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Teaching Factory Management for Entrepreneurial Competency Development: A Case Study Analysis Using Terry's POAC Framework

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Abstract
Vocational education in the Fourth Industrial Revolution requires graduates with entrepreneurial competencies, yet Teaching Factory (TeFa) implementation in BLUD vocational schools remains suboptimal. This study examined TeFa management effectiveness in developing students' entrepreneurial competencies through George R. Terry's management framework (planning, organizing, actuating, controlling). A qualitative case study design was employed at SMKN 1 Pangandaran and SMKN 1 Banjar, Indonesia, involving 24 participants including principals, teachers, BLUD managers, industry partners, and students. Data were collected through in-depth interviews, participatory observations (120 hours), and document analysis over six months (March-August 2024). Analysis followed Miles, Huberman, and Saldaña's interactive model with multiple triangulation strategies. Results revealed that while TeFa programs successfully enhanced students' technical and soft skills, entrepreneurial competency development remained inadequate across all management functions. Planning lacked comprehensive industry collaboration and entrepreneurship frameworks; organizing operated informally without standardized SOPs; implementation focused predominantly on technical skills; and controlling mechanisms neglected multidimensional entrepreneurial assessment. These deficiencies reflect insufficient teacher preparation, weak industry partnerships, and absent comprehensive evaluation frameworks. The study concludes that effective entrepreneurship-oriented TeFa requires formalized industry collaboration in planning, standardized SOPs, pedagogically sophisticated implementation integrating entrepreneurship throughout instruction, and validated multidimensional assessment systems. Findings contribute theoretical insights on implementation fidelity while offering practical recommendations for vocational education policy and management reform.

INTRODUCTION

Vocational education occupies a strategic position in the contemporary educational landscape, particularly in preparing skilled human resources capable of responding to the dynamic demands of the industrial sector (Grech & Camilleri, 2019; Jaedun et al., 2024; Pfeiffer, 2015). In the context of the Fourth Industrial Revolution and Society 5.0, vocational schools are confronted with unprecedented challenges to produce graduates who possess not merely theoretical competencies but also practical entrepreneurial capabilities that enable them to create economic value and employment opportunities (Scheid, 2018; Löhr-Zeidler et al., 2016; OECD, 2019). The Teaching Factory (TeFa) model has emerged as an innovative pedagogical approach that integrates production-based learning with industrial practices, thereby bridging the gap between educational institutions and the world of work (Mukhidin & Mupita, 2018; Wahjusaputri et al., 2024; Directorate General of Vocational Education, 2020). Despite its theoretical promise and widespread adoption across vocational institutions, empirical evidence suggests that the implementation of TeFa remains suboptimal, particularly in cultivating entrepreneurial competencies among students (Kolho, 2024; Bahaw et al., 2024).

The fundamental problem lies in the persistent disconnect between educational delivery and industry expectations, which manifests in graduates' limited entrepreneurial readiness and insufficient preparation for self-employment ventures (R. et al., 2024; Hung Kee & Basher Rubel, 2021). Previous research has predominantly concentrated on the technical dimensions of TeFa implementation, such as production unit operations, workshop management, and skill development outcomes (Dwijayanthi & Rijanto, 2022; Rosidah & Sutirman, 2023; Hummel et al., 2015). Studies by Muhitasari and Purnami (2021) and Suwandi et al. (2023) have documented that while TeFa programs successfully enhance students' technical competencies, they frequently fail to systematically develop entrepreneurial mindsets, business acumen, and innovative thinking. Similarly, Faizah and Wibawa (2023) identified significant gaps in the integration of entrepreneurship education within TeFa learning frameworks at vocational schools, noting that entrepreneurial aspects are often treated as peripheral rather than core components. Suryati and Yulastri (2023) further emphasized that the absence of structured entrepreneurship competency development in TeFa programs limits students' capacity to translate technical skills into viable business opportunities. More recently, Al Hakim and Oktarina (2024) demonstrated that innovative TeFa models incorporating industry partnerships can effectively stimulate entrepreneurial creativity and spirit, yet such approaches remain inconsistently implemented across institutions (Toutain et al., 2024; Huang et al., 2024).

A critical knowledge gap exists regarding the managerial dimensions underpinning effective TeFa implementation, particularly in vocational schools operating under Regional Public Service Agency (BLUD) status (Purnamasari, 2025; Khurniawan, 2021a). While existing literature acknowledges management challenges in TeFa programs, systematic investigations employing comprehensive management frameworks remain scarce (Puspitaningsih et al., 2023; Astuti & Soenarto, 2018). The BLUD status confers financial and operational autonomy that theoretically enables vocational schools to function more entrepreneurially; however, this autonomy simultaneously introduces complex managerial demands requiring sophisticated planning, coordination, and accountability mechanisms (Khurniawan et al., 2021; Waluyo, 2018). The intersection of TeFa implementation, entrepreneurship development, and BLUD governance constitutes an understudied phenomenon that warrants rigorous empirical investigation. Furthermore, previous studies have inadequately examined how fundamental management functions—planning, organizing, implementing, and controlling—are operationalized within entrepreneurship-oriented TeFa contexts, leaving practitioners without evidence-based guidance for effective program management.

This study addresses these lacunae by systematically analyzing TeFa management through the theoretical lens of George R. Terry's (2020) management function framework, which comprises planning, organizing, actuating, and controlling (POAC) (Wijayanti & Wicaksana, 2023; Mariyah et al., 2021). This classical yet enduring framework provides analytical rigor for examining organizational processes and has been extensively validated across diverse educational contexts (Bush & Sargsyan, 2013). The application of Terry's management functions to entrepreneurship-based TeFa in BLUD vocational schools represents a novel contribution that bridges educational management theory, entrepreneurship education, and vocational pedagogy. Additionally, this research incorporates an ethical dimension by examining the integration of value-based principles into TeFa management practices, recognizing that sustainable entrepreneurship must be grounded in ethical foundations including integrity, accountability, and social responsibility (Ahmad, 2015; Al-Abrasyi, 1975; Sreenivasan & M., 2024; De Cremer & Narayanan, 2023).

The rationale for this investigation is multifaceted. First, vocational education policy in Indonesia increasingly emphasizes entrepreneurial competency development as a strategic priority, yet implementation mechanisms remain inadequately theorized and inconsistently executed. Second, BLUD vocational schools represent a distinctive institutional form with unique opportunities and challenges for implementing entrepreneurship education that have not been comprehensively documented. Third, understanding the managerial prerequisites for effective TeFa-based entrepreneurship education can inform policy formulation, institutional capacity building, and

pedagogical innovation across the vocational education sector. This research responds to calls from scholars such as Irsyad and Effendi (2023) for deeper investigations into TeFa management problems and sustainable solutions, and extends the work of Wahjusaputri and Bunyamin (2021) on competency-based TeFa development by foregrounding entrepreneurial outcomes.

This study aims to comprehensively examine TeFa management practices in BLUD vocational schools with particular attention to their effectiveness in developing students' entrepreneurial competencies. Specifically, the research investigates how planning, organizing, implementing, and controlling functions are operationalized in entrepreneurship-oriented TeFa programs, identifies obstacles impeding optimal implementation, and elucidates strategies for enhancing managerial effectiveness. The significance of this research extends beyond descriptive documentation to offer theoretical contributions advancing educational management scholarship and practical recommendations for strengthening vocational education quality. By providing empirically grounded insights into the managerial architecture required for successful entrepreneurship-based TeFa implementation, this study equips educational leaders, policymakers, and practitioners with actionable knowledge for institutional improvement and systemic reform in vocational education.

METHODS

This investigation employed a qualitative case study design, which is particularly appropriate for examining complex organizational phenomena within their real-world contexts and for generating in-depth understanding of managerial processes (Yin, 2018; Merriam, 2009). The case study approach enabled comprehensive exploration of Teaching Factory management practices and their relationships with entrepreneurial competency development in naturalistic educational settings. Two vocational high schools in West Java, Indonesia—SMKN 1 Pangandaran and SMKN 1 Banjar—served as research sites. Both institutions were purposively selected based on specific criteria: (1) implementation of Teaching Factory programs for a minimum of three years, (2) Regional Public Service Agency (BLUD) status conferring operational and financial autonomy, and (3) explicit institutional commitment to entrepreneurship education as evidenced in school strategic planning documents. This purposive sampling strategy ensured selection of information-rich cases that could illuminate the phenomenon under investigation (Palinkas et al., 2015; Patton, 2015).

Research participants were identified through criterion-based purposive sampling to ensure engagement with individuals possessing relevant knowledge and experience regarding TeFa management and entrepreneurship development (Creswell & Plano Clark, 2011). The sample comprised 24 participants distributed across multiple stakeholder categories: school principals (n=2), vice principals for curriculum affairs (n=2), TeFa coordinators (n=2), teachers directly involved in TeFa implementation (n=8), BLUD financial managers (n=2), industry partners (n=4), and students actively engaged in TeFa activities (n=4). This multi-stakeholder approach facilitated triangulation of perspectives and enhanced understanding of TeFa management across different organizational levels. Data collection proceeded through three complementary methods over a six-month period from March to August 2024. First, in-depth semi-structured interviews lasting 45-90 minutes were conducted with all participants to elicit detailed accounts of planning, organizing, implementing, and controlling processes within TeFa programs, with particular attention to entrepreneurship competency development. Interview protocols were developed based on George R. Terry's (2020) management functions framework and pilot-tested with three vocational educators not participating in the main study. Second, participatory observation was undertaken in TeFa production units, workshops, and administrative settings for approximately 120 hours across both schools, enabling direct witnessing of operational practices, organizational interactions, and student engagement patterns. Field notes were systematically recorded using structured observation guides addressing management activities, instructional processes, and entrepreneurial behaviors. Third, document analysis examined institutional materials including school work plans (RKS), school activity and budget plans (RKAS), TeFa lesson plans (RPP), standard operating procedures, financial reports, partnership agreements

with industry, and student assessment records. All interviews were audio-recorded with participant consent and transcribed verbatim, producing approximately 480 pages of textual data.

Data analysis followed the interactive model proposed by Miles, Huberman, and Saldaña (2014), which consists of three concurrent activities: data condensation, data display, and conclusion drawing/verification. During data condensation, transcripts, field notes, and documents were systematically reviewed and coded to identify recurring patterns, themes, and conceptual categories related to TeFa management functions and entrepreneurial competency development. Data display involved creating matrices, charts, and narrative summaries to organize condensed data and facilitate pattern recognition across cases and participant groups. Conclusion drawing proceeded iteratively as provisional findings were progressively refined through continuous comparison with incoming data and theoretical constructs. To ensure analytical rigor, coding was conducted independently by the principal investigator and a trained research assistant, with periodic comparison of interpretations to achieve inter-coder consensus exceeding 85% agreement. Multiple strategies were employed to establish trustworthiness and credibility of findings (Lincoln & Guba, 1985; Creswell & Poth, 2018). Triangulation was achieved through convergence of multiple data sources (interviews, observations, documents) and multiple stakeholder perspectives (administrators, teachers, students, industry partners), thereby enabling cross-verification of evidence and reducing potential bias inherent in single-method or single-source investigations (Patton, 2015; Yin, 2018). Member checking involved sharing preliminary interpretations with six key participants who confirmed accuracy of representations and provided clarifying feedback that was incorporated into final analyses. Prolonged engagement at research sites and persistent observation over six months enhanced contextual understanding and rapport with participants, facilitating access to nuanced information about management practices and challenges. An audit trail documenting all methodological decisions, data transformations, and analytical procedures was maintained to enable external examination of research processes and enhance dependability of findings. Finally, peer debriefing sessions with experienced qualitative researchers not involved in data collection provided critical examination of emerging interpretations and methodological decisions throughout the study. Ethical considerations were rigorously observed throughout the research process. Formal approval was obtained from institutional review authorities at both research sites and participants provided written informed consent after receiving comprehensive information about study purposes, procedures, voluntary nature of participation, and confidentiality protections. All identifying information was removed from transcripts and replaced with pseudonyms to protect participant anonymity, and data were stored securely with access restricted to the research team.

RESULTS AND DISCUSSION

Results

The empirical investigation of Teaching Factory management at SMKN 1 Pangandaran and SMKN 1 Banjar revealed that while both institutions have implemented TeFa programs with explicit entrepreneurship development objectives, the management practices exhibit significant variations in effectiveness across the four functional domains of planning, organizing, implementing, and controlling. Table 1 presents a comprehensive synthesis of findings organized according to George R. Terry's (2020) management framework, providing systematic documentation of current practices, identified gaps, and operational challenges encountered in entrepreneurship-oriented TeFa implementation.

The planning function, while documented through institutional strategic documents, revealed significant deficiencies in operationalizing entrepreneurship-oriented TeFa programs. Analysis of RKS (School Work Plans), RKAS (School Activity and Budget Plans), and RPP (Lesson Plans) indicated that although these documents explicitly reference entrepreneurship development, they lack detailed operational frameworks specifying how entrepreneurial competencies will be systematically cultivated through TeFa activities. A particularly salient challenge emerged in the synchronization of production

schedules with academic calendars, creating temporal conflicts that compromise both educational quality and production efficiency. As articulated by one TeFa coordinator: "We often struggle to align customer order deadlines with our teaching schedule. Sometimes students miss important production phases because of school examinations or other academic commitments, which disrupts both their learning continuity and our commitment to industry partners." This scheduling disjuncture reflects inadequate anticipatory planning and limited flexibility in institutional structures. Moreover, industry participation in planning processes remained largely peripheral, with business partners consulted primarily for equipment provision or market access rather than as substantive collaborators in curriculum design and competency framework development. This finding resonates with observations by Omar & Kamaruzaman (2024), who documented that effective industry-school collaboration requires systematic mechanisms for industry input into educational planning, not merely transactional resource exchanges.

Table 1. Findings of Entrepreneurship-Based TeFa Management at SMKN 1 Pangandaran and SMKN 1 Banjar

Management Function	Key Findings	Notes
Planning	Adaptive RKS, RKAS, and RPP documents for entrepreneurship-based TeFa development are available; however, scheduling inconsistencies persist between production cycles and learning calendars; industry involvement in planning processes remains limited	TeFa planning documents exist formally but lack comprehensive integration of entrepreneurial competency frameworks; needs analysis inadequately addresses market dynamics
Organizing	Teachers function as mentors; students assume roles as operators, cashiers, and quality controllers; entrepreneurship-based TeFa SOPs are incomplete	Coordination mechanisms remain largely informal; absence of standardized operating procedures creates ambiguity in role definitions and accountability structures
Implementing	Students engage directly in production activities; technical skills and soft skills (teamwork, discipline, communication) demonstrate measurable improvement	Entrepreneurial dimensions including business model innovation, market analysis, financial management, and strategic planning receive insufficient instructional emphasis
Controlling	Evaluation protocols focus primarily on product quality and technical proficiency; entrepreneurial competency indicators are not systematically integrated into assessment frameworks	Assessment instruments inadequately capture entrepreneurial mindset, innovation capacity, risk management capabilities, and business acumen development
Barriers	Teachers' limited understanding of BLUD financial mechanisms; incomplete entrepreneurship-based TeFa SOPs; weak industry engagement; scheduling conflicts between academic calendar and production demands	Structural barriers stem from inadequate professional development, insufficient institutional frameworks, and underdeveloped industry partnership mechanisms
Solutions	Teacher capacity building programs; development of comprehensive entrepreneurship-based TeFa SOPs; expansion of industry partnerships; implementation of holistic evaluation systems incorporating entrepreneurial competencies	Proposed interventions require sustained institutional commitment, resource allocation, and systematic implementation monitoring to ensure effectiveness

The organizing function exhibited informal coordination patterns that, while demonstrating flexibility, lacked the structural clarity necessary for sustainable program scalability. Role differentiation was evident, with teachers serving as facilitators and mentors while students rotated through operational positions including machine operators, customer service personnel, financial administrators, and quality assurance inspectors. However, the absence of comprehensive standard operating procedures (SOPs) specific to entrepreneurship-based TeFa created ambiguity regarding

performance expectations, evaluation criteria, and progression pathways. One teacher noted: "We don't have clear written guidelines about what entrepreneurial behaviors we should be developing or how to assess them systematically. It's mostly based on our individual understanding and experience." This procedural gap undermines consistency across different TeFa units and impedes knowledge codification that could inform continuous improvement. The informal nature of organizational structures, while permitting adaptive responses to situational demands, simultaneously constrains institutional memory and hampers replication of effective practices. Recent research by Marsh et al. (2021) emphasizes that standardized collaboration frameworks are essential for establishing sustainable and meaningful industry-school partnerships, corroborating the procedural gaps identified in this study.

Implementation processes demonstrated tangible success in developing students' technical competencies and selected soft skills, yet revealed substantial deficits in fostering entrepreneurial mindsets and business capabilities. Observational data confirmed that students actively engage in authentic production tasks, operating machinery, serving customers, managing transactions, and conducting quality inspections. These experiences visibly enhanced technical proficiencies and cultivated interpersonal skills including teamwork, communication, discipline, and customer orientation. Student interview data corroborated these benefits, with one student stating: "Through TeFa, I've learned not just how to operate equipment, but also how to work with others, manage time, and serve customers professionally." However, systematic examination of instructional practices revealed that entrepreneurial dimensions—including opportunity recognition, business model development, financial planning, market analysis, competitive strategy, and innovation management—received minimal pedagogical attention. Teachers acknowledged this gap, with several indicating they lacked confidence and preparation to facilitate entrepreneurship education effectively. This implementation deficit aligns with findings from Bahaw et al. (2024), who documented that while vocational education programs successfully develop technical skills, they frequently fail to systematically cultivate entrepreneurial competencies necessary for self-employment and venture creation.

The controlling function demonstrated the most pronounced inadequacies, with evaluation mechanisms focused narrowly on technical product quality while neglecting comprehensive assessment of entrepreneurial competency development. Analysis of assessment instruments revealed that evaluation criteria emphasize dimensional accuracy, finish quality, operational efficiency, and adherence to technical specifications, with entrepreneurial indicators largely absent. Periodic student assessments do not systematically measure innovation capacity, business planning proficiency, market awareness, financial literacy, risk assessment capabilities, or entrepreneurial self-efficacy—all recognized as essential components of entrepreneurial competence (Bahaw et al., 2024; European Centre for the Development of Vocational Training, 2024). This evaluative myopia reflects broader conceptual confusion regarding what constitutes entrepreneurial competency in vocational contexts and how such competencies can be validly assessed. One BLUD manager observed: "We measure success by production output and customer satisfaction, but we don't really track whether students are developing entrepreneurial thinking or business skills." The absence of validated assessment frameworks for entrepreneurial competencies in TeFa contexts represents a significant methodological gap that undermines program accountability and continuous improvement. Research by the OECD (2024) on vocational competency assessment emphasizes that comprehensive evaluation systems must integrate occupation-specific skills with transversal employability competencies, including entrepreneurial capabilities, to provide holistic portraits of student development.

An unexpected finding emerged regarding the differential impact of BLUD status on TeFa management effectiveness. While BLUD designation theoretically confers operational flexibility and financial autonomy that should facilitate entrepreneurial program development, interview data revealed that many teachers and mid-level administrators possessed limited understanding of BLUD financial mechanisms and governance frameworks. Several teachers expressed uncertainty about how

BLUD status could be leveraged to enhance TeFa programming or support entrepreneurship education initiatives. This knowledge gap suggests that institutional capacity building must extend beyond pedagogical training to encompass organizational and financial literacy, enabling educators to fully utilize the autonomy afforded by BLUD structures. Additionally, divergent stakeholder perceptions emerged regarding the primary purpose of TeFa, with some viewing it predominantly as a revenue-generation mechanism for school financing while others emphasized its educational and competency development functions. This purpose ambiguity creates tensions that complicate program management and resource allocation decisions, potentially compromising both educational quality and financial sustainability.

Discussion

This investigation contributes to the growing body of scholarship on Teaching Factory implementation in vocational education by foregrounding the managerial dimensions that underpin program effectiveness, particularly regarding entrepreneurship competency development. The central finding—that TeFa management at both research sites demonstrates partial implementation across all four management functions yet fails to achieve systematic integration necessary for robust entrepreneurship education—illuminates critical gaps between policy aspirations and operational realities in Indonesian vocational schools with BLUD status.

The planning deficiencies documented in this study reflect broader systemic challenges in Indonesian vocational education, where policy documents emphasize entrepreneurship development yet provide limited operational guidance for translating these aspirations into concrete pedagogical practices. This finding extends research by Casmudi et al. (2022) and Irsyad and Effendi (2023), who identified curriculum-industry misalignment as a persistent obstacle in TeFa implementation. However, the present study reveals that planning inadequacies manifest not merely as curriculum gaps but as fundamental failures in needs assessment, stakeholder engagement, and temporal coordination—dimensions inadequately addressed in prior literature. The limited industry participation in planning processes contradicts the collaborative ethos central to TeFa philosophy and represents a missed opportunity for co-creating educational experiences grounded in authentic workplace demands. International evidence from Germany's dual vocational education system demonstrates that substantive industry involvement in program planning—extending beyond advisory roles to genuine co-design partnerships—significantly enhances curriculum relevance, graduate employability, and employer satisfaction (Euler, 2013; Hiim, 2023). The findings suggest that Indonesian vocational schools must transition from transactional industry relationships focused on resource provision toward transformational partnerships characterized by shared governance, mutual accountability, and co-investment in student development. Recent work by Rossoni et al. (2024) systematically documents barriers to university-industry collaboration for research and innovation, identifying relational social capital deficits, cultural misalignments, and asymmetric expectations as primary obstacles—challenges that resonate strongly with the partnership difficulties observed in this study.

The organizational gaps identified—particularly the absence of comprehensive entrepreneurship-based TeFa SOPs—illuminate the tension between informal flexibility and structural rigor in vocational education management. While adaptive, relationship-based coordination enables responsive problem-solving and contextual adjustments, the lack of codified procedures constrains institutional learning, impedes quality assurance, and creates dependency on individual teacher initiative rather than systematic organizational capacity. This finding problematizes the assumption that flexibility inherently serves innovation and entrepreneurship education; instead, the evidence suggests that entrepreneurial pedagogy requires structured scaffolding, clearly articulated competency frameworks, and systematic assessment protocols to achieve intended outcomes reliably and equitably across diverse student populations. The organizational informality documented here diverges from management best practices articulated in Terry's (2020) framework, which emphasizes that effective organizing requires not only role differentiation but also explicit coordination mechanisms,

communication channels, and accountability structures. Comparative analysis with successful Teaching Factory implementations internationally reveals that high-performing programs typically feature detailed operational manuals, competency-based progression models, and formalized industry partnership agreements that clarify mutual responsibilities and expected outcomes (Wahjusaputri & Bunyamin, 2021; Kolho, 2024). The present findings thus underscore the need for Indonesian vocational schools to develop context-appropriate yet rigorous organizational architectures that balance flexibility with systematic program management.

The implementation successes in technical skill development juxtaposed against deficiencies in entrepreneurship education reflect a persistent vocational education paradox: the tendency to prioritize readily observable, easily measured technical competencies over more complex, contextually contingent entrepreneurial capabilities. This pattern aligns with findings from multiple international contexts, including studies by Okolie et al. (2019), which document widespread challenges in integrating authentic entrepreneurship education into technically-focused vocational curricula. However, the present research extends these observations by revealing that implementation gaps stem not primarily from philosophical resistance to entrepreneurship education but from teachers' limited pedagogical preparation and confidence in facilitating entrepreneurial learning. This finding has significant implications for teacher professional development design, suggesting that effective capacity building must address not only entrepreneurship content knowledge but also pedagogical content knowledge specific to entrepreneurship education—understanding how to structure learning experiences that cultivate entrepreneurial mindsets, opportunity recognition capabilities, and business planning competencies within production-based educational contexts. Recent scholarship emphasizes that entrepreneurship education requires distinctive pedagogical approaches, including experiential learning, problem-based instruction, reflective practice, and authentic assessment aligned with entrepreneurial processes rather than traditional disciplinary content (Bahaw et al., 2024; Huang et al., 2024). The inadequate pedagogical preparation observed in this study suggests that Indonesian vocational teacher education programs may require substantial reform to equip educators with specialized competencies for facilitating entrepreneurship-oriented TeFa experiences.

The evaluation deficits represent perhaps the most consequential finding, as assessment practices fundamentally shape what teachers emphasize instructionally and what students prioritize in their learning engagement. The narrow focus on technical product quality assessment, to the exclusion of entrepreneurial competency evaluation, signals to all stakeholders that entrepreneurship development remains peripheral despite policy rhetoric suggesting otherwise. This finding corroborates Wijaya's (2013) assertion that TeFa evaluations must encompass technical, interpersonal, and entrepreneurial dimensions to provide holistic accountability for program effectiveness. However, the present study reveals that implementing comprehensive evaluation systems faces significant methodological challenges, as validated assessment instruments for entrepreneurial competencies in vocational TeFa contexts remain scarce. International efforts to develop such instruments, including the OECD's PISA-VET initiative and the Vocational Education Entrepreneurship Knowledge and Skills (VEEKS) Scale, offer promising frameworks that Indonesian vocational schools could adapt (OECD, 2024; Bahaw et al., 2024). These instruments recognize that entrepreneurial competency comprises multiple dimensions—including mindset attributes (self-efficacy, proactivity, creativity), knowledge domains (business planning, financial literacy, market analysis), and behavioral skills (networking, resource mobilization, problem-solving)—requiring multifaceted assessment approaches integrating self-report measures, behavioral observations, portfolio analysis, and performance-based assessments of authentic entrepreneurial tasks. The absence of such comprehensive evaluation frameworks in the researched schools reflects broader capacity gaps in Indonesian vocational education that warrant urgent policy attention and resource allocation.

The unexpected findings regarding BLUD status and stakeholder purpose ambiguity illuminate organizational dynamics that mediate TeFa effectiveness yet receive limited attention in existing

literature. The financial autonomy conferred by BLUD designation creates both opportunities and challenges: opportunities for entrepreneurial resource allocation, programmatic innovation, and responsive adaptation to local industry needs; challenges stemming from limited institutional capacity to leverage this autonomy effectively, potential mission drift toward revenue maximization at the expense of educational quality, and accountability complexities inherent in balancing educational and commercial objectives. These findings resonate with Waluyo's (2018) analysis of tensions between financial autonomy and institutional control in agencification processes, suggesting that BLUD vocational schools require specialized governance frameworks that preserve educational integrity while enabling entrepreneurial operation. The purpose ambiguity documented here—divergent perceptions of whether TeFa primarily serves educational or revenue-generation functions—reflects inadequate organizational sense-making and shared vision development. Effective educational entrepreneurship requires that stakeholders maintain clear commitment to educational missions while engaging in revenue-generating activities as means rather than ends. Leadership practices that cultivate shared understanding, articulate explicit value hierarchies prioritizing student learning, and establish decision-making criteria that systematically privilege educational considerations over financial expediency appear essential for realizing the potential of BLUD-status vocational schools without compromising educational quality.

The theoretical contributions of this research reside in several domains. First, the study demonstrates the utility of classical management frameworks, specifically Terry's POAC model, for analyzing contemporary educational innovations, countering assumptions that traditional management theories lack relevance for understanding emergent pedagogical approaches like TeFa. The systematic application of planning, organizing, implementing, and controlling functions provided analytical structure that revealed specific, actionable gaps rather than generalized criticisms of TeFa implementation. Second, the research illuminates the distinction between program adoption and effective implementation—a differentiation frequently obscured in policy discourse yet critical for understanding why educational innovations often fail to achieve intended outcomes despite widespread uptake. Both researched schools had formally adopted TeFa and explicitly committed to entrepreneurship development, yet implementation remained superficial rather than transformative. This finding underscores that successful educational reform requires sustained attention to implementation fidelity, organizational capacity building, and continuous improvement processes, not merely policy mandate or initial program launch. Third, the study contributes to entrepreneurship education scholarship by documenting how institutional contexts—specifically BLUD governance structures—shape program possibilities and constraints in ways that mediate pedagogical effectiveness. This contextual sensitivity enriches understanding of entrepreneurship education as embedded in and influenced by broader organizational ecologies rather than as decontextualized pedagogical techniques.

The practical implications for vocational education policy and practice are substantial. School leaders must prioritize development of comprehensive, evidence-informed TeFa management frameworks that integrate entrepreneurship competency development throughout planning, organizing, implementing, and controlling functions. This integration requires explicit competency frameworks specifying target entrepreneurial capabilities; curriculum design that systematically embeds entrepreneurship education into technical instruction through authentic business planning, market engagement, and venture simulation activities; organizational structures including formalized industry partnerships with clearly defined roles, responsibilities, and mutual expectations; and multidimensional evaluation systems assessing technical, interpersonal, and entrepreneurial competencies using validated instruments. Teacher professional development emerges as a critical lever for implementation improvement, necessitating not only content knowledge regarding entrepreneurship but also pedagogical expertise in facilitating experiential, problem-based entrepreneurial learning and assessment literacy enabling authentic evaluation of complex entrepreneurial competencies. Policy makers should consider establishing regional TeFa networks

facilitating peer learning, resource sharing, and collaborative problem-solving among schools implementing entrepreneurship-oriented programs. Such networks could accelerate diffusion of effective practices, enable economies of scale in developing specialized resources (assessment instruments, curriculum modules, teacher training programs), and create communities of practice supporting sustained implementation fidelity.

Several limitations warrant acknowledgment. First, the case study design, while enabling deep contextual understanding, limits statistical generalizability to other vocational school contexts. Future research employing mixed methods with larger samples could quantify relationships between specific management practices and entrepreneurial competency outcomes. Second, the six-month observation period, though substantial, may not capture longer-term program evolution or delayed impacts on student entrepreneurship. Longitudinal investigations tracking students into post-graduation employment and entrepreneurial activities would provide valuable outcome data currently absent. Third, the study focused primarily on school-based perspectives; more extensive engagement with industry partners and alumni could illuminate additional dimensions of TeFa effectiveness and suggest alternative improvement strategies. Fourth, the research examined TeFa management at a particular organizational level; future investigations could productively explore how district, provincial, and national policy environments shape school-level implementation possibilities and constraints. Despite these limitations, the systematic application of management theory to empirical investigation of entrepreneurship-oriented TeFa in BLUD vocational schools provides foundational insights for both scholarship and practice, illuminating critical gaps between policy aspirations and operational realities while identifying concrete pathways toward more effective implementation.

In synthesis, this research reveals that Teaching Factory management in BLUD vocational schools has progressed beyond mere adoption to partial implementation, yet substantial work remains to achieve systematic integration of management functions supporting robust entrepreneurship competency development. The pathway forward requires moving beyond fragmented, informal practices toward comprehensive, evidence-based management systems characterized by collaborative industry partnerships in planning, formalized organizational structures with clear SOPs, pedagogically sophisticated implementation integrating entrepreneurship throughout technical instruction, and multidimensional evaluation assessing the full range of entrepreneurial competencies. Achieving these transformations demands sustained institutional commitment, substantial capacity building, strategic resource allocation, and continuous improvement processes responsive to emerging evidence and evolving industry demands. The successful realization of entrepreneurship-oriented TeFa represents not merely a programmatic innovation but a fundamental reconceptualization of vocational education's purpose and methods—one that positions graduates as not merely job-ready workers but as entrepreneurial agents capable of creating economic value, generating employment, and driving regional development in an increasingly dynamic and uncertain economic landscape.

CONCLUSION

This study systematically examined Teaching Factory management in BLUD vocational schools through George R. Terry's POAC framework, revealing that while both SMKN 1 Pangandaran and SMKN 1 Banjar have implemented TeFa programs, their management remains suboptimal in fostering entrepreneurial competencies. The findings demonstrate that planning processes lack comprehensive industry collaboration and robust entrepreneurship competency frameworks; organizing structures operate informally without standardized SOPs; implementation successfully develops technical and soft skills but inadequately addresses entrepreneurial mindsets and business capabilities; and controlling mechanisms focus narrowly on product quality while neglecting multidimensional entrepreneurial competency assessment. These deficiencies collectively constrain TeFa's potential as a transformative entrepreneurship education strategy. The research contributes theoretically by demonstrating classical management frameworks' continued relevance for analyzing contemporary educational innovations and illuminating the critical distinction between program adoption and

effective implementation. Practically, the findings underscore the imperative for vocational schools to develop comprehensive management systems integrating formalized industry partnerships, detailed entrepreneurship-based SOPs, pedagogically sophisticated implementation embedding entrepreneurship throughout technical instruction, and validated multidimensional evaluation frameworks. Several limitations warrant acknowledgment, including the case study design's limited generalizability, the six-month temporal scope potentially missing longer-term impacts, and the predominantly school-based perspective. Future research should employ longitudinal mixed-methods designs tracking students' post-graduation entrepreneurial outcomes, investigate district and provincial policy influences on school-level implementation, and examine comparative effectiveness of different TeFa management models across diverse institutional contexts. Ultimately, realizing entrepreneurship-oriented TeFa's transformative potential requires sustained institutional commitment, substantial capacity building, and continuous improvement processes that position vocational graduates as entrepreneurial agents capable of creating economic value and driving regional development in an increasingly dynamic global economy.

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