

Managing Teaching Factory Programs to Develop Student Character and Work Readiness in Vocational High Schools

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Abstract. This study examines the management of Teaching Factory (TeFa) programs in developing student character and vocational skills in vocational high schools. The research is motivated by the need to improve the relevance of vocational education to industry demands while fostering professional attitudes and work readiness among students. Teaching Factory is viewed as a production-based learning model that requires effective management to achieve sustainable educational outcomes. The study employed a qualitative approach with a descriptive case study design. Data were collected through in-depth interviews, participant observations, and document analysis involving school principals, Teaching Factory managers, vocational teachers, students, and industry partners at SMK Sinar Prahangan, Kabupaten Cianjur, and SMK Negeri 1 Kota Sukabumi. Data were analyzed using the interactive model of Miles, Huberman, and Saldaña, while data trustworthiness was ensured through triangulation, member checking, and audit trails. The findings reveal that Teaching Factory management is implemented through four interrelated functions: planning, organizing, implementation, and evaluation. Planning aligns curriculum and industry standards with character education goals; organizing structures human resources, facilities, and workflows to simulate real industrial environments; implementation engages students in authentic production-based learning; and evaluation ensures quality assurance through performance assessment and industry feedback. The study concludes that systematic Teaching Factory management effectively enhances students' vocational competencies and professional character, contributing to improved work readiness and industry relevance.

Keywords: teaching factory, vocational education management, production-based learning, student character development, vocational high school

1 Introduction

The era of globalization has fundamentally transformed the landscape of vocational education, particularly in relation to workforce competitiveness and industry relevance[1], [2]. Vocational high schools (Sekolah Menengah Kejuruan/SMK) are

increasingly expected to produce graduates who are not only technically competent but also possess strong character traits, adaptability, and work readiness aligned with industry standards. In this context, vocational education plays a strategic role in national human resource development, serving as a bridge between formal education and the labor market[3]–[5].

Despite this strategic position, empirical evidence indicates that many SMK graduates in Indonesia have not yet met the expectations of the business and industrial sectors (*Dunia Usaha dan Dunia Industri/DUDI*) [6], [7]. Industry stakeholders frequently report that graduates lack practical skills, work discipline, productivity, and professional attitudes required in real work environments[8]. This condition is reflected in relatively high unemployment rates among vocational school graduates compared to other education levels, indicating a mismatch between vocational education outcomes and labor market demands[9], [10].

In response to these challenges, the Indonesian government has introduced various policy initiatives aimed at strengthening the relevance of vocational education, including the link and match policy between schools and industry. One of the most prominent strategies derived from this policy is the implementation of the Teaching Factory (TeFa) model [11]–[14]. Teaching Factory is a production-based learning model that simulates real industrial processes within the school environment, allowing students to engage directly in the production of goods and services according to industry standards, procedures, and timelines[12], [15].

Teaching Factory is not merely a form of practical training but represents an integrated learning system that combines curriculum, production management, industry collaboration, and competency assessment [16]. Through TeFa, students are expected to develop not only hard skills related to their vocational competencies but also soft skills and character attributes such as responsibility, discipline, teamwork, initiative, and entrepreneurial mindset. These character dimensions are increasingly recognized as essential components of workforce competitiveness in the global labor market[17], [18].

However, the effectiveness of Teaching Factory implementation largely depends on how it is managed at the institutional level. Many vocational schools face challenges in implementing TeFa optimally due to limitations in infrastructure, funding, human resources, industry partnerships, and managerial capacity. Previous studies have tended to focus on the outcomes of Teaching Factory in terms of skill acquisition or employment rates, while relatively limited attention has been given to the management processes that determine the sustainability and effectiveness of TeFa programs, particularly in relation to character development and skill formation[19][20].

The research gap addressed in this study lies in the limited exploration of Teaching Factory management as a comprehensive and systematic process. Specifically, there is a need to examine how Teaching Factory programs are planned, organized, implemented, and evaluated as part of school management strategies aimed at developing both student character and vocational skills. Understanding these management processes is crucial to ensuring that Teaching Factory functions not only as a learning model but also as an institutional system that supports continuous improvement and industry relevance.

Therefore, this study aims to analyze the management of Teaching Factory programs in developing student character and vocational skills at SMK Sinar Prahianan, Kabupaten Cianjur, and SMK Negeri 1 Kota Sukabumi, West Java. By employing a qualitative descriptive case study approach, this research seeks to provide a comprehensive understanding of Teaching Factory management practices, the challenges encountered, and the strategies adopted to enhance program effectiveness. The findings are expected to contribute theoretically to vocational education management and practically to policymakers, school leaders, and practitioners seeking to strengthen the quality and relevance of vocational education in Indonesia..

2 Method

This study employed a qualitative approach with a descriptive case study design. The qualitative approach was chosen to obtain an in-depth understanding of Teaching Factory (TeFa) management practices in developing student character and vocational skills within real educational contexts. Qualitative research allows researchers to explore complex management processes, interactions, and meanings from the perspectives of participants in their natural settings, making it particularly suitable for examining vocational education management [21]–[24].

The research was conducted at two vocational high schools in West Java, Indonesia, namely SMK Sinar Prahianan, Kabupaten Cianjur, and SMK Negeri 1 Kota Sukabumi. These schools were purposively selected based on their implementation of Teaching Factory programs and their active collaboration with industry partners. The selection of two different school contexts was intended to provide comparative insights into Teaching Factory management practices and challenges across institutional settings.

The research participants consisted of school principals, vice principals for curriculum and industry relations, Teaching Factory managers, vocational teachers, students, and representatives from industry partners. School leaders and teachers were selected as key informants due to their direct involvement in planning, organizing, implementing, and evaluating Teaching Factory programs. Students and industry partners were included as supporting informants to capture learning experiences, character development, and industry perspectives on graduate readiness.

Data collection was carried out through methodological triangulation, including in-depth interviews, participant observation, and document analysis. In-depth interviews were conducted to explore participants' experiences, perceptions, and strategies related to Teaching Factory management. Participant observations were used to examine production-based learning activities, student engagement, work discipline, and interactions within Teaching Factory environments. Document analysis involved reviewing curriculum documents, Teaching Factory program plans, standard operating procedures (SOPs), partnership agreements with industry, production records, and evaluation reports to validate and enrich data obtained from interviews and observations [25]–[28].

In this qualitative study, the researcher served as the primary research instrument, as data collection and interpretation were closely linked to the researcher's interaction with the research setting and participants[29]. To support systematic data collection, several supporting instruments were developed, including semi-structured interview guides, observation protocols, and document review matrices. These instruments ensured consistency while allowing flexibility to capture emerging issues and themes during the research process.

Data trustworthiness was ensured by applying the four criteria proposed by Lincoln and Guba: credibility, transferability, dependability, and confirmability. Credibility was enhanced through triangulation of data sources and techniques, as well as member checking to confirm the accuracy of participants' statements. Transferability was addressed by providing rich and detailed descriptions of the research context. Dependability and confirmability were strengthened through audit trails, systematic documentation of research procedures, and reflective notes to minimize researcher bias.

Data analysis followed the interactive model proposed by Miles, Huberman, and Saldaña [30], which consists of three interrelated stages: (1) data reduction, involving the selection, coding, and condensation of raw data; (2) data display, where organized data were presented in narrative descriptions, matrices, and tables; and (3) conclusion drawing and verification, in which patterns, themes, and relationships were identified and continuously validated throughout the research process. Data analysis was conducted concurrently with data collection, allowing the researcher to refine analytical focus in response to emerging findings.

The analytical framework of this study was guided by classical management theory, particularly management functions of planning, organizing, implementation, and evaluation, as applied to Teaching Factory programs. Through this methodological approach, the study aims to provide a comprehensive and credible understanding of how Teaching Factory management contributes to the development of student character and vocational skills in vocational high schools..

3 Results

3.1 Planning of Teaching Factory Management

Planning constitutes a critical initial stage in the management of Teaching Factory (TeFa) programs, as it determines program direction, learning objectives, and alignment with industry needs. Findings from interviews, participant observations, and document analysis at SMK Sinar Prahangan and SMK Negeri 1 Kota Sukabumi indicate that Teaching Factory planning was systematically designed to integrate vocational skill development with student character formation.

Interview data reveal that Teaching Factory planning was oriented toward aligning school curricula with industry standards and real workplace conditions. School leaders emphasized that planning focused not only on technical competencies but also on character values such as discipline, responsibility, and work ethics. One school principal stated:

“We design our Teaching Factory planning based on industry needs. In addition to technical skills, we also plan how students are trained in discipline, responsibility, and professional work attitudes.” (Principal, interview, March 2025)

A Teaching Factory manager further explained that planning involved close collaboration with industry partners:

“We discuss with industry partners from the planning stage, covering aspects such as product types, quality standards, and the workflow that must be implemented at the school.” (TeFa Manager, interview, March 2025)

These statements indicate that Teaching Factory planning was collaborative and industry-oriented.

Participant observations show that prior to implementation, schools conducted preparatory activities such as production planning meetings, task allocation, and scheduling of Teaching Factory activities. Teachers and instructors prepared production workflows, learning scenarios, and supervision mechanisms to simulate real industrial environments. Observations also indicate that students were briefed on work procedures, safety standards, and expected professional behavior before engaging in production activities.

Document analysis of Teaching Factory program plans, curriculum documents, partnership agreements (MoU) with industry, and standard operating procedures (SOPs) confirms that planning activities were formally documented. Planning documents outlined production targets, competency standards, character indicators, assessment criteria, and timelines. These documents demonstrate that Teaching Factory planning was integrated into school management and curriculum structures. Table 1 summarizes the key planning strategies in Teaching Factory management.

Table 1. Planning Strategies in Teaching Factory Management

No.	Planning Aspect	Planning Strategy	Description
1	Program objectives	Industry-oriented goals	Alignment of skills and character development with industry needs
2	Curriculum integration	TeFa-based curriculum	Integration of Teaching Factory into vocational curriculum
3	Industry collaboration	Partnership planning	Joint planning with industry partners
4	Learning scenarios	Production-based learning	Simulation of real industrial workflows
5	Character indicators	Work ethics values	Discipline, responsibility, teamwork, and professionalism

Source: Interviews, participant observations, and document analysis (2025)

Overall, the planning stage demonstrates that Teaching Factory management is strategically designed to ensure relevance, sustainability, and effectiveness. By integrating industry needs, curriculum requirements, and character education goals into structured plans, schools position Teaching Factory as both a learning model and a management system. These findings suggest that effective planning serves as a

foundational element for organizing resources, implementing production-based learning, and evaluating student competency and character development in vocational education.

3.2 Organizing of Teaching Factory Management

The organizing stage focuses on how Teaching Factory (TeFa) plans are translated into structured arrangements of human resources, facilities, workflows, and partnerships to support production-based learning. Findings from interviews, participant observations, and document analysis at SMK Sinar Prahangan and SMK Negeri 1 Kota Sukabumi indicate that effective organization plays a crucial role in ensuring the sustainability and authenticity of Teaching Factory implementation.

Interview data reveal that Teaching Factory organization involves clear role distribution among school stakeholders and coordination with industry partners. School leaders emphasized the importance of organizational structure to ensure that TeFa activities run according to industrial standards. One vice principal explained:

“The organization of the Teaching Factory includes a clear division of roles among the principal, Teaching Factory (TeFa) managers, productive-subject teachers, and industry instructors to ensure that the production process runs effectively.” (Vice Principal, interview, April 2025)

A vocational teacher highlighted the operational aspect of organization:

“Each teacher has specific responsibilities, ranging from production supervision and student mentoring to product quality control.” (Teacher, interview, April 2025)

These statements indicate that Teaching Factory organization is structured and task-oriented.

Participant observations show that Teaching Factory activities are organized to closely resemble real industrial environments. Production units are arranged according to workflow sequences, including preparation, processing, quality control, and finishing. Students are grouped into work teams with specific roles such as production operators, quality controllers, and logistics coordinators.

Observations also indicate that work schedules, production targets, and safety procedures are clearly communicated to students. Teachers and instructors supervise activities while allowing students to experience responsibility, teamwork, and discipline—key character values expected in the workplace.

Document analysis of organizational structures, duty assignment letters, production schedules, and standard operating procedures (SOPs) confirms that Teaching Factory organization is systematically documented. Organizational charts show formal coordination between school management, Teaching Factory units, and industry partners. Documents also detail task distribution, reporting mechanisms, and coordination meetings, indicating that organization is embedded within school management systems. Table 2 summarizes the key organizing strategies in Teaching Factory management.

Table 2. Organizing Strategies in Teaching Factory Management

No.	Organizing Aspect	Organizational Strategy	Description
1	Organizational structure	Clear role distribution	Defined roles for principals, TeFa managers, teachers, and instructors
2	Human resources	Team-based organization	Students organized into production work teams
3	Workflow management	Industry-standard processes	Production flow follows real industrial procedures
4	Facility utilization	Functional production units	Equipment and spaces arranged according to workflow
5	Industry coordination	Continuous collaboration	Regular coordination with industry partners

The organizing stage demonstrates that Teaching Factory management requires a well-structured organizational system to support authentic production-based learning. By organizing human resources, facilities, and workflows in alignment with industry practices, schools create learning environments that foster both vocational skills and professional character. These findings suggest that effective organization serves as a bridge between strategic planning and successful implementation of Teaching Factory programs.

3.3 Implementation of Teaching Factory Management

The implementation stage reflects how Teaching Factory (TeFa) plans and organizational structures are enacted in real production-based learning activities. Findings from interviews, participant observations, and document analysis at SMK Sinar Prahiangan and SMK Negeri 1 Kota Sukabumi indicate that Teaching Factory implementation integrates vocational skill development, character formation, and industry-oriented work practices in a systematic manner.

Interview data reveal that Teaching Factory implementation emphasizes learning by doing in authentic work environments. Teachers and managers highlighted that students are actively involved in real production processes under industry standards. One Teaching Factory manager stated:

“At the implementation stage, students are directly involved in the production process, starting from work planning and execution to quality control in accordance with industry standards.” (TeFa Manager, interview, April 2025)

A vocational teacher emphasized the character-building aspect of implementation:
“Through the Teaching Factory, students are trained in time discipline, responsibility for their work, and teamwork, as they operate in a manner similar to the industrial workplace.” (Teacher, interview, April 2025)

These statements indicate that implementation focuses on both technical competence and character development.

Participant observations show that Teaching Factory activities are conducted in production units that simulate real industrial environments. Students perform tasks

according to assigned roles, adhere to work schedules, and follow standard operating procedures (SOPs). Teachers and instructors supervise production activities while providing guidance and feedback.

Observations also indicate that students demonstrate increased responsibility, discipline, and teamwork during Teaching Factory activities. Mistakes and production challenges are addressed through reflective discussions, allowing students to learn problem-solving and professional attitudes in real contexts.

Document analysis of production reports, student competency records, and supervision notes confirms that Teaching Factory implementation is systematically monitored and documented. Records show that student performance is assessed based on product quality, work process compliance, teamwork, and professional behavior. These documents demonstrate that Teaching Factory implementation aligns with planned objectives and organizational structures. Table 3 summarizes key implementation practices in Teaching Factory management.

Table 3. Implementation Practices in Teaching Factory Management

No.	Implementation Aspect	Practice	Description
1	Learning approach	Production-based learning	Students engage in real industrial production
2	Student roles	Work-based assignments	Students perform industry-like roles
3	Character development	Work ethics cultivation	Discipline, responsibility, teamwork
4	Supervision	Guided practice	Teachers and instructors provide continuous guidance
5	Performance assessment	Product and process evaluation	Assessment based on quality and professionalism

Source: Interviews, participant observations, and document analysis (2025)

The implementation stage demonstrates that Teaching Factory management effectively bridges school learning and industrial practice. By engaging students in authentic production processes, schools create meaningful learning experiences that enhance vocational competencies and professional character. These findings suggest that successful implementation depends on consistent supervision, adherence to industry standards, and the integration of character education into daily work practices.

3.4 Evaluation of Teaching Factory Management

The evaluation stage represents the final management function in Teaching Factory (TeFa) implementation and serves as a mechanism for ensuring program effectiveness, quality control, and continuous improvement. Findings from interviews, participant observations, and document analysis at SMK Sinar Prahangan and SMK Negeri 1 Kota Sukabumi indicate that evaluation focuses on both student performance and program management outcomes.

Interview data reveal that evaluation is conducted to assess the achievement of vocational competencies, character development, and alignment with industry

standards. School leaders emphasized that evaluation is essential for maintaining Teaching Factory quality and relevance. One school principal stated:

“Teaching Factory evaluation is conducted to assess the extent to which students’ skills and work attitudes have developed, as well as whether the products produced meet industry standards.”(Principal, interview, May 2025)

A Teaching Factory manager further explained that evaluation results are used for improvement:

“The evaluation results serve as the basis for improvements, both in terms of the learning process, production management, and collaboration with industry.” (TeFa Manager, interview, May 2025)

These statements indicate that evaluation serves both assessment and improvement functions.

Participant observations show that evaluation activities are conducted throughout the Teaching Factory process. Teachers and instructors monitor student performance during production activities, focusing on technical accuracy, work discipline, teamwork, and compliance with safety procedures. At the end of production cycles, reflective discussions are held to review outcomes, challenges, and lessons learned.

Observations also indicate that industry partners occasionally participate in evaluation processes by providing feedback on product quality and student performance, reinforcing the authenticity of assessment practices.

Document analysis of evaluation reports, student competency assessments, quality control records, and partnership feedback confirms that evaluation practices are systematically documented. Evaluation documents include rubrics assessing technical skills, character indicators, and product quality. Feedback from industry partners is recorded and used to refine Teaching Factory planning and implementation. Table 4 summarizes the key evaluation practices in Teaching Factory management.

Table 4. Evaluation Practices in Teaching Factory Management.

No.	Evaluation Aspect	Evaluation Practice	Description
1	Student competency	Performance assessment	Evaluation of skills, discipline, and teamwork
2	Product quality	Quality control review	Assessment based on industry standards
3	Process effectiveness	Reflective evaluation	Review of workflow and learning processes
4	Industry feedback	External evaluation	Input from industry partners
5	Follow-up actions	Continuous improvement	Evaluation results used for program refinement

Source: Interviews, participant observations, and document analysis (2025)

The evaluation stage demonstrates that Teaching Factory management emphasizes accountability, quality assurance, and continuous improvement. By combining internal assessment, reflective evaluation, and industry feedback, schools ensure that Teaching Factory programs remain relevant and effective in developing students’ vocational skills and professional character. These findings suggest that systematic evaluation is

essential for sustaining the impact and credibility of Teaching Factory as a production-based learning model in vocational education.

4 Discussion

This study examined the management of Teaching Factory (TeFa) programs in developing student character and vocational skills at SMK Sinar Prahangan and SMK Negeri 1 Kota Sukabumi through four core management functions: planning, organizing, implementation, and evaluation. The findings indicate that Teaching Factory management, when implemented systematically and collaboratively, serves as an effective strategy to bridge vocational education with industry demands while simultaneously fostering students' professional character.

The findings from the planning stage demonstrate that Teaching Factory programs are strategically designed to align vocational curricula with industry needs and workplace standards. Planning activities emphasize not only technical competencies but also character values such as discipline, responsibility, and work ethics. This aligns with classical management theory, which positions planning as a decisive function that determines organizational direction and effectiveness[31], [32].

From a vocational education perspective, these findings support the link and match paradigm, which stresses the importance of aligning educational outcomes with labor market expectations. Previous studies have shown that vocational programs are more effective when industry involvement is integrated at the planning stage[33]. This study extends existing research by highlighting that character development is intentionally embedded within Teaching Factory planning, thereby positioning TeFa not only as a skills-training model but also as a character education system.

The organizing stage reveals that effective Teaching Factory management depends on clear organizational structures, role distribution, and workflow arrangements that mirror real industrial environments. The organization of human resources, facilities, and production processes enables students to experience authentic workplace conditions. This finding supports contingency theory, which argues that organizational effectiveness is influenced by the alignment between structure, environment, and task demands.

The team-based organization observed in Teaching Factory implementation fosters collaboration, communication, and shared responsibility among students. These findings are consistent with studies emphasizing that workplace-simulated learning environments enhance both technical and soft skills development. The novelty of this study lies in demonstrating how organizational management functions as a pedagogical mechanism, enabling students to internalize professional values through structured work systems.

The implementation findings indicate that Teaching Factory activities provide students with meaningful learning experiences through direct involvement in real production processes. Learning by doing enables students to develop technical skills while simultaneously cultivating professional attitudes such as discipline, accountability, teamwork, and problem-solving. This aligns with experiential learning

theory, which emphasizes that knowledge and skills are constructed through concrete experiences and reflective practice [34].

Moreover, the role of teachers and instructors as supervisors and mentors rather than traditional instructors reflects a shift toward student-centered vocational pedagogy. This finding supports previous research suggesting that production-based learning models enhance student engagement and work readiness. The present study contributes to the literature by illustrating that effective implementation is contingent upon consistent supervision and adherence to industry standards embedded within Teaching Factory management.

The evaluation stage highlights the importance of systematic assessment and feedback in maintaining Teaching Factory quality and relevance. Evaluation practices encompass student competency assessment, product quality control, and reflective reviews of production processes. The inclusion of industry partners in evaluation further strengthens the authenticity and credibility of assessment outcomes.

These findings align with quality management principles, which emphasize evaluation as a mechanism for accountability and continuous improvement. Unlike conventional school assessments that focus primarily on academic outcomes, Teaching Factory evaluation emphasizes holistic performance, including character and professional behavior. This study reinforces prior findings that industry-involved evaluation enhances vocational education relevance and adds new insight by showing how evaluation outcomes inform subsequent planning and organizational refinement.

Overall, this study contributes descriptively by illustrating how Teaching Factory management operates as a comprehensive system, explanatorily by clarifying how management functions influence character and skill development, and predictively by suggesting that well-managed Teaching Factory programs can enhance graduate readiness and employability. The findings underscore that Teaching Factory effectiveness depends not solely on facilities or industry partnerships but on integrated management practices.

Practically, the study highlights the need for school leaders and policymakers to strengthen managerial capacity in Teaching Factory implementation. Teachers must function not only as instructors but also as production supervisors and character mentors. This research therefore contributes to vocational education management theory and provides a practical reference for vocational schools seeking to implement Teaching Factory as a sustainable, character-oriented learning model..

5 Conclusion

This study concludes that effective management of Teaching Factory (TeFa) programs plays a crucial role in developing students' vocational skills and professional character in vocational high schools. At SMK Sinar Prahangan and SMK Negeri 1 Kota Sukabumi, Teaching Factory management is implemented systematically through the functions of planning, organizing, implementation, and evaluation. Strategic planning aligns curriculum objectives with industry needs and character values, organizing establishes authentic industrial workflows and role distribution,

implementation engages students in real production-based learning, and evaluation ensures quality control and continuous improvement through reflective practices and industry feedback.

The findings indicate that Teaching Factory is not merely a practical learning model but a comprehensive management system that integrates skill formation and character education. Despite challenges related to resource limitations and coordination complexity, effective collaboration with industry partners and systematic evaluation enable sustainable program implementation. This study contributes theoretically to vocational education management by reinforcing the importance of integrated management functions and practically by providing a reference model for vocational schools seeking to enhance graduate readiness, employability, and professional character through Teaching Factory programs..

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