of alumni data governance. This supports the view of Tentama et al. (2024) that the PDCA cycle is effective in maintaining quality consistency through data-based evaluation. However, the results of the study also confirm the weakness, namely evaluations that are still focused on technical competence, while the soft skills aspect

has not been optimally integrated. This condition confirms the relevance of research which emphasizes that job readiness is not only determined by hard skills but also soft skills.

The follow-up step (Action) shows different strategic directions according to the school's profile. SMKN 1 Karangtengah emphasizes network diversification, curriculum updates, and the expansion of direct recruitment, in line with the concept of sustainable innovation in Total Quality Management (TQM). Meanwhile, SMKN PP Cianjur focuses more on strengthening teaching factories, updating specialist curricula, and certifying competencies relevant to the fields of agribusiness and fisheries. These findings support the study of Sudarsono et al. (2022) that PDCA in industry-based training can improve the quality of graduates according to school identity.

Comparatively, the results of this study show that both schools implement PDCA equally, but with differentiation of strategies determined by internal capacity (number of students, educators, laboratory facilities) and identity of expertise. SMKN 1 Karangtengah positions itself as a school with a multi-sectoral and large-scale strategy, while SMKN PP Cianjur takes a position as a specialist school with a focus on agribusiness and fisheries. This analysis reinforces the warnings of Sari and Wahyono (2020) and Harnety and Almasdi (2022) that previous research still tended to be partial and had not highlighted the integration of internal and external dimensions comparatively.

Thus, the novelty of this research lies in the presentation of a comparative analysis of the application of PDCA in the SMK-DUDI partnership in two different school contexts. This approach expands on previous literature by showing that PDCA serves not only as an instrument of internal quality improvement, but also as a strategic framework for building vocational partnerships in a sustainable, adaptive, and contextual manner. The strategic implication is that the best practices identified can be replicated by other vocational schools to strengthen links and matches according to the needs of the industry and the characteristics of the school.

Conclusion

This study shows that the partnership strategy of SMK with DUDI at SMKN 1 Karangtengah and SMKN Pertanian Pembangunan (PP) Cianjur has been implemented according to the Plan-Do-Check-Act (PDCA) cycle, with different patterns and focuses according to the capacity and identity of the school. Planning The two schools prepare partnership plans through curriculum synchronization with industry partners and the preparation of MoU/PKS. SMKN 1 Karangtengah emphasizes a multi-sector strategy with a wide network, while SMKN PP Cianjur focuses on specializing in agribusiness and fisheries.

The implementation (Do) of SMKN 1 Karangtengah optimizes the network ±80 industrial partners for street vendors, teaching factories, industrial classes, and direct recruitment. SMKN PP Cianjur is more prominent in laboratory practices, street vendors in the agriculture-fisheries sector, and the Open Day program with Polbangtan. Evaluation (Check) The two schools succeeded in increasing tracer studies by 100% by 2024, supported by street vendor monitoring and industry feedback. However, evaluation is still dominant on hard skills, not emphasizing soft skills such as communication and adaptability. Follow-up (Action) SMKN 1 Karangtengah expands its network internationally and strengthens the recruitment program. SMKN PP Cianjur emphasizes updating the specialist curriculum, competency certification, and labor absorption-based work agreements.

Overall, this study confirms that PDCA can be used as a strategic framework in the management of SMK-DUDI partnerships. The difference in strategy between large-scale

schools and specialist schools provides a lesson that there is no single model, but rather strategies must be tailored to the capacity, potential, and identity of the school.

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