

## PRINCIPAL MANAGEMENT IN THE IMPLEMENTATION OF THE TEACHING FACTORY TO IMPROVE GRADUATES' QUALITY

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### ARTICLE INFO

#### Article history:

Received : Oct 29, 2025

Revised : Nov 26, 2025

Accepted : Dec 27, 2025

Available online : Dec 31, 2025

#### Keywords:

Graduate Quality, Principal Management, Teaching Factory.

### ABSTRACT

Vocational High Schools are designed to produce work-ready graduates; however, the high unemployment rate among SMK graduates indicates a mismatch between school competencies and labor market demands. Teaching Factory (TEFA) has been developed as a contextual vocational learning approach, yet its implementation continues to face challenges, particularly in managerial aspects. This study aims to describe the principal's management in improving graduate quality through Teaching Factory-based learning at SMK Negeri 2 Langsa. A qualitative approach was employed, with data collected through interviews, observations, and documentation. Data analysis was conducted using NVivo 12 software.

The novelty of this study lies in positioning Teaching Factory as a vocational education management system driven by the principal's leadership, rather than merely as a learning model, through the integration of four management functions: planning, organizing, implementing, and supervising. The findings indicate that planning is carried out strategically and collaboratively with industry partners, organizing is reflected in the strengthening of work structures and human resources, implementation is conducted through coordination and product-based evaluation, and supervision is adaptive and continuous. The implementation of TEFA management has a significant impact on improving graduate quality, as reflected in the increased graduate absorption rate based on the 2025 Education Report. These findings provide both theoretical and practical contributions to the development of vocational education management at SMK Negeri 2 Langsa.

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### INTRODUCTION

Education is fundamental to enhancing the quality of human resources, essential for national development. It enables individuals to develop their potential in alignment with societal and workforce needs. Proper education management must be professional, systematic, and sustainable, focusing not only on academic success but also on character

development, skills enhancement, and competitiveness of graduates. In a globalized context, education should equip individuals to be adaptable and competitive in the job market. Therefore, elevating educational quality is crucial and closely linked to national development initiatives.

Education is vital for the social, economic, and cultural development of a country, driving efforts to enhance quality across various systems (Hafsah et al., 2023: 41). Consequently, improving education quality remains a global priority in light of ongoing economic and social transformations (Nasir et al., 2023: 801). In the context of vocational education, Vocational High Schools (SMK) play a strategic role in preparing human resources ready to enter the workforce with specific skills that meet the needs of the business and industrial world (Susilo et al., 2020: 26). Vocational High Schools (SMK) are crucial for equipping students with specific skills for workforce entry, as delineated by the National Education System, which aims to prepare students for various job roles based on their competencies. However, vocational graduates in Indonesia encounter significant workforce absorption challenges, revealing a disconnect between educational outcomes and industrial competency requirements. To address this gap, there is a pressing need for a learning approach that emphasizes real-world experiences. One innovative solution gaining momentum is the Teaching Factory (TEFA), a production-oriented learning framework designed to connect academic theory with industry practices (Hendra et al., 2020: 126).

The low absorption rate of vocational high school (SMK) graduates into the workforce suggests a misalignment between graduates' competencies and industry needs. This issue arises not only from limited technical skills but also from ineffective management of practice-based learning. The Teaching Factory (TEFA) approach aims to address this gap by combining learning with industry production activities. However, its effectiveness in enhancing employability hinges on quality management, including careful planning, organization, implementation, and monitoring. Without these, TEFA risks becoming a routine activity that fails to significantly improve graduates' work readiness. Thus, effective TEFA management is essential for vocational schools to enhance competency relevance and improve workforce integration.

According to data from the Central Bureau of Statistics (BPS) in 2022, the open unemployment rate (TPT) for vocational high school graduates reached 9.94%, which is one of the highest unemployment rates compared to other educational levels. This condition reflects a gap between the skills possessed by vocational high school graduates

and the demands of industry. This challenge is exacerbated by the rapid development of technology and globalization, which increasingly demands a workforce with high adaptability, critical thinking, and technical skills relevant to the needs of Industry 4.0. In an effort to address this challenge, the Ministry of Education, Culture, Research, and Technology is developing the TEFA approach. This learning model integrates theory with production practice in a work environment that closely resembles real-world conditions in the industrial sector.

The conditions faced by vocational high school graduates in the face of globalization and the Fourth Industrial Revolution demand innovative and relevant learning systems. The TEFA learning system integrates the learning process with production practice in a school environment that resembles the real world of work (Sudiyono, 2020: 161). The use of digital technology in production, critical thinking, complex problem-solving skills, and collaboration in a dynamic work environment are key skills that can be developed through TEFA. Case studies show that there is a gap between the skills of vocational school graduates and the demands of Industry 4.0, such as a lack of understanding of advanced manufacturing technologies and proficiency in industrial software (R. Effendi, 2022: 3).

Vocational high schools will be effective when the learning process is carried out in an environment that represents real working conditions. Teaching Factory (TEFA) is designed to bring a business or industrial atmosphere into the school environment through production activities that resemble the work processes in the business and industrial world. Through this approach, students gain practical learning experiences that are relevant to the demands of the working world (Triyanto et al., 2024: 2). In the TEFA model, learning is not only focused on mastering theory in the classroom, but also on students' active involvement in production projects in specific business or industrial sectors. This involvement allows students to integrate theoretical knowledge with professional practice, thereby increasing their work readiness and understanding of field work processes (Nadira & Kamaruddin, 2024: 30-31).

The learning process in TEFA is designed in such a way that students interact directly with the technology, equipment, and procedures used in the industry (Mahardika et al., 2023: 30). This expands their understanding of the norms and regulations prevailing in the business world, and enhances their ability to face the challenges present in the industry. Additionally, involvement in real-world projects also empowers students to strengthen their collaborative, speaking, and problem-solving skills, all of which are essential competencies for a ready-to-work workforce (Susianita & Riani, 2024: 10-11).

Thus, TEFA serves as a bridge connecting formal education with the industrial world, narrowing the gap between the competencies acquired in the classroom and the needs of industry. This provides students with opportunities to enhance skills relevant to the business sector's needs, while also preparing them to become skilled and competitive workers in the international market.

In Indonesia, the TEFA approach has already been implemented as a step to support the quality of education. A number of vocational education institutions and polytechnics have already involved students in various projects related to specific industrial sectors (Astina, 2024). By using the TEFA method, students have the opportunity to hone their practical skills while deepening their understanding of the business system or industry field they are studying. This approach is desired to prepare students so they are more mature in facing the demands of the professional environment after completing their education (Zulbaidah & Giatman, 2024: 7210)

Additionally, the school principal is a key element in the world of education, playing a vital role in efforts to improve the quality of learning. A school principal needs to have a comprehensive vision, mission, and educational management strategies that are oriented toward quality improvement (Munawwarah et al., 2024: 150). The strategy must be designed as a systematic and integrated effort to continuously improve the quality of educational services, with a primary focus on stakeholders such as students, graduates, teachers, school staff, the government, and the wider community (Indadihayati & Hariyanto, 2023: 15-16).

SMK N 2 Langsa employs TEFA as a primary method to enhance graduate quality, allowing students to create goods and services that serve as educational tools while providing economic value. Products developed by students are registered with the Regional Public Service Agency (BLUD) and align with the Governor of Aceh's initiative to foster creative economic development in education. This approach has resulted in multiple product orders, showcasing the effectiveness of TEFA in equipping graduates for the industrial sector.

SMK Negeri 2 Langsa has established collaborations with various local businesses and economic sectors, enabling students to gain practical experience through internships and contribute to curriculum development. This relationship not only aids in enhancing the quality of education but also improves job placement opportunities for students after graduation. The school principal plays a vital role in driving the educational goals and strategies, particularly in implementing the TEFA method, by providing resources and

support for teachers. Teachers receive regular training to enhance their skills in TEFA, while students are guided to maximize their learning experience with this method, resulting in highly skilled graduates who are competitive in the job market.

Although SMK Negeri 2 Langsa has employed Teaching Factory (TEFA)-based learning across its vocational programs, the initial absorption rate of graduates in 2024 was low at 29.54%. This suggests that graduates were not effectively integrated into the business sector or able to establish independent enterprises, indicating that early improvements in TEFA learning did not significantly enhance work readiness. However, following enhancements in TEFA management—such as collaborative planning with industry partners, resource organization, production-based implementation, and ongoing monitoring—the employment rate of graduates surged to 96.02% in 2025. This notable increase demonstrates that the effectiveness of TEFA in boosting graduate absorption correlates strongly with management quality and the alignment of educational practices with market demands.

This study highlights the critical role of school principals in the effective management and implementation of the TEFA program, which aims to enhance students' readiness for work according to industry standards. Principals are responsible for strategic planning, organizing, directing, and supervising the program, ensuring adequate resources, teacher training, and facility support for competitive product development. Research by Wahyuni et al., (2022) emphasizes that effective management, including teacher training and supervision, enhances the quality of human resources, positively impacting student skill development. Additionally, the study Akyuwen et al., (2023: 1152) indicate that principals with strong managerial skills increase stakeholder involvement in TEFA, while Harliansyaha & Amon, (2022: 160) underline that effective management functions by principals significantly enhance educational quality through resource management and supportive learning environments.

This research examines the strategies employed by school principals to manage TEFA (Technical Education for the Future) challenges at SMK Negeri 2 Langsa, which has diverse majors. Despite successes in some areas, disparities in development among different majors pose significant issues. The study aims to analyze how principals balance departmental growth to enhance the overall quality of TEFA-based learning and identify innovative managerial approaches to address these disparities effectively.

## **RESEARCH METHODS**

This research employs a qualitative method to gain a deeper understanding of educational policies in schools, focusing on the role of school principal management in enhancing graduate quality through TEFA. Utilizing a case study design, the research aims for an in-depth examination of a single unit of analysis, reflecting real-world conditions and providing holistic insights into future education.

### **Population and Subjects**

The subjects in this study are the Principal, Vice-Principal, Teachers, Head of Vocational Program, Administrative Coordinator, and Students. The technique for determining informants was carried out thru purposive sampling, which is the intentional selection of informants based on specific criteria relevant to the research objectives. Informants were selected from parties directly involved and with a deep understanding of the phenomenon being studied.

### **Instruments and Data Analysis**

The study employs observation, interviews, and documentation as its research instruments, emphasizing the necessity of valid data for credibility in qualitative research. Strategies to enhance trustworthiness include prolonged observation, triangulation, and peer discussions. The investigation into principal management aimed at improving educational quality through the Teaching Factory method at SMK Negeri 2 Langsa utilized an interactive analysis method from Miles and Huberman. The data analysis proceeded through three key phases: data reduction, data presentation, and conclusion verification. NVivo 12 software was used for qualitative analysis, which involved open coding for initial concept identification, axial coding for grouping codes, and selective coding for extracting themes that summarize the research findings.

## **RESULTS AND DISCUSSION**

The research results indicate that the principal's management in implementing Teaching Factory-based learning is grouped into four management aspects: planning, organizing, implementing, and supervising. The following is a description of the discussion results for each aspect:

## **Principal Planning in Improving Graduate Quality through TEFA at SMK Negeri 2 Langsa**

Planning is a crucial initial step in the implementation of any educational program, including the implementation of FEFA in vocational schools. At SMK Negeri 2 Langsa, the principal plays a strategic role in designing and directing policies to improve graduate quality to meet the needs of the workforce and industry. Through the TEFA approach, the school is expected to create a learning environment based on real production or service, so that students not only master theory but also develop practical skills and a relevant work ethic. To this end, the principal needs to conduct structured planning, starting with the development of work programs, curriculum development, provision of supporting facilities and infrastructure, and strengthening collaboration with the business and industrial world (DUDI).

This planning involves various parties, such as the curriculum team, heads of expertise programs, productive teachers, and industry partners, to ensure TEFA implementation is truly relevant to market needs. In this process, the principal also plays a crucial role in ensuring ongoing monitoring, evaluation, and development of each stage of program implementation.

This finding aligns with research conducted by Novianty Djafriyong, (2017: 3) states that effective educational planning is part of the principal's strategic management to improve educational quality. Furthermore, the National Professional Certification Agency (BNSP) also emphasized that a project-based learning approach is essential in vocational high schools (SMK) to prepare graduates who are ready for the workforce.

The results of this study align with those of Oktafiyah & Hariyati (2020: 78), who showed that implementing TIFA in vocational high schools requires integration between curriculum planning and industry needs, as well as collaboration between stakeholders within the school. Another study by Sudiyono (2020: 179) shows that TEFA's success is determined by careful planning and the involvement of industry partners from the start.

### **Organizing School Principals in Improving the Quality of TEFA-Based Graduates**

The research findings indicate that the principal of SMK Negeri 2 Langsa implemented a systematic organizational strategy in the TEFA program, starting from establishing an organizational structure, providing facilities, implementing routine coordination, and improving human resource competencies. This finding is crucial for strengthening industry-based school management relevant to the needs of the workplace.

This finding aligns with research by Suryadi & Wibowo (2020), who found that a clear and integrative organizational structure significantly influences the success of TEFA implementation in vocational schools. Another study by Mahfud et al. (2022) also emphasized the importance of principal support in providing practical facilities and strengthening human resources to foster an industrial work culture within the school environment. Compared with that study, this study emphasizes the sustainability of the TEFA program through a participatory and collaborative supervision system.

The establishment of the TEFA organizational structure with an official decree demonstrates the existence of a planned coordination system and formal legality that strengthens program implementation. This implies that organization is not merely administrative but also strategic in building synergy between management and technical implementation. The provision of an industrial-like practice space illustrates the principal's efforts to adopt the principles of project-based learning, a hallmark of modern vocational education. This demonstrates that the principal's role is not merely an administrator, but also an instructional leader who is sensitive to technological developments and graduate competency needs. Regular meetings and regular supervision reflect a participatory and adaptive management pattern. This means that the organization is not a one-way instructional process, but rather encourages the creation of an evaluative culture and data-driven decision-making.

Theoretically, this finding reinforces the basic principles of educational management according to George R. Terry (in Siagian, 2015), who states that organizing is a crucial process in achieving goals through the establishment of tasks, authority, and responsibility. This also aligns with Mintzberg's (2005) theory regarding adaptive organizational structures in complex environments such as industry-based vocational education. Thus, the principal's organization in the TEFA program is not only an application of managerial practices but also an integration of the transformational leadership model and performance-based strategic management.

### **Implementation of School Principals in Improving the Quality of TEFA-Based Graduates**

TEFA implementation at SMK Negeri 2 Langsa was carried out using a structured and focused managerial strategy, with the principal playing a central role in overseeing and directing the program. The process involved five key actions that formed the

foundation for TEFA's success: first, curriculum coordination and planning involving various school stakeholders and industry partners. The principal actively initiated regular meetings to align the curriculum with industry needs, ensuring that graduates were truly relevant and employable.

Second, strict monitoring and supervision were carried out to ensure that each stage of TEFA implementation met established standards and targets. The principal, along with the management team, regularly oversaw the learning process, practical facilities, and teacher and student involvement in production activities.

Third, clear and systematic task allocation and briefings were key to TEFA's daily operations. The principal established a specific organizational structure and job descriptions, and held regular briefings to ensure all team members understood their roles and responsibilities, creating effective synergy in program implementation.

Fourth, TEFA policy dissemination was comprehensively disseminated to teachers, students, and industry partners. The principal plays an active role in disseminating the vision, mission, and implementation procedures of the Teaching Factory, ensuring that all parties have a shared understanding and a strong commitment to supporting the program's sustainability.

Fifth, ongoing performance evaluation is crucial for measuring the effectiveness of TEFA implementation. The principal leads a regular evaluation process using various success indicators, including the quality of student output, skill levels achieved, and feedback from industry partners. The results of these evaluations are then used to inform future program improvements and development.

Overall, the implementation of TEFA at SMK Negeri 2 Langsa demonstrates the principal's strategic role in ensuring the program runs optimally. Through intensive coordination, close supervision, efficient organization, effective outreach, and continuous evaluation, the quality of graduates produced continues to improve and align with the needs of a dynamic job market.

These findings align with research by Suyitno et al. (2025: 309-321), which demonstrates that curriculum coordination emphasizes the principal's role as an instructional leader and boundary spanner, bridging national standards with the rapid pace of industrial change. Simultaneous digital and in-person monitoring and supervision demonstrate adaptive management, making teachers feel supported rather than controlled. Task allocation and briefings foster an industrial work culture within schools, enabling students to identify as productive workers from an early age. Multilayered

socialization fosters a shared vision in line with participatory theory, enhancing implementation fidelity. Product-based performance evaluation and industry satisfaction validate graduate quality externally, in line with the concept of employability skills.

These findings reinforce the global PJBL-Based Learning framework, which demands curriculum-industry synchronization, multi-stakeholder collaboration, and performance-based evaluation. By incorporating digital monitoring practices and student engagement as structural entities, this study enriches the body of knowledge on TEFA/PJBL at the secondary school level.

### **Principal Supervision in Improving the Quality of TEFA-Based Graduates**

The principal's oversight of improving the quality of TEFA-based graduates at SMK Negeri 2 Langsa is a crucial managerial function. The principal conducts comprehensive oversight, from planning and implementation to the final outcomes of TEFA learning. Supervision involves directly observing activities in the practice room, the quality of teacher performance, and student involvement in the production process. The principal also ensures that the TEFA program is not merely a formality but has a genuine impact on improving student competency.

During supervision, the principal maintains intensive communication with productive teachers, heads of expertise programs, technicians, and industry partners to identify emerging obstacles and promptly find appropriate solutions. Furthermore, the principal conducts regular evaluations of the program's success based on indicators such as student engagement, product quality and quantity, and industry partner satisfaction. These evaluations are conducted through meetings with the TEFA team and the vice principal, as well as through analysis of learning outcomes, production unit financial reports, and customer feedback.

Early problem detection is also a crucial part of supervision, conducted through regular reports and direct observation. Once problems are identified, the principal and his team immediately take remedial action using a collaborative approach, including involving industry partners and students, so that problems can be resolved based on the principles of continuous improvement.

The principal also proactively provides alternative solutions when obstacles arise, such as rescheduling production schedules, providing additional training, procuring replacement equipment, and improving team coordination. Collaboration with industry is also utilized for technical and material assistance to ensure optimal TEFA processes.

After evaluation and management, the principal establishes further directives to serve as strategic guidelines for program development. These directives are outlined in the School Work Plan, which prioritizes strengthening TEFA, encouraging new product innovation, expanding industry collaboration, and integrating TEFA into the curriculum through project-based learning. With structured and ongoing supervision, the TEFA program can continue to develop and produce competent graduates who are ready to enter the workforce according to industry needs. This aligns with research findings by Risnawan (2020: 8), who noted that supervision is an integral part of TEFA management, involving all school components and facilitated by regular coordination. A continuous quality control process also ensures the quality of program implementation.

### **Principal Management in Improving the Quality of TEFA-Based Graduates**

The implementation of the TEFA learning model at SMK Negeri 2 Langsa has significantly improved the quality of graduates. Through this method, students not only acquire theoretical knowledge but also hone practical skills that are directly applied in the production process according to industry standards. Thus, graduates are better prepared to face the demands of the workforce because their technical abilities are increasingly honed and relevant to market needs. In addition to technical skills, the learning process also develops soft skills such as discipline, responsibility, teamwork, and time management, which are highly needed in a professional work environment. This is evident in the increase in students' practical exam scores and portfolios, as well as the results of official certification-based competency tests. Furthermore, the increase in graduate absorption in the workforce and entrepreneurship is clear evidence of the program's success. Graduate absorption, which increased from 29.54% in 2024 to 96.02% in 2025, demonstrates that SMK Negeri 2 Langsa graduates are now better prepared and able to compete in the job market, especially with the majority choosing the entrepreneurial path. Close collaboration between the school and the industry also ensures that the competency standards taught are always aligned with real-world needs. Thus, it can be concluded that the implementation of TEFA not only improves students' technical and soft skills but also strengthens their readiness to enter the workforce and become independent entrepreneurs.

The implementation of the TEFA learning model at SMK Negeri 2 Langsa has demonstrated a significant impact on improving graduate quality, in line with findings from various previous studies. Research by Sudiyono (2020: 175) states that TEFA

implementation in vocational schools can improve graduate quality. Research conducted by Tanjung et al. (2025: 7) shows that the TEFA model contributes to increased student learning motivation, communication, collaboration, and leadership skills, all of which are essential for readiness to enter the workforce.

The findings of this study provide an important contribution to the development of industry-based vocational education management theory and practice, specifically the TEFA model. The research integrates the concepts of strategic management, instructional leadership, and Project-Based Learning in the real-life context of SMK Negeri 2 Langsa. The research's novelty lies in its emphasis on the principal's role as a boundary spanner between the school and industry, as well as the use of digital monitoring to enrich TEFA practices.

The novelty of this research lies in the conceptual reconstruction of the Teaching Factory (TEFA) as a vocational education management system, which is empirically driven by the principal's management, rather than simply a production-based learning approach. Unlike previous research that positioned TEFA as a pedagogical strategy, this study shows that the success of TEFA is determined by the comprehensive integration of four management functions – planning, organizing, implementing, and supervising – in a single, integrated and contextual managerial framework.

Through a case study at SMK Negeri 2 Langsa with purposive selection of informants and data analysis using NVivo 12, this research produces empirical themes that describe real TEFA management practices, ranging from collaborative planning with the business world and the industrial world, organization based on strengthening human resources, implementation through product-based coordination and evaluation, to adaptive and continuous supervision. These findings expand the application of George R. Terry's management theory and the concept of Project Based Learning in the context of vocational education, and provide a practical contribution in the form of a TEFA management model that is oriented towards improving the quality and absorption of graduates.

## **CONCLUSIONS AND SUGGESTIONS**

Planning is carried out by developing a curriculum relevant to industry needs, forming a collaborative planning team, and involving the Industrial and Industrial Industries (DUDI). This planning reflects a strategic approach to addressing the challenges of project-based learning in vocational education. The organization

demonstrates that the principal has implemented a clear organizational structure, established an effective coordination system, provided representative practice facilities, and strengthened human resource competencies. This reflects a participatory and transformative management approach. TEFA implementation is carried out through intensive curriculum coordination, ongoing supervision, systematic division of tasks, comprehensive policy dissemination, and product-based performance evaluation. The principal acts as an instructional leader and bridges the gap between educational standards and industry needs. Supervision is conducted adaptively and participatively through ongoing evaluation, regular monitoring, and coaching for teachers and students. This ensures the sustainability and quality of TEFA implementation. Further research is recommended to use a quantitative or mixed methods approach by measuring TEFA management variables and graduate quality through measurable indicators such as employment rates, job waiting times, competency suitability, and entrepreneurship levels. Comparative studies across various majors and vocational high schools are also needed to obtain a more comprehensive picture of TEFA's effectiveness.

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