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Implementation of Teaching Factory in Fashion Design Expertise Program at Muhammadiyah Sumowono Vocational School: Supporting Factors, Obstacles and Solutions

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ABSTRACT

This study examines the implementation of the Teaching Factory (TEFA) model in the Fashion Design Expertise Program at SMK Muhammadiyah Sumowono, Central Java. The research aims to (1) describe the planning and implementation of TEFA, (2) identify supporting factors, (3) explore inhibiting factors, and (4) formulate recommendations for improvement. Using a qualitative descriptive design, data was collected through interviews, observations, and document analysis involving teachers, students, and industry partners. Data were analyzed through Miles, Huberman, and Saldana's interactive model consisting of data reduction, data display, and conclusion verification. The findings show that TEFA planning includes curriculum alignment, partnership development, and facility preparation, while implementation consists of production-based learning, industry-assisted projects, and quality control. Supporting factors include leadership commitment, adequate facilities, and motivated students. Inhibiting factors include inconsistent industry involvement, varied student competencies, and limited marketing capacity. A structured data display presents the emerging themes and supporting evidence. The study concludes that TEFA implementation has progressed but requires stronger industry collaboration, systematic production management, and improved marketing strategies. Recommendations include strengthening long-term partnerships, developing quality standards, implementing mini-industry learning routines, and expanding digital marketing initiatives. This study contributes a context-based TEFA improvement model applicable to similar vocational schools.

Introduction

Vocational education in Indonesia, particularly Vocational High Schools (SMK), is expected to produce competent graduates who are adaptable to industry needs and possess entrepreneurial skills. However, SMK graduates still face the highest open unemployment rate compared to other levels of education, at 9.27% (BPS, 2023), indicating a gap between the learning process and the needs of the workforce. To address this challenge, the government developed the Teaching Factory (TEFA) as a production-oriented learning model that integrates industrial culture into the school environment. However, the effectiveness of TEFA implementation across various majors remains variable. For example, a study at SMK Negeri 5 Surakarta showed that TEFA's effectiveness was only in the "fairly effective" category with a score of 70.3/100, primarily due to suboptimal industrial partnerships (Setyawan et al., 2022). Furthermore, teachers' digital competence and production management readiness remain challenges in implementing TEFA in the Industry 4.0 era (Rahmawati, 2025). This research focuses on the implementation of TEFA in the Fashion Design Expertise Program at Muhammadiyah Sumowono Vocational School, Semarang, Central Java.

The Teaching Factory concept refers to a school-based production environment designed to mimic industrial work processes, thereby developing technical skills, real-world experience, and a streamlined learning cycle (Smith & Van Laar, 2019). In a Teaching Factory environment, students engage in actual production tasks, under the supervision of teachers and industry mentors, aligned with current market demands (Jones et al., 2021). Research shows that Teaching Factories improve students' employability, entrepreneurial mindset, and industry readiness (Brown & Adams, 2020). For example, a study of automotive TVET found significant improvements in work readiness scores after implementing a Teaching Factory (Lee, 2022).

Partnerships between vocational schools and industry are crucial to ensure curriculum relevance, access to the latest technology, and the provision of real-world work experiences (Nguyen & Marsick, 2021). The mismatch between what is taught and what industry expects remains a major barrier (Kang & Kim, 2020). Therefore, strategies such as co-designing curricula, internships, and collaborative projects are emphasized.

Supporting factors for TEFA include leadership commitment, faculty competence, adequate equipment, student motivation, and strong industry linkages (Zhang et al., 2023). Barriers include limited funding, inadequate equipment maintenance, variability in student readiness, and a lack of marketing channels for student-developed products (Henderson & Sims, 2022). Research also highlights the need for a continuous improvement cycle, including industry feedback, to sustain

TEFA programs (Gomez & Perez, 2021).

While most TEFA literature focuses on engineering, recent studies have expanded to include the fashion and creative industries. For example, Ivanova & Petrova (2023) discuss a TEFA model in a fashion design college where students produce commercial garments under industry supervision, demonstrating enhanced creative and entrepreneurial skills.

Specifically in the field of Fashion Design, several studies have examined the production process in TEFA but have not comprehensively linked the supporting factors, obstacles, and solutions in the local context of community-based schools and market potential such as tourist areas and carnival events. To date, there are not many studies that have in-depth examined the implementation of TEFA in the Fashion Design Expertise Program at SMK Muhammadiyah Sumowono, especially in identifying how the school's strengths such as its status as a Center of Excellence Vocational School, local market potential, and opportunities for commercialization of fashion products can be developed into a sustainable production system. Therefore, this study focuses on the Implementation of Teaching Factory in the Fashion Design Expertise Program at SMK Muhammadiyah Sumowono: Supporting Factors, Obstacles, and Solutions, to provide a context-based solution model that can be adapted by other vocational schools.

Method

This study adopted a qualitative descriptive design. The setting was SMK Muhammadiyah Sumowono in Semarang, Central Java, in the Fashion Design Expertise Program. Purposive sampling was used to select key informants: two program teachers, one industrial partner manager, and eight students participating in the TEFA program. Data collection techniques included semi-structured interviews, direct observation of production activities, and document analysis (e.g., lesson plans, partnership agreements, production logs). Data analysis followed the steps of data reduction, data presentation, and drawing/verifying conclusions (Miles, Huberman & Saldana, 2019). Ethical considerations included obtaining informed consent from all participants and ensuring the confidentiality of responses.

Result and Discussion

1. TEFA Program Planning and Management

The findings indicate that the edupreneurship program in the Fashion Design Department of SMK Muhammadiyah Sumowono is strategically structured to produce graduates equipped with

both technical competencies and entrepreneurial skills. The school implements School-Based Enterprises (SBE) where students are actively involved in producing school uniforms, customized boutique clothing, and carnival costume rentals. To manage this, the school integrates Total Quality Management (TQM) principles into the workflow. This covers all production phases order management, design, manufacturing, and quality control, encouraging students to adopt a continuous improvement mindset.

These findings align with Bahari et al. (2022), who stated that an edupreneurship-oriented vocational learning model increases entrepreneurial self-efficacy by integrating technical mastery with market-oriented innovation. The effective use of SBE at this school supports Firmansyah et al. (2023), who highlighted that SBE provides a practical environment fostering entrepreneurial intentions through direct business transactions. Furthermore, the application of TQM principles mirrors the findings of Rahman and Saputra (2021), who found that TQM-based vocational learning significantly improves product reliability and strengthens consumer confidence.

External collaboration plays a crucial role in maintaining the edupreneurship ecosystem within schools. SMK Muhammadiyah Sumowono has established partnerships with local governments, micro-industry players, educational institutions, and community-based event organizers requiring costumes or uniforms. This collaborative relationship strengthens market access and ensures students are exposed to industry-relevant demands. This aligns with Susanti and Widodo (2020), who argue that vocational-industry collaboration enhances curriculum relevance and accelerates the transition from school to entrepreneurship or the workplace.

The edupreneurship model at SMK Muhammadiyah Sumowono demonstrates a promising integration of vocational skills, exposure to business ecosystems, and quality-based production management. This approach provides an alternative pathway for vocational graduates to engage in entrepreneurship, especially in areas with growing local economies such as Semarang Regency. The findings suggest that similar models could be replicated in other vocational institutions, provided they incorporate structured business units, industry partnerships, and quality assurance mechanisms.

2. Curriculum and Integration of Theory and Practice

The curriculum implementation emphasizes an integrative learning approach through cross-subject teaching and block scheduling. In the Fashion Design program, "practice blocks" allow students to focus on the entire garment-making process from design and pattern construction to sewing and finishing without distraction from other subjects. This arrangement reflects real-world

industrial production conditions, requiring students to maintain focus and work pace over extended periods.

This block-based schedule approach is consistent with Nsiah-Gyabaah (2020), who found that block scheduling in vocational education improves psychomotor performance and work efficiency. Similarly, Winata and Sukardi (2022) concluded that such scheduling enhances production competency while fostering an entrepreneurial spirit. The cross-subject teaching model observed also supports Beane's (1997) theory that integrative curriculum models help students construct knowledge contextually, and Yusuf and Arifin (2021), who assert that this method improves problem-solving skills for complex work scenarios.

Thus, curriculum integration through cross-subject teaching and block-based practical scheduling is a strategic approach to strengthening the alignment of theory and practice. This approach encourages vocational students to master not only technical skills but also entrepreneurial insights, enabling them to transform into future job creators, rather than mere job seekers.

3. Facilities and Resources

The effectiveness of the program is heavily supported by the availability of industrial-grade facilities. SMK Muhammadiyah Sumowono is equipped with high-speed sewing machines, overlock machines, embroidery machines, sublimation printing machines, and finishing equipment. Additionally, the school has established the Essemmu Business Center, which serves as a physical platform for exhibiting and selling student work. This is complemented by human resources; productive teachers possess competencies not only in sewing but also in production management, ensuring students are guided correctly.

The availability of these facilities aligns with Peñate (2024), who emphasized that technical facilities and technology in vocational schools significantly influence learning innovation and institutional reputation. The existence of a dedicated business center supports the notion that tangible marketing support is crucial for edupreneurship. Furthermore, the focus on teacher competence supports Setiawan and Mulyani (2023), who argue that continuous teacher training is key to aligning schoolwork culture with industry standards.

Human resources also play a crucial role in the sustainability of the edupreneurship program. Productive teachers at SMK Muhammadiyah Sumowono possess competencies in sewing techniques, fashion design, printing, and finishing. Furthermore, students are equipped not only with technical competencies but also trained in aspects of production management, marketing, and

quality control to foster job readiness and an entrepreneurial spirit. Research by Inderanata et al. (2023) shows that integrating vocational guidance with hands-on practice on production equipment positively contributes to improving the job readiness of vocational high school students.

Thus, comprehensive technical facilities, tangible marketing support through the Essemmu Business Center, and the optimization of teacher competencies and active student involvement in real-life production experiences are strategic elements in strengthening edupreneurship-based vocational education. This model supports the development of a contextual and adaptive learning environment to market dynamics, while strengthening students' entrepreneurial character.

4. Production Marketing and Sales

The production process at the school follows the "TEFA-6M" model: ordering, analyzing demand, declaring readiness, executing work, quality control (QC), and delivery. Students produce tangible products with commercial value, such as carnival costumes and uniforms. Marketing is conducted through the Essemmu Business Center and digital platforms like Instagram and TikTok to reach wider markets. The school also leverages local events (carnivals, tourism activities) for promotion.

The implementation of the TEFA-6M cycle reflects actual industrial practices. This finding is supported by Handayani et al. (2021), who confirmed that a systematic work cycle contributes to improving technical competence and quality awareness. The utilization of digital marketing and local events aligns with Damayanti et al. (2023), who stated that integrating digital platforms in vocational education strengthens market networks and student business exposure.

The implementation of the edupreneurship program in the Fashion Design Expertise Program at SMK Muhammadiyah Sumowono, Semarang, Central Java, is realized through a production orientation that produces tangible products with commercial value. The products produced by students not only function as a medium for practical assignments but also have a selling value and can be rented, such as carnival costumes, school uniforms, and custom boutique clothing according to consumer demand. This approach proves that student involvement in real production provides an authentic, industry-based learning experience while instilling an entrepreneurial mindset. This finding aligns with research by Wijayanti et al. (2022), which shows that real production in a teaching factory (TEFA) can increase work motivation and business spirit in vocational students.

The integrated production, marketing, and sales systems within the learning process create a complete edupreneurship ecosystem. Students not only learn to create products but also comprehensively understand the business cycle, from demand analysis to delivery. This provides a strong foundation for developing graduates who are ready to become independent entrepreneurs

and business-oriented workers.

5. Evaluation and Development

Evaluation and development within the edupreneurship program within the Fashion Design Expertise Program at Muhammadiyah Sumowono Vocational School are systematically implemented through product quality control and user feedback. Quality evaluation is conducted through inspection of stitching, neatness of finishing, size accuracy, and customer satisfaction levels. Productive teachers, along with the teaching factory coordinator, verify quality and provide input for improving the production process. This evaluation practice aligns with the findings of Sarwanto et al. (2023), who emphasized that customer feedback-based quality control mechanisms can improve production accuracy and strengthen the reputation of vocational schools within the local entrepreneurial ecosystem.

In addition to product evaluation, student learning assessments cover aspects of production techniques, speed, creativity, accuracy of custom designs, teamwork skills, and adherence to occupational safety standards. This comprehensive assessment follows a holistic competency approach that assesses not only technical skills but also professional attitudes and social skills. This is supported by research by Kusuma et al. (2022), which states that competency-based evaluation in a teaching factory can improve the work readiness and professionalism of vocational high school students.

Curriculum development is carried out continuously based on feedback from industry, local consumers, and market needs. These adjustments involve adding production practices to suit local fashion trends, the need for costumes for tourist events, and the demand for uniforms from educational institutions in the surrounding area. This adaptive approach aligns with the view of Mardani et al. (2024), who stated that a market-responsive vocational curriculum increases the relevance of graduate competencies and strengthens the competitiveness of vocational schools.

Strategically, SMK Muhammadiyah Sumowono has several strengths and opportunities that support the sustainability of its edupreneurship program. Its status as a Center of Excellence Vocational School provides institutional support, including teacher training, facility improvements, and mentoring to strengthen school entrepreneurship. Furthermore, the school's location in a strategic area with high tourism activity and a high number of schools creates a potential market for costumes, t-shirts, and uniforms. The local market is also relatively unsaturated due to the lack of large-scale boutique competitors, thus providing an opportunity for student products to meet the needs of event uniforms and local souvenirs. This situation aligns with the findings of Sari & Putra

(2023), which indicate that vocational schools located in creative economy and tourism areas have significant potential to develop teaching factories based on local community needs.

With the school's ability to integrate real-world production experiences into the learning process, students not only understand theory but also directly master the process of providing products to customers. This positions SMK Muhammadiyah Sumowono as a model for implementing adaptive, market-oriented, and sustainable edupreneurship.

6. Supporting Factors

The successful implementation of the Teaching Factory (TEFA) in the Fashion Design Expertise Program at Muhammadiyah Sumowono Vocational School is influenced by various strategic factors that synergize each other in creating a real production-based learning ecosystem.

First, leadership commitment is the primary foundation for TEFA development. Vocational school principals and management play a central role in directing the vision, allocating budgets, developing strategic policies, and coordinating all school elements, from productive teachers and curriculum teams to facility and infrastructure managers. Transformational leadership committed to learning quality has proven key to the effective implementation of TEFA in vocational education (Sutrisno et al., 2022).

Second, the competence and motivation of human resources (teachers and students) play a significant role in ensuring the quality of the production process. Productive teachers must master the latest technical skills such as fashion design, sewing techniques, digital printing, and quality control, as well as possess managerial, customer communication, and entrepreneurial skills. Continuous teacher training is a crucial factor in aligning the school's work culture with industry standards (Setiawan & Mulyani, 2023). Furthermore, student motivation, work ethic, creativity, and active involvement from the planning to production stages have been shown to increase a sense of responsibility and product quality.

Third, adequate production facilities and infrastructure, such as industrial sewing machines, overlock machines, digital embroidery machines, ergonomic workspaces, and product display outlets like the Essemmu Business Center, support a smooth production process. The availability of facilities that meet industry standards significantly impacts student competency and production efficiency (Yuliana et al., 2023).

Fourth, TEFA's success is reinforced by a curriculum integrated with real-life production projects. Project-based learning allows students to experience the entire industrial work cycle, from product design to marketing. Research by Putri & Handayani (2023) confirms that integrating the

curriculum with commercial projects increases the relevance of learning and students' entrepreneurial readiness.

Fifth, partnerships between industry and local stakeholders significantly contribute to aligning quality standards, providing internship opportunities, procuring raw materials, and opening markets for student products. This collaboration builds a sustainable vocational education business ecosystem (Fatimah & Prasetyo, 2023).

Sixth, the existence of a clear business model and professional financial management enables TEFA units to generate independent income. Marketing strategies through digital platforms, school product branding, and utilization of local events contribute to increasing the visibility of student products (Damayanti et al., 2023).

Seventh, the work culture and industrial ethos implemented in schools build students' professional character through the implementation of time discipline, precision, production target achievement, and continuous quality control. The implementation of an industrial work culture in vocational education has been shown to increase the internalization of professional values (Irawan et al., 2024).

Finally, TEFA's sustainability is supported by regular evaluation, adaptive product development to market trends, and financial support from schools, government, industry partners, and internal revenue for reinvestment. This evaluative-adaptive approach enables the TEFA model to continue to evolve in a relevant and competitive manner (Mardani et al., 2024).

By fulfilling these factors, TEFA at SMK Muhammadiyah Sumowono is able to develop as an edupreneurship model that not only improves students' technical competence, but also forms an entrepreneurial mentality based on real production experience.

7. TEFA Inhibiting Factors and Their Solutions

Despite the successes, the implementation faces several significant obstacles.

1. Unsustainable Industry Involvement: Industrial partnerships are often temporary. Industries accept short internships but hesitate to establish long-term production contracts or place regular orders.
2. Inconsistent Product Quality: Although facilities are adequate, production results vary between students regarding sizing, stitch neatness, and finishing. This indicates a lack of standardized consistency.
3. Student Work Culture: While block scheduling is used, not all students have fully adapted to the industrial "rhythm," lacking time discipline and a sense of urgency in meeting production

targets.

4. Suboptimal Marketing Management: The marketing effort lacks a dedicated team; social media branding is inconsistent, leading to underutilized market potential.

The issue of temporary partnerships aligns with Hiim (2023), who noted that school-business collaboration is often limited by a lack of formal long-term agreements. The root cause here appears to be a lack of trust in the consistency of student products. Regarding quality inconsistency, Yang (2025) identified that a major barrier in vocational integration is the mismatch in quality standards and lack of rigorous monitoring. The cultural gap in student discipline supports findings by Irawan et al. (2024), suggesting that internalizing professional values requires more than just scheduling changes; it requires a total cultural immersion. Finally, the marketing weakness highlights the need for strategic brand identity, as emphasized by Kayyali (2025).

Research at SMK Muhammadiyah Sumowono shows that while the Teaching Factory (TEFA) model is promising, its implementation faces a number of significant obstacles, which, if left unaddressed, will hamper the effectiveness of the edupreneurship program. These main obstacles include unsustainable industry involvement, unstable product quality and consistency, a sub-professional student work culture, and suboptimal TEFA marketing and business management.

The first obstacle relates to temporary or poorly structured industrial partnerships. Industries only accept short internships, have not yet included schools as long-term production partners and have not yet established real orders, and do not yet have full confidence in the quality of students' products. This aligns with research by Hiim (2023), which shows that collaboration between schools and businesses is often limited by the lack of formal agreements, clarity of responsibilities, and long-term cooperation mechanisms. Solutions to overcome this include building trust-based partnerships through long-term MoUs with local garment factories or boutiques, starting with small pilot orders to demonstrate quality and timeliness, developing co-branding of TEFA products with industrial partners ("TEFA X Mitra"), and establishing industrial communication forums at the district level or within the Muhammadiyah network to expand networks.

The second obstacle arises when, despite the availability of production facilities, results vary between students, for example in terms of size, neatness of finishing, or product uniformity; quality control is not carried out in a disciplined manner at all stages, and documentation of technical production standards has not been implemented. Research by Yang Yang (2025) identified that one of the main obstacles in vocational education-industry integration is the mismatch in quality standards and the lack of monitoring of production quality. Solutions to overcome this include the

establishment of a TEFA (Quality Standard Book) quality standard book that contains criteria for sewing, sewing straightness, finishing, and packaging; the use of photo catalogs or physical samples as references; the formation of a daily QC team consisting of teachers or senior students; and a customer feedback system that generates quality ratings for ongoing evaluation.

The third obstacle relates to students' work culture, which has not yet fully adopted industrial work patterns: although the practical work schedule is already in a block format, students' time discipline, responsibility, quality orientation, and entrepreneurial spirit are still inadequate. This aligns with research showing that implementing a mini-industry model in vocational schools helps foster a professional work culture (e.g., Sutrisno et al., 2022). The solution to the third problem is the implementation of a "mini-industry school" system with students playing the roles of operators, quality control officers, logistics officers, and marketers; the implementation of simulated industrial work hours, morning briefings, and daily production targets; a reward system for disciplined and productive students; and soft skills training such as communication, teamwork, problem-solving, and time management.

The fourth obstacle arises in the marketing and business management aspects: the products that have been produced are not supported by an active marketing strategy, social media and branding are inconsistent, so that market potential is not optimally utilized. Kayyali (2025) emphasizes the importance of marketing strategies and brand identity in vocational education to increase market visibility and engagement. The solutions proposed in this study are the formation of a TEFA marketing team consisting of students and supervising teachers; development of TEFA product brand identity (logo, tagline, packaging, uniform promotional content); utilization of social media, marketplaces, school events, bazaars, and local collaborations to expand customer networks; and training students in marketing and communication to be able to understand consumer needs and promote products effectively.

Conclusion

The conclusion of this study shows that the implementation of the Teaching Factory (TEFA) at SMK Muhammadiyah Sumowono has partially met the needs of the industrial world through the implementation of real production processes, although it still faces obstacles such as limited facilities, less than optimal industrial involvement, and production management that is not fully systematic. A productive work culture, direct experience in production, and student enthusiasm are significant driving factors in strengthening the vocational learning ecosystem. Theoretically, the

findings of this study strengthen the industry-based TVET learning model that emphasizes adaptation to market needs and multi-stakeholder collaboration, while practically underscoring the importance of synergy between schools, teachers, industry, and the community in realizing sustainable TEFA.

Based on these implications, it is recommended that schools develop industrial teaching relevant to local potential, teachers improve their capacity through production management and entrepreneurship training, and industry be involved as curriculum co-designers and product quality evaluators. Furthermore, further research is needed to test the effectiveness of the TEFA solution model in various vocational education contexts. From a TVET policy perspective, national regulations are needed that clarify school-industry partnership standards, provide financial support for strengthening production units, and provide incentives for vocational education units that successfully implement TEFA productively to encourage the transformation of vocational education in Indonesia.

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