Evaluation of teaching factory implementation in state vocational high schools in sleman regency

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Abstract
This study evaluates the implementation of the Teaching Factory (TeFa) program in vocational high schools (SMK) in Sleman Regency using the CIPP model (Context, Input, Process, Product). The research employed a descriptive-evaluative approach with 175 student respondents, supported by teacher input and school documents. Findings show that the curriculum has been aligned with industry needs through synchronization with partners, though limited facilities, regulations, and accessibility remain obstacles. Teachers are relatively well-prepared, most having completed industrial internships, and industry partners provide positive responses, yet disparities in infrastructure between schools are evident. The process is carried out through project-based learning with cross-major collaboration, offering realistic experiences but constrained by insufficient resources and non-standardized evaluation. In terms of outcomes, students generally display high motivation, discipline, responsibility, and technical skills, though independence and innovation remain weak. Overall, TeFa in Sleman has been on the right track to realize link and match between vocational education and industry, but improvements in facilities, evaluation standards, and innovation culture are still required.

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1. Introduction

Indonesia is currently facing significant challenges related to the development of the 21st-century Industrial Revolution 4.0. This revolution not only influences the competitive climate in the business world but also has a broader impact on the education, social, and economic sectors (Wahjusaputri et al., 2021) The increasingly rapid development of technology and science, particularly in the field of information technology, has driven fundamental changes in society. Consequently, the dynamics of educational development policy are required to adapt to these changes. Generally, technology and vocational education in Indonesia still needs improvement to be able to meet the demands of change. The utilization of technology in the production process is one of the keys to realizing a competitive Indonesia in the era of the Industrial Revolution 4.0 (Ghazali, 2015).

As a vocational secondary education institution, it has a strategic role in preparing graduates who are ready to work, competent, and adaptive. According to the Ministry of Education and Culture (Depdikbud, 2003) SMK (Vocational High School) is an advanced level of education after junior secondary school that emphasizes the provision of vocational skills. In line with this, vocational education in Indonesia continues to undergo transformation, one of which is through the implementation of the Teaching Factory (TeFa) model. TeFa is a learning model that connects learning activities at school with real industrial practice (Agung Kuswantoro, 2014). Through TeFa learning, students not only receive theory but also gain work experience that is relevant to the needs of the business and industrial world (DUDI) (Kasman, 2017)

However, data from the Central Statistics Agency (BPS, 2024) show that SMK graduates still hold the highest position in open unemployment figures. This indicates a gap

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between the competencies of graduates and the demands of the world of work. According to Kurniawan (2017), one of the causes is an inadequate learning method, which leads to students having difficulty understanding the material. Meanwhile, Fitrihana (2019) asserts the necessity of a new approach in vocational learning so that graduates are truly ready to face industrial challenges. The Special Region of Yogyakarta (DIY) Province, as a national education center (Sugiyanto, 2004), has become a pilot region for implementing the Teaching Factory (TeFa) model. The implementation of TeFa in various SMKs across DIY is carried out by adjusting to their respective fields of expertise. According to Brunello & Rocco (2017), TeFa is expected to produce high-quality, competitive SMK graduates who are ready to enter the global job market. Other research also shows that the improvement of SMK graduate quality is urgent to address the rapid global competition (Tjiptady et al., 2019)

Evaluation of TeFa implementation is important because it can provide information about the program's effectiveness. According to Shagira et al. (2021), evaluation is the process of assessing a program based on specific instruments and then comparing it with the applicable standards. In line with this, Schmidbauer et al. (2020) state that the success of TeFa is strongly determined by continuous evaluation so that the program can be improved and enhanced according to its initial objectives. The context of DIY is increasingly relevant for evaluation because the government has developed the Excellent SMK Program , one of whose strategies is the implementation of the Teaching Factory. However, the effectiveness of this policy still needs to be proven empirically. Data from the Yogyakarta City Government (Pemkot Yogyakarta, 2023) even recorded that SMK graduates contributed the largest number to unemployment in the city, totaling 856 people out of 2,916 unemployed individuals. This reinforces the urgency of evaluating the extent to which TeFa has contributed to the work readiness of graduates.

The problems with TeFa implementation can be viewed from various aspects, including: organizational governance, limited facilities and infrastructure, teacher readiness, curriculum management, relationship with industry, and work culture. A preliminary survey shows that there are still obstacles in block-based learning, the involvement of industry (DUDI) instructors, the suitability of assessment indicators, and the fulfillment of teachers' pedagogic, social, professional, and personality competencies. Furthermore, based on initial interviews, some students admitted they were not ready to enter the workforce even though they had participated in TeFa learning. Based on these conditions, this research is focused on evaluating the implementation of the Teaching Factory at State Vocational High Schools (SMK Negeri) in Sleman Regency using the CIPP (Context, Input, Process, Product) approach. This evaluation is expected to be able to provide a comprehensive overview of TeFa implementation, while also yielding strategic recommendations that can assist schools, industries, and local governments in enhancing the quality of industry-based vocational education. Thus, SMK graduates in DIY are expected to be increasingly ready to compete in the increasingly competitive job market strategic recommendations that can assist schools, industries, and local governments in enhancing the quality of industry-based vocational education. Thus, SMK graduates in DIY are expected to be increasingly ready to compete in the increasingly competitive job market.

The research gap in this study lies in whether the TEFA (Teaching Factory) curriculum designed to simulate a real industrial environment for students has been effectively implemented, and to what extent students' mental readiness for the professional workforce has been addressed at Vocational High Schools (SMKN). The problems with TeFa implementation can be viewed from various aspects, including: organizational governance, limited facilities and infrastructure, teacher readiness, curriculum management, relationship with industry, and work culture. A preliminary survey shows that there are still obstacles in block-based learning, the involvement of industry (DUDI) instructors, the suitability of assessment indicators, and the fulfillment of teachers' pedagogic, social, professional, and personality competencies. Furthermore, based on initial interviews, some

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The CIPP model was selected for this study because Teaching Factory (TeFa) is not merely a classroom instructional method, but a complex, industry-based school management system. The application of the CIPP method in evaluating the TeFa curriculum is comprehensive, allowing for the examination of numerous variables. Furthermore, the advantage of using CIPP is its ability to facilitate decision-making when issues arise within the system's processes or inputs. It also enables an assessment of partnership aspects, specifically whether effective collaboration with Business and Industry Partners (DUDI) has been established. This evaluation is expected to be able to provide a comprehensive overview of TeFa implementation, while also yielding strategic recommendations that can assist schools, industries, and local governments in enhancing the quality of industry-based vocational education. Thus, SMK graduates in DIY are expected to be increasingly ready to compete in the increasingly competitive job market strategic recommendations that can assist schools, industries, and local governments in enhancing the quality of industry-based vocational education. Thus, SMK graduates in DIY are expected to be increasingly ready to compete in the increasingly competitive job market.

2. Method

The method in this research is descriptive evaluative. A qualitative method is used to measure in-depth understanding of the context, process, and interpretive data. A quantitative method is used in measuring numerical variables in the form of a scaled questionnaire. The stages in this research are as follows.

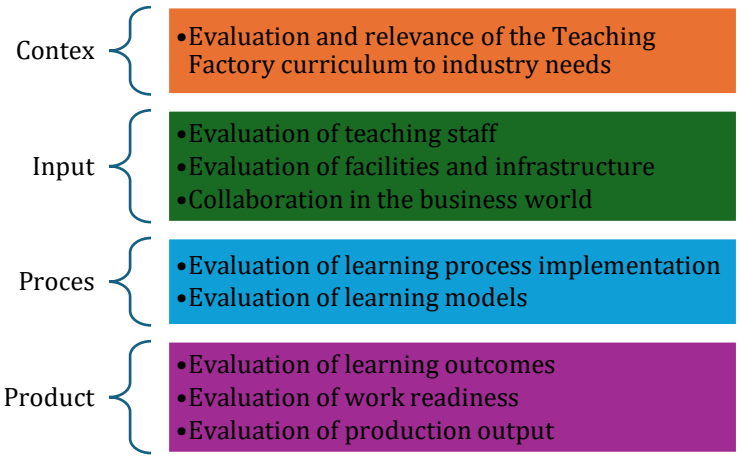

Figure 1. Stages in the research

1. Context Stage
   This stage of the research includes the identification of needs, problems, and opportunities
   that form the basis for the requirement of the Teaching Factory curriculum. The steps in this stage are the analysis of curriculum suitability, policy support, and industry needs.
2. Input Stage
   This stage of the research is the assessment of the strategy, resources, and plans used in achieving the program's goals through steps such as determining: the

suitability of learning planning, the feasibility of facilities, the teaching materials used, the teaching staff, and partnerships with the industrial world

3. Process Stage
   This stage of the research involves monitoring the program implementation phase, identifying obstacles, and assessing the learning models being used. The steps used in this assessment are monitoring implementation, identifying problems or obstacles, and conducting periodic evaluations
4. Product Stage
   This research stage includes the measurement of learning outcomes in the form of expected competencies, long-term evaluation in the form of skill enhancement and the program's achievement in reaching its goals, technical skills, soft skills, quality of products/services, and graduate work readiness

The analysis techniques used in this study can be described as follows

Table 1. Description of data analysis techniques in each stage

Contex	identification of needs, problems, and opportunities that form the basis for the requirement of the Teaching Factory curriculum	Structured interviews, observation with data reduction
Input	the suitability of learning planning, the feasibility of facilities, the teaching materials used, the teaching staff, and partnerships with the industrial world	In-depth interviews, field study
Process	assessment are monitoring implementation, identifying problems or obstacles, and conducting periodic evaluations	Structured interviews, Observation
Product	form of expected competencies, long-term evaluation in the form of skill enhancement and the program's achievement in reaching its goals, technical skills, soft skills, quality of products/services, and graduate work readiness	Measurement evaluation using a Likert scale

Structured interviews are conducted by processing and preparing raw data into an analysis-ready format, utilizing interview transcripts derived from recordings. Scanning is performed by reviewing materials, typing field notes, and selecting data based on the information source or interview type. Coding is then assigned to each theme addressed. Once data is collected, it is coded and reduced. The coding process involves classifying relevant themes into sub-sections within a structured report. Data presentation is carried out through narratives in the form of interview quotations. The following is an overview of the interview results elaboration process.

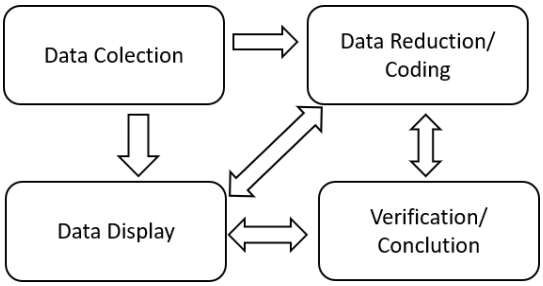

Figure 2. Data analysis techniques

The data production stage is presented through measurements using student questionnaires. The measurement technique employs a Likert scale. The sample is determined using a purposive sampling technique, specifically selecting schools that actively implement Teaching Factory (TeFa) and have industrial partners. The research objects are examined using structured interviews involving school leadership and Office Administration subject teachers.

3. Results

3.1. Context Stage: Evaluation and relevance of the Teaching Factory curriculum to the needs of the business world

The context discussion related to TeFa learning evaluation covers various aspects related to the Teaching Factory learning model which integrates education and the world of work, relevant practical skills, structured work experience, collaboration with industry, soft skills development, and better career preparation. In reality, TeFa learning already involves cooperation between the school and the industrial world (DUDI). This activity includes curriculum synchronization and a higher proportion of practical lesson hours compared to theory. During curriculum synchronization, DUDI representatives are invited to provide input regarding the competencies required by the industry. The process of aligning the curriculum with the needs of job profiles in DUDI is carried out through internal curriculum review stages, followed by a verification stage by the Education Office (Dinas Pendidikan). After that, a public testing is conducted, involving representatives from local/national industries. Schools can consider the technical content of the material and learning achievements that are more relevant to the needs of the industrial world. Other considerations, for example, include the most appropriate teaching methods to prepare students for work, and the future career development of SMK graduates.

The challenges faced are: a) The industrial world expects graduates who are ready to work with specific competencies, but school facilities, tools, and human resources are sometimes not fully supportive. b) The location of the school not being accessible by large vehicles (such as box trucks) also becomes an obstacle in carrying out logistics practice. c) Government regulations, such as the prohibition of leasing school space for business activities, also limit the flexibility of industrial cooperation.

Through TeFa learning practice, students are expected to gain work experience, including the school establishing a production unit as a place for students to practice improving work skills and soft skills, and learn to be responsible for the duties outlined in their job description. In addition to the production unit, schools that have supplementary funds have a more structured TeFa implementation, starting from curriculum synchronization, module creation for TeFa, assessment rubrics, and technical assessment. Meanwhile, schools whose TeFa does not have supplementary funds limit the TeFa orientation to work practice only. The students attend TeFa learning on a set schedule. Technically, they perform tasks according to the work determined by the industry."

3.2. Input Stage: Evaluation of teaching staff, facilities and infrastructure, and cooperation with partners

The learning objectives of the Teaching Factory (TeFa) are developed based on the work competency needs in each area of expertise by identifying the competency requirements of the industrial world. The development process involves curriculum preparation that refers to industrial competency standards and input from industry partners, especially through public testing activities. The goal is for students not only to understand theory but also to be able to master skills that are applicable in the workplace. So far, the problems arising in Teaching Factory (TeFa) learning related to input include the

aspect of school facilities and infrastructure, which are still very minimal or can be said to be not yet representative for use as a practical learning environment. As an effort, the school establishes cooperation with industry to provide students with skills that meet the demands of the world of work. Schools that have supplementary funds from the government are better able to meet the needs for facilities and infrastructure. Some schools already have adequate facilities by utilizing BOS funds (School Operational Assistance funds) to support learning needs, while supplementary funds are used to purchase equipment and buildings. Although still in limited conditions, the industry remains positive toward TeFa program graduates. Several partners, such as Indomaret, even actively recruit these graduates.

> "*We have established a partnership to set up classes in collaboration with Alfamart. Typically, during peak seasons, our students are requested to undergo internships... our students also tend to be selective, choosing internship placements that offer a salary." (W.I.02)*

The laboratories available in the school are quite representative, for example, a mini-market, an administration room, and logistics warehouse simulation. Furthermore, practical work is also carried out directly in the field, such as at partner stores (Alfamart, Post Office, Mini Bank) as a form of real-life laboratory alternative. If the school does not yet have adequate facilities, the industrial world often invites students to conduct practical work directly at the workplace. Contextually, the availability of TeFa supervising teachers is sufficient. Most teachers have participated in industrial internships. Teacher training to provide work experience in the industry has also been carried out with government funding support. The teacher mentorship of students during the learning process proceeds according to the established schedule. The teachers involved in TeFa implementation are selected based on the suitability of their competence with the field of expertise they manage and their direct practical experience in the industrial world.

School cooperation with industry has been carried out through a Memorandum of Understanding (MoU) which includes clauses related to the learning process and internship activities. Specifically for the Teaching Factory, the industry places an office or business unit that can be used as a practical facility for students. Schools that receive grant supplementary funds implement cooperation in accordance with the proposed TeFa proposal, and the contracts are done periodically. Thus, the TeFa program has a broader basis for cooperation in terms of content.

3.3. Process Stage: Evaluation of implementation process and learning model

The review of the process aspect covers the activities carried out by the school in implementing TeFa-based learning. This program is executed in the form of project-based practice with a duration that varies depending on the respective areas of expertise. Generally, TeFa activities are carried out in weekly and monthly time blocks to provide students with real work experience. Each program is adjusted to the specific competency of its major. Although the TeFa learning practice aligns with the major, in reality, a single project is often carried out in the form of cross-major collaboration. There are several schemes for the TeFa program, including a)TeFa program based on administrative and logistics services. b). Pos Indonesia and Alfamart Industry Class. c) Digital-based office administration practice. d) Modern store management simulation."

The usual activities in the work project are based on industry demand. For example: a) for the Logistics Management major: practice in warehouse management, goods distribution, and logistics administration, b) for the Office Administration major: simulation of customer service, document management, and administrative information systems, c) for the Marketing major: practice in retail store management and transaction systems using

cashier applications. Because it is project-based, the implementation of TeFa learning is carried out through collaboration between several majors. Teachers act as facilitators and mentors for the practical activities. Their duties include preparing learning plans, guiding students in executing the project, evaluating student work results, and adjusting activities according to developments in the industrial world. Teachers also serve as the main link between the school and industry partners in coordinating joint programs.

Implementation is not without constraints. Some of these include limited funds for teacher training, limited facilities, and time constraints for coordinating the implementation schedule. There are two types of success measurement: for schools that receive funds, the assessment process is based on pre-established assessment rubrics. However, for schools that do not have supplementary funds, the assessment is based on: participation in practice, feedback from the user, and work discipline. Generally, the level of learning success is measured by: a) student competency achievement based on practical assessment, b) graduate absorption into the workforce, c) feedback from industry partners, d) assessment from the education department supervisor and LSP (Professional Certification Body) certification. Students who are declared passed or have achieved competence are directed to undergo competency certification. They are also encouraged to apply for jobs at industry partners or continue their education at applied higher education institutions. The school assists through career guidance programs and the provision of job vacancy information. For students who have not yet reached the competency standard, the school provides remedial programs and additional mentoring. They are given the opportunity to repeat practice and receive guidance from teachers until they achieve results that meet the established standards.

3.4. Product Stage: Evaluation of learning outcomes, work readiness, and production output

A total of 175 students at State Vocational High Schools in Sleman Regency filled out the questionnaire evaluating the implementation of the Teaching Factory. This number is considered representative because all participants in the activity provided feedback. The Teaching Factory itself is defined as a trilateral integration among the industrial world, educational institutions, and the government to prepare competent SMK graduates to enter the workforce. This learning model gives students direct experience in an industrial environment and expands their entrepreneurial insight. Therefore, the enthusiasm and positive perception of students regarding the implementation of TeFa is very important to evaluate. The results of the questionnaire data analysis are as follows

Table 2. Product stage results data in percentages

No	Description	Always	Often	Sometimes	Never
1	Student Motivation to Participate in the Teaching Factory (TeFa) Program	61,1	24,6	14	0
2	Student Desire to Work According to Their Major	64	25	11	0
3	Student Responsibility in Completing Tasks	67	25	8	0
4	Student Independence in Decision-Making	15	65,7	65,7	0
5	Graph of Student Emotional Management Skills	53	25	22	0
6	Student Punctuality in Following the TeFa Schedule	66	30	4	0
7	Student Social Interaction Skills	73	22	5	0
8	Student Receptiveness to Teacher Feedback	73	21	6	0
9	Student Politeness in Interacting with Customers	74	23,4	2	1
10	Student Punctuality in Attending TeFa	71	23	5	1
11	Student Awareness in Maintaining Cleanliness and Professional Appearance	84	16	0	0

No	Description	Always	Often	Sometimes	Never
12	Technical Skill Proficiency Relevant to the Field of Study	68	29	3	0
13	Ability to Operate Equipment and Materials Following Procedures	59	31	10	0
14	Student Consistency in Following Work Procedures	64	32	4	0
15	Capability to Finish Tasks in Line with Industry Standards	60	34	6	0
16	Student Skill in Creating Products According to Customer Standards	56	33	11	0
17	Student Conscience Regarding Quality Production	76	21	3	0
18	Student Innovativeness in Product Development	64	24	11	0
19	Suitability of Teacher Assignment with Field of Expertise in TeFa	62	38	0	0
20	Clarity and Systematic Nature of the TeFa Implementation Schedule	59	38	2	1
21	Clarity of Product or Service Planning in TeFa	58	40	1	1
22	Student Perception of the Market Value of TeFa Products	63	36	1	0
23	Equity in the Assignment of TeFa Tasks	60	38	1	0
24	Student Comprehension of Their Roles and Responsibilities	59	40	1	0

The data in the table 2 above shows that the evaluation results for learning outcomes can be seen in descriptions 1 – 8, the work readiness results are found in descriptions no. 9 – 16, and the production output results are in descriptions no. 17 – 24. The evaluation results for learning outcomes, work readiness, and production output all show high scores.

4. Discussion

The context of Teaching Factory (TeFa) implementation at State Vocational High Schools (SMK Negeri) in Sleman Regency indicates a serious effort to link the curriculum with the needs of the business and industrial world (DUDI). The synchronization process is carried out systematically, through internal curriculum review, verification by the Education Office (Dinas Pendidikan), and public testing with the industry. As a result, the curriculum places greater emphasis on practice than on theory, making it relevant to the required work competencies. This aligns with Fitrihana (2019), who asserts that industry involvement in the SMK curriculum is crucial for reducing the competence gap among graduates. Nevertheless, constraints remain quite evident. The industry expects graduates to be ready-to-work with specific skills, but school facilities are not fully supportive. Furthermore, there are structural obstacles such as the school's location access hindering logistics practice or government regulations prohibiting the use of school facilities for business activities. This reality reinforces BPS (2024) data showing that SMK graduates still dominate the open unemployment rate. Theoretical studies support this finding; UNESCO-UNEVOC (2019) emphasizes that vocational education is a crucial pillar of sustainable development, and if the implementation context is not supported by adequate infrastructure, the potential of vocational education cannot be optimally realized

The input aspect of TeFa covers teacher readiness, facilities and infrastructure, and industry support. From the teachers' perspective, the research shows that most educators have participated in industrial internships and training, making them better able to provide students with real-world experience. This finding aligns with research by Hadi & Suyanto (2021), which indicates that link-and-match programs between schools and industry increase student work readiness when teachers actively serve as facilitators. However, facilities and infrastructure remain uneven across schools. Schools that receive supplementary funds are able to build representative laboratories, such as mini-markets, administration rooms, and logistics warehouses, while schools with limited funding rely solely on direct practical experience in the field with industry partners. Nevertheless, the

industrial world continues to give a positive response to TeFa graduates. Several partners, such as Indomaret and Alfamart, even actively recruit graduates from this program, demonstrating confidence in the students' quality. Industry support is also formally bound through Memorandums of Understanding (MoU), which provide students with the opportunity to learn directly in the industry's business units. This condition is consistent with Afandi (2019), who states that the success of TeFa is largely determined by facility support and strong partnerships with the industry

The TeFa learning process at State Vocational High Schools (SMK Negeri) in Sleman Regency is implemented through project-based practice using weekly or monthly time blocks. Each major plays a role according to its competence, but cross-major collaboration is also a prominent pattern. For example, students from the Logistics major manage warehousing and distribution, the Office Administration major handles document administration and services, while the Marketing major manages retail stores with digital cashier systems. This approach aligns with the concept of production-based learning, as explained by Gessler (2020), where learning in a real-world context enhances student work readiness Teachers serve as facilitators, lesson plan developers, and liaisons with the industry. However, the research found constraints, including limited funding for teacher training, limited facilities, and difficulties in coordinating schedules among stakeholders. Furthermore, there is a difference in the evaluation mechanism: schools with supplementary funding use formal rubrics, while schools with minimal funding rely only on discipline, practical involvement, and industry feedback. This condition is similar to the findings of Schmidbauer et al. (2020), which emphasize the importance of continuous evaluation to maintain the quality of vocational education

The product aspect of this research involved 175 student respondents who provided feedback on the implementation of TeFa. The majority showed positive results. The questionnaire data indicates that 61.1% of students always follow TeFa activities with enthusiasm, and 64% always want to work according to their major, signifying a clear career orientation. Students' professional attitude is also evident, where 67% always complete tasks with a strong sense of responsibility, 71% always arrive on time, and 73.7% always behave politely towards customers. Furthermore, 84% of students always maintain cleanliness and a neat personal appearance, reflecting the internalization of professional work culture. Technical skills are also quite high, with 68% of students always mastering skills relevant to their field, 60% always completing work according to industry standards, and the majority rating TeFa products as having market value. These findings demonstrate TeFa's success in equipping students with work-relevant skills, supported by Sari et al.'s (2022) research, which noted that TeFa enhances technical skills, motivation, and discipline. However, there are weaknesses that deserve attention. Only 15% of students are always independent in decision-making, while in the aspect of innovation, 65% often innovate but only 24% always innovate. This suggests that while TeFa succeeds in building basic competencies and work ethic, the aspects of critical thinking and innovation are still weak. This aligns with the evaluation by Wahjusaputri et al. (2023), who found that although student competence improves, many graduates are still unprepared to face the complexity of the working world due to a lack of creativity, innovation, and problem-solving skills..

5. Conclusion

Based on the research findings and discussion, it can be concluded that the implementation of the Teaching Factory (TeFa) at State Vocational High Schools (SMK Negeri) in Sleman Regency has been executed reasonably well with a tangible contribution to improving the quality of vocational learning. The curriculum has been aligned with the needs of the business and industrial world through synchronization involving industry partners, making the proportion of practical work more dominant than theory. Teachers

possess adequate readiness, as most have participated in industrial internships, and industry support is quite positive, evidenced by formal cooperation and the direct recruitment of graduates. However, constraints remain, including limited school facilities, access barriers, regulations restricting the management of production units, and the disparity of infrastructure among schools. Meanwhile, the project-based learning process has provided realistic learning experience, although evaluation mechanisms are not yet standardized across all schools. This study enriches the literature on Teaching Factory (TeFa) curriculum evaluation by employing a CIPP analysis with a mixed-methods approach. From the product aspect, students demonstrate good motivation, discipline, professional attitude, and technical skills, but are still weak in autonomy and innovation. Therefore, the overall implementation of TeFa is on the right track to realize the link and match between vocational education and the working world. Nevertheless, it still requires improvement in facility equalization, evaluation standardization, and strengthening of the innovation culture so that graduates can be more adaptive, independent, and competitive in the global era.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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