

Analysis of the Input, Process, and Output Stages of Vocational Industrial Work Practice Education in Enhancing Vocational High School Students' Work Competence in East Jakarta

Lutfi Hardiyanto¹, Romdanih², Yuliwati³

¹ Sekolah Tinggi Keguruan dan Ilmu Pendidikan Kusuma Negara, Indonesia; lutfi_h@stkipkusumanegara.ac.id

² Sekolah Tinggi Keguruan dan Ilmu Pendidikan Kusuma Negara, Indonesia;
romdanih@stkipkusumanegara.ac.id

³ Sekolah Tinggi Keguruan dan Ilmu Pendidikan Kusuma Negara, Indonesia; yuliwati@stkipkusumanegara.ac.id

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Abstract

This study analyzes the implementation of the Industrial Work Practice (*Prakerin*) program using an Input–Process–Output (IPO) framework to improve the work competence of Vocational High School (SMK) students in East Jakarta. A qualitative case study approach was applied at SMK Islam PB Soedirman 2 Cijantung and SMK Era Pembangunan Umat Ciracas. Data were obtained from grade XII students, supervisors, and industry partners through in-depth interviews, observation, and documentation. The findings indicate that at the input stage, student readiness, pre-placement training, and strong school–industry partnerships support program success. At the process stage, structured supervision effectively improves both technical and soft skills, although placement mismatches and limited industry mentors remain challenges. At the output stage, 92% of students gained relevant competencies, and 75% felt ready to work. The study recommends improving competency-based placement, strengthening mentor capacity, and adopting digital monitoring. Overall, *Prakerin* significantly enhances students' competence and work readiness.

Keywords

Industrial Work Practice (*Prakerin*); Input-Process-Output (IPO); Vocational Education; Work Competence; Work Readiness

Corresponding Author

Lutfi Hardiyanto

Sekolah Tinggi Keguruan dan Ilmu Pendidikan Kusuma Negara, Indonesia; lutfi_h@stkipkusumanegara.ac.id

1. INTRODUCTION

Vocational education in Indonesia, particularly at the Vocational High School (SMK) level, faces strategic challenges in preparing graduates who not only master theoretical knowledge but also possess practical competencies relevant to the needs of the business world and industry (Haruna & Kamin, 2019). Industrial Work Practice (*Prakerin*) is a core program in the SMK curriculum, aiming to strengthen graduates' work-readiness by integrating school-based learning with real-world experience in industrial settings (Ardiani & Ridwan, 2020; Rembang & Purwastuti, 2020). This program is expected to bridge the gap between graduates' competencies and the ever-evolving demands of the labor market, while supporting the achievement of the national education vision to produce superior and adaptive human resources (Widodo et al., 2017).

The effective implementation of *Prakerin* requires structured program management, encompassing



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the stages of input (selection and preparation of participants, school-industry partnerships, initial briefing), process (monitoring of internship execution, mentoring, and instillation of professional values), and output (competency improvement, work readiness, and absorption rates of graduates in the workforce) (Akbar et al., 2022; Hutagalung & Hutasuhut, 2021). The study by Kiram et al. (2025) shows that *Prakerin*'s success is highly determined by a dual-supervision system, intensive monitoring, and comprehensive preparatory training, which can minimize adaptation barriers and enhance students' technical competencies. In urban contexts such as East Jakarta, the rapid, diverse dynamics of the industrial world require active collaboration between schools and industry partners to ensure the relevance of the materials and work experiences students acquire.

However, analyses in various SMKs in East Jakarta still indicate a gap between the school curriculum and actual industry needs. These gaps include mismatches in internship placements, limited field supervision, and weak evaluation systems that tend to emphasize administrative reporting rather than holistic assessment of work competency mastery (Ardiani & Ridwan, 2020; Muthi, 2024; Yuliyanto & Rahmanto, 2023). Meanwhile, conventional management systems have also proven less effective in monitoring and evaluation, prompting the adoption of technology-based innovations, such as *Prakerin* information systems, in several schools to enhance efficiency, accountability, and transparency in program implementation (Lestari & Roesminingsih, 2023).

Furthermore, Areli et al. (2020) highlight that the implementation of *Prakerin* in SMKs generally remains oriented toward preparing graduates as industrial workers, and has not yet optimally fostered managerial competence and entrepreneurial spirit. Another challenge is the limited number of industry partners able to provide work experiences relevant to students' areas of expertise, as well as the need to improve the quality of industrial mentorship. On the other hand, research by Zahroh et al. (2025) asserts that *Prakerin* experiences significantly contribute not only to technical skill enhancement but also to the development of positive self-perception among students, which influences their entrepreneurial interest and work readiness.

These findings reinforce the importance of critical analysis and in-depth evaluation of each stage of *Prakerin* implementation—input, process, and output—to identify both supporting and inhibiting factors and to formulate innovative strategies to improve program effectiveness. This study focuses on SMKs in East Jakarta, aiming to comprehensively analyze how the stages of input (participant preparation and partnerships), process (monitoring, mentoring, and internship execution), and output (work competency improvement and graduate absorption) are implemented, as well as the extent to which each stage contributes to enhancing SMK students' work readiness.

Specifically, this research aims to: (1) describe and analyze the implementation of the *Prakerin* program in the input, process, and output stages in accordance with applicable regulations; (2) identify supporting and inhibiting factors in the implementation of *Prakerin* in improving students' work competencies; (3) formulate strategies to address obstacles at each stage of *Prakerin* implementation; and (4) depict the work readiness of SMK graduates in East Jakarta based on the analyzed implementation of *Prakerin*. Thus, this research not only provides an empirical overview of *Prakerin* implementation but also offers policy recommendations and adaptive, relevant management models for vocational education in the era of Industry 4.0. The main research question is: "*How is the implementation of input, process, and output stages of the Prakerin program in improving the work competence of SMK students in East Jakarta, as well as the supporting, inhibiting factors, and strategic efforts to overcome them?*"

The literature review and field findings integrated into this study are expected to enrich the scientific discourse on vocational education in Indonesia. In addition, the research results are expected to serve as a reference for policymakers, school administrators, and industry partners in designing, implementing, and evaluating more effective, efficient, and relevant *Prakerin* programs. With optimal synergy between schools, the business world, and industry, SMK graduates in East Jakarta are expected to become competent, adaptive, and competitive human resources in the dynamic global labor market.

2. METHODS

This study employs a qualitative case study design, specifically applying the Input-Process-Output (IPO) framework to comprehensively analyze the implementation of the input, process, and output stages of the Industrial Work Practice (*Prakerin*) program to enhance vocational students' work competencies in East Jakarta. The primary rationale for selecting the IPO approach is its ability to delineate causal and processual relationships among initial factors (inputs), implementation mechanisms (processes), and outcomes (outputs), thereby providing a more holistic, valid, and replicable overview in the context of vocational education.

The IPO framework has been widely recognized in recent studies as an effective analytical model for identifying and measuring the influence of input factors on output through the processes that occur between them (Fan et al., 2022; Galais et al., 2021; Subiyakto & Ahlan, 2014). Galais et al. (2021) emphasize that IPO can explain both direct and indirect relationships among input, process, and output in participatory institutions, where the process acts as a mediator, transmitting the influence of input to output, thus enabling a deeper analysis of program design and implementation effectiveness. Furthermore, Fan et al. (2022) demonstrate that the IPO model is effective at mapping internal mechanisms that mediate the relationship between initial resources (inputs) and innovative outcomes (outputs) within organizations and teams, thereby identifying strategic intervention points. In the field of vocational education and project success measurement, Subiyakto & Ahlan (2014) also recommend IPO as a comprehensive model because it can integrate the dimensions of input (context, resources, policies), process (implementation, interaction, monitoring), and output (competence achievement, graduate success rates) into a single framework that various stakeholders easily understand.

Technically, the subjects of this study include twelfth-grade students who have participated in *Prakerin*, supervising teachers, and representatives from industry partners at SMK Islam PB Soedirman 2 Cijantung and SMK Era Pembangunan Umat Ciracas, all selected purposively based on their active involvement in *Prakerin* implementation. Data were collected through semi-structured in-depth interviews to explore experiences, challenges, and supporting/inhibiting factors; participatory observation during the briefing, internship, and evaluation stages; and document analysis (*Prakerin* guidebooks, student reports, partnership documents). The research instruments, comprising interview guides and observation sheets, were developed with reference to *Prakerin* success indicators and national vocational education regulations. The research instruments used consisted of semi-structured interview guidelines and observation sheets, developed based on the success indicators of the Industrial Work Practice (*Prakerin*) program and aligned with national vocational education policies and regulations. Data were analyzed thematically through the stages of data reduction, data presentation, and conclusion drawing, with coding conducted in qualitative data analysis software (NVivo) to enhance the validity of the findings. Validation was carried out through data source triangulation and member checking with key informants. Research ethics principles were applied by obtaining written consent, maintaining confidentiality, and ensuring that data were used solely for academic purposes. The research process flow is visualized in Figure 1 below:

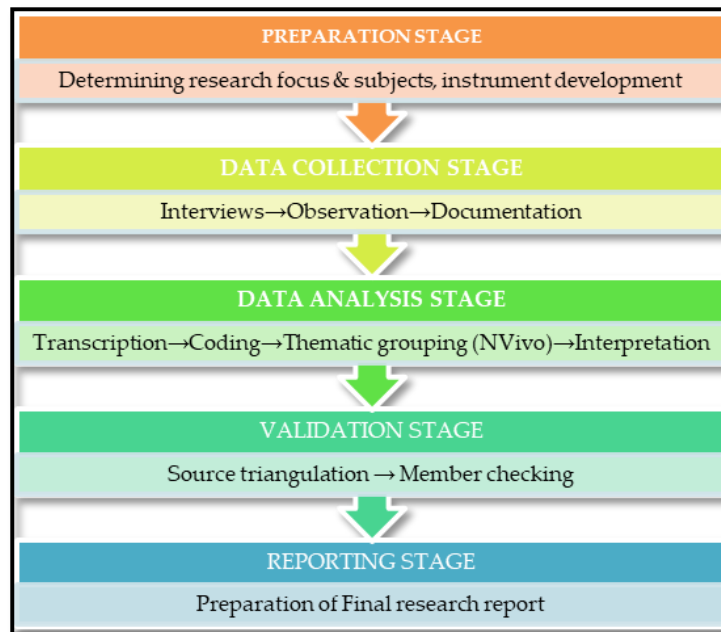


Figure 1. Research Process Flow

Supported by the IPO framework and recent literature (Fan et al., 2022; Galais et al., 2021; Morin & Romero-Torres, 2024), this method ensures a systematic, valid, and replicable analysis for the development and evaluation of *Prakerin* programs and similar vocational education research.

3. FINDINGS AND DISCUSSIONS

Findings

General Description of Informants, Number of Informants, and Research Site Conditions

The study was conducted at two vocational high schools (SMK) in East Jakarta, namely SMK Islam PB Soedirman 2 Cijantung and SMK Era Pembangunan Umat Ciracas, both of which regularly implement the Industrial Work Practice (*Prakerin*) program. The research subjects comprised twelfth-grade students who had completed *Prakerin*, supervising teachers, and representatives from industry partners. Details of the number and characteristics of informants are presented in Table 1.

Table 1. Number and Characteristics of Research Subjects

Informant Category	Number	Initials
Students	12	S1-S12
Supervising Teachers	4	GP1-GP4
Industry Representatives	4	MI1-MI4
Total	20	

The research sites reflect the dynamics of urban vocational education, supported by active partnerships with medium- to large-scale industries and adequate practical facilities. Participating students come from diverse socioeconomic backgrounds and demonstrate a strong motivation to enter the workforce.

IPO Diagram of Prakerin Implementation

As a foundation for the analytical framework, Figure 2 below presents a diagram of the Input-

Process-Output (IPO) model used to map the implementation of *Prakerin*.

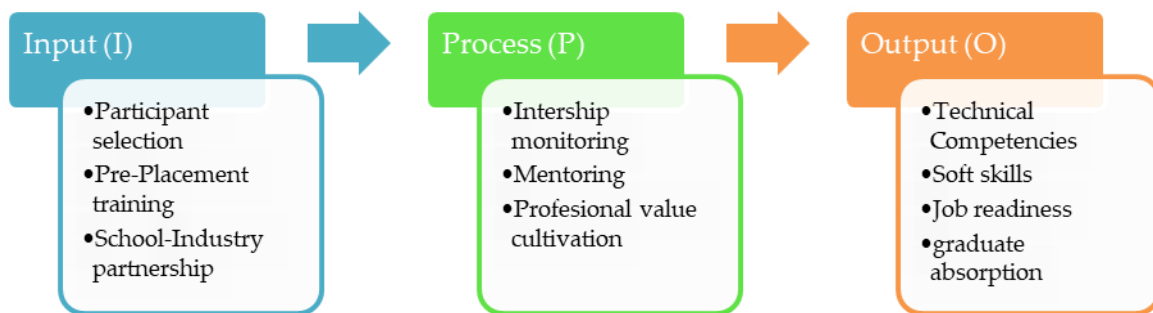


Figure 2. Implementation of *Prakerin* with the IPO Approach

Figure 2 illustrates the implementation of the Industrial Work Practice (*Prakerin*) program using the Input–Process–Output (IPO) approach, which shows the relationships among the input stages, the implementation process, and the results in the form of improved competence and work-readiness of siswa. This IPO model serves as the systematic framework for reporting the results in the subsequent subsections.

Input (I) Stage of the Prakerin Program

a. Participant Selection and Preparation

All eleventh-grade students who met academic and non-academic requirements were selected to participate in *Prakerin*. The selection process considered academic completeness, discipline, and mental readiness, and was carried out transparently with involvement from supervising teachers. *The selection process emphasizes students' readiness, both academically and mentally. We ensure that those participating in Prakerin are students who are prepared to face the challenges in the industry,*" (GP1).

Pre-placement training lasted 2 weeks and covered industry introductions, soft skills training, and interview simulations.

Table 2. Participant Responses After Briefing

Training Aspect	Percentage of Students Stating "Very Helpful"
Industry Introduction	91%
Soft Skill Training	83%
Interview Simulation	75%

Table 2 shows that the majority of students consider pre-placement debriefing activities to be very helpful, especially in industry introduction, soft skills training, and interview simulation.

b. School–Industry Partnership

Both vocational schools have established partnerships with more than ten companies in the automotive, electronics, and manufacturing sectors. Student placements are matched as closely as possible to their areas of expertise. *"Our partnership with companies has been ongoing for over five years, so student placement is relatively smooth and matches their major,"* (GP3).

Prakerin Implementation Process (P) Stage

a. Monitoring and Mentoring

Monitoring is carried out through field visits by supervising teachers at least twice during the three-month internship. Industry mentors are responsible for daily supervision.

Table 3. Monitoring and Mentoring Results

Monitoring Frequency (per student)	Percentage of Students
2 times	58%
3 times	34%
>3 times	8%

Table 3 shows that most students obtained monitoring and mentoring during Industrial Work Practice (*Prakerin*) at least twice, reflecting the active involvement of the supervisor teacher and industry mentor in the internship process. *“The supervising teacher visits regularly, at least twice, asking about our progress and challenges during the internship,”* (S4). Industry mentors actively assist students in adapting and transferring skills. *“Industry mentors are very open, we are invited to discuss and given the opportunity to operate equipment directly,”* (S8).

b. Cultivation of Professional Values

Aspects such as discipline, teamwork, and responsibility are strongly emphasized in the industry setting.

Table 4. Results of the Value Instillation Process in Participants

Professional Value	Percentage of Students Experiencing Improvement
Discipline	88%
Teamwork	79%
Responsibility	83%

Table 4 shows an increase in students' professional values during the implementation of Industrial Work Practice (*Prakerin*). Discipline scores increased the highest (88%), followed by responsibility (83%) and teamwork (79%). These findings show that *Prakerin* effectively instills professional values and develops students' soft skills as part of job readiness. *“The most noticeable change is in discipline. Students value time and assignments more after Prakerin,”* (GP2).

Output (O) Stage: Improvement of Students' Work Competence

a. Technical Competence

As many as 92% of students reported acquiring new skills relevant to their internship field.

Table 5. New Expertise and Skills Acquired

Area of Expertise	Number of Students Acquiring New Skills
Automotive	4
Electronics	5
Administration	3

Table 5 shows the distribution of new skills students acquire during Industrial Work Practice (*Prakerin*) in automotive, electronics, and administration, highlighting the relevance of the internship experience to students' areas of expertise. *“After the internship, I could operate a CNC machine and understand work safety standards,”* (S2).

b. Non-Technical Competence (Soft Skills)

Students' communication, time management, and problem-solving skills improved significantly.

Table 6. Aspects of Students' Soft Skills that Improved

Soft Skill Aspect	Percentage of Students Feeling More Capable
Communication	81%
Time Management	76%
Problem Solving	72%

Table 6 shows improvements in students' soft skills after participating in Industrial Work Practice (*Prakerin*), particularly in communication, time management, and problem-solving. "I used to lack confidence when talking to superiors; now I am more fluent after being trained during the internship," (S10).

c. Job Readiness

The majority of students felt more prepared to enter the workforce.

Table 7. Participant Work Readiness Status

Job Readiness Status	Percentage of Students
Very Ready	50%
Ready	42%
Less Ready	8%

Table 7 shows that the majority of students are in the ready and very ready categories to enter the world of work after participating in Industrial Work Practices (*Prakerin*). "The internship was very helpful; I got to know the real work environment and its challenges" (S12).

Supporting and Inhibiting Factors of the Prakerin Program

The effectiveness of the *Prakerin* program is strongly influenced by several supporting and inhibiting factors identified during the research. Key supporting factors include sustainable partnerships between schools and industry, which facilitate alignment of student competencies with real industry demands. Additionally, the active involvement and support of supervising teachers are vital to ensuring students receive proper guidance throughout the internship period. Adequate school infrastructure further supports the smooth implementation of *Prakerin*, providing students with the necessary resources before and after their industry placements. Conversely, several inhibiting factors were also observed. Not all students are placed in internships that match their areas of expertise, resulting in suboptimal skill development for some participants. The limited number of industry mentors also hampers supervision, making it difficult to provide intensive, personalized guidance to every student. Furthermore, inconsistencies in monitoring frequency and quality across both schools and industry partners have been noted as additional challenges that may affect the program's overall outcomes.

Efforts to Overcome Obstacles

To address the obstacles identified in the *Prakerin* implementation, both schools and their industry partners have initiated various corrective measures. One significant step is the adjustment of the student placement system, which is now increasingly based on matching students' interests and competencies with available internship opportunities. This targeted approach aims to ensure that students are assigned to roles that best support their skill development and career aspirations. Schools have also increased the frequency of monitoring visits by supervising teachers to track students' progress better and promptly address issues that arise during the internship period. In addition, there has been an emphasis on enhancing industry mentor training, equipping them with the skills needed to provide more effective guidance and supervision. These concerted efforts reflect a collaborative commitment to

improving the quality and impact of the *Prakerin* program, thereby maximizing its contribution to students' workforce readiness.

Overview of Graduates' Job Readiness

Post-*Prakerin* evaluation indicates that about 75% of graduates reported being ready to work in related industries, and 18% received job offers from their internship companies.

Table 8. Percentage of Job Readiness of *Prakerin* Program Graduates

Indicator	Percentage/Graduates
Graduates ready to work	75%
Graduates receiving job offers	18%

"This year, three students were directly recruited by their internship companies," (MI3).

Based on the results described above, the implementation of the *Prakerin* program at SMK Islam PB Soedirman 2 Cijantung and SMK Era Pembangunan Umat Ciracas was found to be highly effective across the input, process, and output stages. The input stage was marked by a participant selection process that considered academic and mental readiness, intensive pre-placement training aligned with industry needs, and well-established industry partnerships. During the process stage, structured monitoring and mentoring by both teachers and industry partners were consistently conducted, although challenges remained regarding placement mismatches and limited industry mentors.

In terms of output, *Prakerin* proved effective in significantly enhancing students' technical and soft skills, particularly in work-related competencies, communication, time management, and problem-solving. Moreover, graduates' job readiness increased markedly, as evidenced by high levels of self-confidence to enter the workforce and by the direct absorption of several students by industry partners following their internships. The main supporting factors for the program's success included sustainable industry partnerships, active support from supervising teachers, and adequate school infrastructure. In contrast, the predominant inhibiting factors were mismatched internship placements and a shortage of industry mentors. Remedial measures have been undertaken through interest- and competency-based placement systems and increased monitoring frequency. Overall, *Prakerin* implementation at these schools significantly improved the job-readiness of vocational school graduates in East Jakarta.

Discussion

This discussion critically examines the main findings of the implementation of the Industrial Work Practice (*Prakerin*) program at vocational high schools (SMK) in East Jakarta, relating the research results to the Input-Process-Output (IPO) model and both national and international literature on vocational education.

Interpretation of Findings: Synergy of Prakerin Input, Process, and Output Stages

a. Input Stage (I): Selection, Preparation, and Partnerships

Findings indicate that a structured input phase—comprising participant selection based on academic and non-academic criteria, pre-placement training, and active school-industry partnerships—forms the primary foundation for *Prakerin's* success (Fan et al., 2022; Galais et al., 2021; Sitohang, 2025; Subiyakto & Ahlan, 2014). Pre-internship training not only shapes a work-oriented mindset but also enhances students' adaptability. Placement relevant to students' areas of expertise, as recommended by Destafiana et al. (2024), as well as industry mapping, are key to ensuring that the internship experience truly supports the competencies required by the labor market. Planning, resource management, and industrial collaboration, as emphasized by Dermawan & Erliyana (2024), further reinforce input quality. Goca et al. (2024) also highlight that strong input strengthens students' self-efficacy, which plays a vital role in work readiness.

b. Process Stage (P): Monitoring, Mentoring, and Professional Values

During the process stage, intensive monitoring by teacher supervisors and industry mentors has proven effective for skill transfer and the development of professional values (Galais et al., 2021; Subiyakto & Ahlan, 2014). Two-way monitoring practices enhance students' discipline and responsibility (Destafiana et al., 2024), although challenges remain, such as unsuitable placements and limited numbers of mentors (Dermawan & Erliyana, 2024). Adjustments to the placement system and industry mentor training are important improvements. Enhanced self-efficacy is also found to mediate the internalization of soft skills (Goca et al., 2024).

c. Output Stage (O): Technical Competence, Soft Skills, and Work Readiness

The outputs of *Prakerin* demonstrate significant improvements in students' technical skills, soft skills, and work readiness (Fan et al., 2022; Galais et al., 2021). *Prakerin* not only strengthens hard skills but also builds the soft skills highly needed in the Industry 4.0 era (Fan et al., 2022; Goca et al., 2024). Alignment between practical materials and school learning (Destafiana et al., 2024), as well as evaluation through presentations and reflection-based assessments (Dermawan & Erliyana, 2024) further ensure optimal competency transfer. Graduates' acceptance in the industrial world is concrete evidence of the quality of *Prakerin* outputs. Harefa et al., (2025) Reinforce this by demonstrating that *Prakerin* experience, entrepreneurship learning outcomes, and soft skills are strongly and positively correlated with students' entrepreneurial interest and career readiness.

Contribution and Significance of the Research

This research provides important contributions to the development of vocational education in Indonesia. The findings confirm that the IPO and CIPP models are highly valid for systematically and holistically evaluating the effectiveness of the *Prakerin* program (Dermawan & Erliyana, 2024; Galais et al., 2021; Sitohang, 2025). Furthermore, this study emphasizes the role of soft skills as an essential output, challenging the outdated paradigm that only highlights technical competencies. Soft skills such as communication, time management, and problem-solving are now recognized as key factors in the work-readiness of vocational graduates, as highlighted by Fan et al. (2022) and Goca et al. (2024). The study also affirms the importance of sustainable industry partnerships and dual mentoring systems (teacher supervisors and industry mentors) in shaping competent and adaptive graduates (Dermawan & Erliyana, 2024; Destafiana et al., 2024; Harefa et al., 2025). The study also affirms the importance of sustainable industry partnerships and dual mentoring systems (teacher supervisors and industry mentors) in shaping competent and adaptive graduates (Dermawan & Erliyana, 2024; Destafiana et al., 2024; Fauziah et al., 2024). A practical implication of these findings is the need to strengthen monitoring systems, adjust practical materials, and evaluate internship outcomes through ongoing presentations and reflection.

Policy and School Practice Implications

The research findings have clear practical implications, especially for improving the management of *Prakerin* at the school level. Standardizing the selection system and more targeted placement of interns is crucial to ensuring that industrial experiences are relevant to students' competencies. Additionally, increasing the intensity of soft skills training, optimizing two-way communication between schools and industry, and expanding industrial partnership networks are expected to address challenges such as mismatches in placements and a shortage of mentors in the field (Fauziah et al., 2024; Sitohang, 2025). These recommendations can serve as a reference for designing vocational education policies that are industry-driven and output-based, thereby facilitating the integration of vocational graduates into the workforce.

Implications for Further Research and Development

Theoretically, this study enriches the vocational education literature by emphasizing that

integrating the IPO model into the evaluation of the *Prakerin* program not only maps causal relationships among input, process, and output but also reveals the dynamics of interaction between internal (students, schools) and external (industry) factors. The focus on the importance of soft skills and dual mentoring as mediators of program success is also a significant contribution to the field of vocational education management studies. In practice, the findings provide a foundation for schools to strengthen selection systems, participant preparation, placement mechanisms, and monitoring and mentoring throughout the internship. Furthermore, these results encourage a more active role for industry in mentoring and recruiting vocational graduates and support policymakers in formulating more responsive, evidence-based vocational education policies. The research also opens opportunities for further studies, such as longitudinal analyses of *Prakerin*'s impact on graduates' long-term careers, or the exploration of digital innovations, such as *Prakerin* information systems, to increase monitoring and evaluation efficiency (Harefa et al., 2025).

Research Limitations

This study has several limitations that must be acknowledged. First, the research was limited to only two vocational schools in East Jakarta, so the results may not fully represent the broader context of vocational education in Indonesia. Second, data collection relied on interviews, observations, and documentation, which may introduce informant subjectivity bias and limited triangulation, potentially affecting the external validity of the findings. Third, the output analysis was limited to short-term technical competencies, soft skills, and work readiness, without a longitudinal study of graduates' career development in the medium- and long-term. Fourth, the quality of internship experiences and student mentoring depends greatly on the characteristics of each industry partner, so that *Prakerin* outcomes may vary between industries.

Recommendations for Future Research

To strengthen and broaden research findings, future studies should expand their geographic and subject coverage to include various regions and industrial sectors. Large-scale quantitative methods should also be considered to measure the effectiveness of *Prakerin* comparatively across schools and regions. In addition, longitudinal studies are needed to analyze the long-term impact of *Prakerin* on graduates' careers and social mobility. Exploration of the role of digital innovation, such as *Prakerin* information systems, is also important to enhance the effectiveness of monitoring, evaluation, and program transparency. Lastly, further research on the role of mentoring, participant motivation, and the variation of industry characteristics on *Prakerin* outputs is highly relevant for future agendas.

4. CONCLUSION

Based on the research findings, it can be concluded that the implementation of the Industrial Work Practice (*Prakerin*) program at vocational high schools (SMK) in East Jakarta, particularly at SMK Islam PB Soedirman 2 Cijantung and SMK Era Pembangunan Umat Ciracas, has been effective in improving students' work competencies. Through well-prepared input stages, structured monitoring and guidance processes, and outputs in the form of enhanced technical and soft skills, the majority of students are better prepared to enter the workforce. The program's success is strongly supported by ongoing industrial partnerships, comprehensive pre-placement training, and the active involvement of supervising teachers and industry mentors. However, challenges remain in internship placement and the limited number of industry mentors.

Moving forward, the effectiveness of the *Prakerin* program can be further improved by expanding industrial partnership networks, strengthening supervisors' capacity, and implementing digital monitoring systems. This research is expected to serve as a reference for developing an adaptive, relevant, and industry-oriented *Prakerin* program and to make a significant contribution to the work-readiness of vocational school graduates in the era of global competition.

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