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Implementing Link and Match in Practice: A Comparative Study of Management Processes and Graduate Employability Outcomes

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Abstract
Persistent mismatches between vocational graduate competencies and industry requirements have resulted in suboptimal employment absorption rates in Indonesia, particularly amid Fourth Industrial Revolution demands. This study examines link and match management between vocational schools and the business-industrial world (DUDI) to enhance graduate employability. A qualitative comparative case study was conducted at SMK Negeri 2 Cilaku and SMK Negeri 1 Cikalongkulon in Cianjur Regency. Data were collected through semi-structured interviews, participatory observations, and documentation analysis with purposively selected participants including principals, teachers, DUDI representatives, students, and alumni. Analysis employed Miles et al.'s (2014) interactive model based on Robbins and Coulter's (2009) management functions framework. Both schools systematically implemented link and match through comprehensive planning involving early industry participation, integrated organizational structures with frequent communication mechanisms, holistic implementation of eight program pillars including curriculum synchronization and teaching factories, and participatory evaluation processes. Graduate employment absorption reached 68-74% within six months, exceeding national averages. BNSP-certified competency verification significantly accelerated employment timelines. Findings demonstrate that partnership quality—characterized by structural integration, communication intensity, and nationally recognized certification—surpasses partnership quantity in determining employability outcomes. Despite structural constraints including limited regional industry diversity and competency gaps, adaptive institutional responses facilitated program effectiveness, contributing empirical evidence for systematic school-industry collaboration strategies.

INTRODUCTION

The alignment between vocational education and labor market demands represents a critical challenge in contemporary educational policy, particularly within the context of rapidly evolving industrial requirements. Skills mismatch—characterized by disparities between worker competencies and employer expectations—has emerged as a recurring theme in vocational education globally (International Labour Organization, 2020; Bol et al., 2019). In Indonesia, vocational high schools (Sekolah Menengah Kejuruan, or SMK) are designed to prepare students for direct workforce entry. However, persistent mismatches between graduate competencies and employer expectations have resulted in suboptimal employment absorption rates, undermining the fundamental purpose of vocational education. This phenomenon is especially pronounced in the Fourth Industrial Revolution era, where technological advancement necessitates not only technical proficiency but also adaptability and alignment with real-world industrial standards (Avis, 2020; Spöttl & Windelband, 2021). The Fourth Industrial Revolution, characterized by cyber-physical systems integration, Internet of Things, and cloud computing, has fundamentally transformed qualification requirements across all economic sectors (Benešová & Tupa, 2017).

In response to these challenges, the Indonesian Ministry of Education launched the Center of Excellence Vocational School Program (SMK PK) in 2021, emphasizing a link and match approach that fosters strategic partnerships between vocational schools and the business and industrial world (DUDI). This framework aims to synchronize curricula, pedagogical practices, and graduate competencies with industry needs through systematic collaboration. The link and match program encompasses internship placements, competency skill assessments, and workforce recruitment (Romadin et al., 2021). Despite this promising policy direction, implementation at the institutional level has revealed significant operational obstacles, including limited industry partnerships, outdated facilities, competency gaps, and insufficient evaluation mechanisms (Putra et al., 2020; Shah & Gillen, 2024).

Existing research has examined various dimensions of link and match implementation. Maulina and Yoenanto (2022) focused on curriculum relevance optimization, while Herawati et al. (2025) investigated teacher training frameworks. International studies have demonstrated positive correlations between partnership duration and vocational education outcomes (Zhang & Zhao, 2021). However, these studies predominantly adopt descriptive methodologies without comprehensively examining the management processes—planning, organizing, implementing, and evaluating—that collectively determine program effectiveness (Robbins & Coulter, 2009). Furthermore, previous research has largely focused on curriculum alignment or partnership quantities rather than analyzing how managerial practices directly influence graduate employability. Graduate employability, defined as the capability to obtain and sustain fulfilling work throughout one's career (Yorke, 2006; Holmes, 2013), has become increasingly critical as employers report difficulties finding adequately prepared candidates (Jackson & Wilton, 2016). This represents a significant knowledge gap: the absence of holistic managerial analysis linking systematic processes to measurable workforce absorption impacts.

This study addresses this gap through two distinctive contributions. First, it employs Robbins and Coulter's (2009) management function framework—encompassing planning, organizing, implementing, and evaluating—as the primary analytical lens for examining link and match initiatives. This approach enables systematic investigation of how each management function contributes to program effectiveness. Second, rather than merely assessing curriculum relevance or partnership frequency, this research prioritizes graduate employability as the central success indicator, thereby connecting managerial processes to concrete labor market outcomes. Research demonstrates that effective industry-education partnerships significantly influence job readiness across technical competencies, soft skills development, and professional network formation (Naseer et al., 2025). Additionally, the study utilizes a comparative case study design examining two Center of Excellence vocational schools in Cianjur Regency: SMKN 2 Cilaku and SMKN 1 Cikalongkulon. These institutions differ in geographical location, vocational program structures, and industry partner profiles, enabling analysis of management strategy variations within comparable local environments.

The primary objective of this research is to analyze how link and match management is implemented at SMKN 2 Cilaku and SMKN 1 Cikalongkulon to enhance graduate employment absorption, while identifying implementation obstacles and impacts. Specifically, this study aims to: identify and analyze planning processes for link and match programs; describe organizational structures supporting collaboration initiatives; examine implementation across curriculum development, industrial work practices, and school-industry partnerships; and evaluate the effectiveness of these programs in improving graduate employability. Through qualitative inquiry grounded in management theory, this research assumes that systematic and collaborative link and match management positively influences graduate workforce absorption.

The findings are expected to yield practical recommendations for vocational schools seeking to strengthen their DUDI collaboration strategies, inform educational policymakers regarding effective link and match implementation frameworks, and contribute theoretical insights for future researchers investigating vocational education-industry partnerships. By examining the nexus between management processes and employability outcomes, this study advances understanding of how

vocational education institutions can effectively bridge the competency gap and enhance graduate competitiveness in Indonesia's evolving labor market, ultimately contributing to developing job-ready vocational human resources aligned with Fourth Industrial Revolution demands (Deloitte Global & Global Business Coalition for Education, 2018).

METHODS

This study employed a qualitative research approach with a comparative case study design to gain in-depth understanding of link and match management processes between vocational high schools and the business and industrial world (DUDI), and its implications for graduate employment absorption (Vavrus & Bartlett, 2017; Stake, 2006). The comparative case study approach was selected as it enables systematic examination of two or more cases to identify patterns, variations, and contextual factors influencing program implementation and outcomes (Goodrick, 2014; Bartlett & Vavrus, 2017). This methodology is particularly appropriate for exploring how educational policies and practices unfold across similar yet distinct institutional contexts, allowing for horizontal comparison between sites while attending to vertical dimensions of policy implementation (Vavrus & Bartlett, 2017). The research was conducted at two Center of Excellence vocational schools in Cianjur Regency: SMK Negeri 2 Cilaku and SMK Negeri 1 Cikalongkulon, which differ in geographical location, vocational program structures, and industry partnership profiles, thereby enabling analysis of management strategy variations within comparable socioeconomic environments.

Research participants were selected using purposive sampling, a non-probabilistic sampling technique that involves deliberately choosing information-rich cases based on specific characteristics relevant to the research objectives (Patton, 2002; Campbell et al., 2020). This sampling strategy is widely recognized in qualitative research for its effectiveness in identifying participants who possess particular knowledge, experiences, or strategic roles related to the phenomenon under investigation (Palinkas et al., 2015). Specifically, criterion sampling was employed to ensure all participants held strategic positions in planning, implementing, and evaluating link and match programs (Creswell & Poth, 2018). Participants included school principals, vice principals responsible for curriculum, public relations, facilities, and student affairs, heads of vocational programs, productive teachers, representatives from DUDI partner organizations, twelfth-grade students, and alumni currently employed in industry sectors. This diverse participant selection ensured multiple perspectives on link and match management processes, enhancing the credibility and comprehensiveness of findings. Secondary data sources comprised memoranda of understanding (MoU), operational curriculum documents (KOSP), internship reports, evaluation meeting minutes, and policy documents related to the Center of Excellence Vocational School Program.

Data collection employed three complementary methods: semi-structured in-depth interviews, participatory observation, and documentation analysis. Semi-structured interviews were conducted to elicit detailed information about participants' perceptions, experiences, and management strategies regarding link and match implementation, allowing for flexible exploration of emerging themes while maintaining focus on research objectives. Participatory observations were carried out at both school sites and DUDI partner locations to directly examine program implementation including teaching factories, industrial internships, and project-based learning activities. Documentation studies systematically reviewed official documents to triangulate interview and observation data, including MoUs, evaluation reports, graduate absorption statistics, and institutional policies. Data collection occurred between August and September 2025 following ethical approval and research permit acquisition from participating schools and the Cianjur District Education Office. Data trustworthiness was established through triangulation of sources, methods, and investigators, comparing information across interviews, observations, and documents to identify convergent findings (Denzin, 2012; Carter et al., 2014). Member checking procedures were implemented by sharing preliminary interpretations with key informants to verify accuracy and enhance credibility (Birt et al., 2016).

Data analysis followed the interactive model proposed by Miles et al. (2014), consisting of three concurrent processes: data reduction, data display, and conclusion drawing/verification. Data reduction involved systematically selecting, focusing, simplifying, and transforming raw data from field notes, interview transcripts, and documents through coding procedures based on Robbins and Coulter's (2009) management functions—planning, organizing, implementing, and evaluating. Initial codes were generated inductively from the data, then organized into broader thematic categories aligned with research questions. Data display involved creating matrices, charts, and network diagrams to organize information systematically, enabling pattern identification and cross-case comparison between the two schools (Miles et al., 2014). Conclusion drawing and verification occurred iteratively throughout analysis, with initial patterns and propositions continuously tested against new data until saturation was achieved. Comparative analysis identified similarities, differences, and contextual factors facilitating or constraining link and match implementation across both institutional settings. The validity of findings was ensured through prolonged engagement, persistent observation, audit trails documenting analytical decisions, and researcher reflexivity throughout the investigation process (Lincoln & Guba, 1985).

RESULTS AND DISCUSSION

Results

This research reveals that link and match management between SMK Negeri 2 Cilaku and SMK Negeri 1 Cikalongkulon with the Business and Industrial World (DUDI) has been systematically implemented through four management functions according to Robbins and Coulter (2009): planning, organizing, implementing, and evaluating. The implementation encompasses not only administrative dimensions but also substantial aspects of vocational learning, yielding direct impacts on graduate employment absorption. This section presents findings from both research sites, structured according to the management functions framework and supplemented with empirical data illustrating implementation variations.

Link and Match Planning

Both schools established specialized management teams from the initial planning stages, comprising school principals, vice principals, vocational program heads, teachers, school committees, and DUDI representatives. Table 1 illustrates the comparative planning structure across both institutions.

Table 1. Planning Structure and Components at Both Research Sites

Planning Component	SMKN 2 Cilaku	SMKN 1 Cikalongkulon
Management Team Formation	School Development Team (Principal, VPs, Program Heads, DUDI reps)	Special Management Team (Principal, VPs, School Committee, DUDI)
Industry Partners	18-27 partners per department	Multiple partners including PT. Asputra, PT. Berdikari, Quin Cake
Measurable Targets	Graduate absorption focus	70% absorption within 6 months
DUDI Involvement	Curriculum co-development, facility construction (mini-coop 3,000 capacity by PT. Paranje)	Weekly/monthly coordination, daily WhatsApp communication
Planning Documentation	Formal MoU covering 8 pillars	MoU with measurable target specifications

Planning activities encompassed three primary dimensions: identifying industry competency needs through direct consultations with partners, drafting formal memoranda of understanding covering eight link and match pillars (curriculum synchronization, teaching factory, industrial training, guest teachers, teacher upskilling/reskilling, certification, project-based learning, and employment commitment), and establishing measurable targets such as achieving 70-80% graduate employment within six months of graduation.

A notable finding at SMKN 2 Cilaku revealed that PT. Paranje's involvement extended beyond conventional partnership agreements. As stated by the school principal, "PT. Paranje not only signed the MoU but actively participated in curriculum design and constructed a mini chicken coop with 3,000-bird capacity on our school grounds" (Principal, SMKN 2 Cilaku, personal communication, August 18, 2025). This represents a substantive collaborative investment rather than a symbolic partnership, demonstrating genuine industry commitment to vocational education infrastructure.

At SMKN 1 Cikalongkulon, planning exhibited higher specificity in target-setting mechanisms. The vice principal for curriculum noted, "We established clear metrics from the beginning: minimum 70% graduate absorption within six months, quarterly industry feedback sessions, and annual curriculum review cycles" (VP Curriculum, SMKN 1 Cikalongkulon, personal communication, September 5, 2025). This strategic approach reflects proactive planning aligned with measurable outcomes.

Organizational Structure and Coordination

Partnership organizational structures were clearly delineated at both institutions, with roles and responsibilities distributed across functional areas including curriculum, public relations, facilities, and student affairs. Internal coordination occurred weekly to monthly at both sites, while external coordination with DUDI partners was conducted minimally once per semester. A distinguishing characteristic at SMKN 1 Cikalongkulon was the establishment of daily communication channels through WhatsApp groups, enabling rapid response to field dynamics. As explained by the public relations coordinator, "Our WhatsApp group includes all stakeholders—teachers, industry supervisors, and school management. This allows us to address issues immediately, from student internship challenges to equipment needs" (PR Coordinator, SMKN 1 Cikalongkulon, personal communication, September 7, 2025).

The division of roles ensured synergistic management operation. The vice principal for public relations maintained relationships with DUDI partners and facilitated new collaborations, while the vice principal for facilities ensured practical equipment met industry standards. Documentation analysis revealed that SMKN 2 Cilaku conducted formal coordination meetings four times annually with complete minutes, whereas SMKN 1 Cikalongkulon held six formal meetings supplemented by informal weekly check-ins.

Implementation of Eight Link and Match Pillars

Both schools comprehensively implemented the eight link and match pillars established in Center of Excellence policy guidelines. Table 2 summarizes implementation details across both institutions.

Table 2. Implementation of Eight Link and Match Pillars

Pillar	SMKN 2 Cilaku Implementation	SMKN 1 Cikalongkulon Implementation
Curriculum Synchronization	Joint workshops with BBPPMPV Pertanian Cianjur and PT. Kimia Farma	Collaboration with PT. Asputra Perkasa Makmur, PT. Berdikari, Quin Cake Cianjur
Teaching Factory	Poultry Agribusiness with production capacity	Agribusiness Livestock with real production units
Industrial Internship (PKL)	6 months at 66 DUDI partners; 3 monitoring visits per location	6 months with 3 monitoring sessions by supervising teachers
Guest Teachers	Minimum 50 teaching hours/year per department	Industry practitioners as regular instructors
Teacher Upskilling/Reskilling	Training in in vitro culture, hydroponics	Training at P4S Hasanudin Orchid, PT. Momenta Agrikultura
Competency Certification	Training center-based (non-LSP BNSP)	BNSP-licensed LSP certification
Project-Based Learning	Real industry projects (network assembly at Arrafi Komputer)	Cake production at Quin Cake Cianjur
Employment Commitment	PT. Sierad Produce, PT. Asputra consistently recruit graduates	Multiple partners with annual recruitment agreements

Curriculum Synchronization

Curriculum synchronization was conducted through collaborative workshops involving school curriculum teams and industry representatives. At SMKN 2 Cilaku, synchronization workshops with

BBPPMPV Pertanian Cianjur resulted in curriculum adjustments incorporating contemporary agricultural technologies. A productive teacher stated, "The synchronization process required us to update our teaching modules to include hydroponic systems and organic farming techniques that industries now prioritize" (Teacher, Agribusiness Department, SMKN 2 Cilaku, personal communication, August 20, 2025).

SMKN 1 Cikalongkulon's synchronization process involved multiple stakeholders. According to documentation analysis, the 2024 curriculum revision incorporated input from five industry partners, resulting in 15 competency standard modifications and the addition of three new practical modules aligned with current market demands.

Teaching Factory Implementation

Teaching factory implementation at both schools transformed learning environments to simulate authentic industrial conditions. At SMKN 2 Cilaku, the Poultry Agribusiness teaching factory operated as a functional production unit. Observational data indicated that students managed the complete production cycle—from procuring day-old chicks, feeding management, health monitoring, to marketing finished products. A twelfth-grade student explained, "In teaching factory, we don't just learn theory. We actually raise chickens, record production costs, calculate profits, and sell to real customers. It feels like running an actual business" (Student, Agribusiness Program, SMKN 2 Cilaku, personal communication, August 22, 2025).

Similarly, SMKN 1 Cikalongkulon's teaching factory in Livestock Agribusiness generated revenue that was reinvested in facility improvements. Financial documentation revealed that teaching factory operations in the 2024 academic year produced IDR 45 million in revenue, with 60% allocated to equipment purchases and 40% for student incentives.

Industrial Internship (PKL)

Industrial internships were conducted for six full months at both institutions, exceeding the minimum requirement stipulated in Center of Excellence guidelines. Internship placements were strategically distributed across 66 partner locations at SMKN 2 Cilaku and multiple sites at SMKN 1 Cikalongkulon. Supervising teachers conducted three monitoring visits per location to evaluate student progress and ensure adherence to learning objectives.

An unexpected finding emerged regarding internship quality variation across partner sites. Several students at SMKN 2 Cilaku reported that smaller industry partners provided more intensive mentoring but limited technological exposure, while larger corporations offered advanced equipment access but less personalized supervision. As one student noted, "At the small farm, I learned everything hands-on because the owner personally trained me. At the large company, I worked with sophisticated equipment but mostly observed rather than practiced" (Alumni, SMKN 2 Cilaku, personal communication, August 25, 2025). This variation suggests the importance of matching student learning needs with appropriate partner characteristics.

Competency Certification

A critical differentiating factor between the two schools involved competency certification mechanisms. SMKN 1 Cikalongkulon collaborated with BNSP-licensed Professional Certification Institutions (Lembaga Sertifikasi Profesi/LSP), providing nationally recognized certificates that significantly enhanced graduate marketability. In contrast, SMKN 2 Cilaku utilized training center-based certification not accredited by BNSP, which industry partners acknowledged as a limitation. A DUDI representative stated, "Graduates from schools with LSP certification have formal credentials that simplify our hiring process. Non-LSP certificates require additional internal assessment" (Industry Representative, personal communication, August 28, 2025).

Documentation analysis revealed that 85% of SMKN 1 Cikalongkulon graduates obtained BNSP certification, compared to 60% of SMKN 2 Cilaku graduates receiving training center certificates. This disparity influenced employer perceptions and recruitment decisions.

Evaluation Mechanisms and Feedback Systems

Both schools implemented formal evaluation processes conducted semestrally, involving comprehensive stakeholder participation including school management, DUDI partners, teachers, students, and school committees. Table 3 presents evaluation characteristics at both institutions.

Table 3. Evaluation Mechanisms and Stakeholder Involvement

Evaluation Aspect	SMKN 2 Cilaku	SMKN 1 Cikalongkulon
Evaluation Frequency	Semester-based (twice annually)	Semester-based plus mid-term reviews
Stakeholder Involvement	School, DUDI, teachers, students, committee	All stakeholders plus alumni representatives
Documentation	Meeting minutes, written reports	Comprehensive reports with quantitative metrics
Follow-up Actions	Program adjustments based on DUDI feedback	Immediate action plans with assigned responsibilities
Evaluation Tools	Semi-structured discussions, questionnaires	Structured surveys, graduate tracer studies

Evaluation results were documented in formal meeting minutes and written reports, subsequently utilized as bases for program improvement. For instance, based on industry partner feedback, SMKN 1 Cikalongkulon strengthened soft skills training components in the curriculum, while SMKN 2 Cilaku increased guest teacher frequency in the Visual Communication Design department to address identified competency gaps.

A noteworthy finding involved participatory evaluation approaches that fostered shared ownership. As stated by a school committee member at SMKN 1 Cikalongkulon, "When we evaluate together—school, industry, parents, even alumni—everyone feels responsible for the program's success. It's not just the school's job anymore; it becomes our collective responsibility" (School Committee Member, personal communication, September 10, 2025).

Implementation Challenges

Despite systematic implementation and positive outcomes, both schools encountered significant challenges that constrained optimal link and match effectiveness. Table 4 summarizes identified obstacles across multiple dimensions.

These obstacles are both structural (limited regional industrial diversity, inadequate budgets) and operational (teacher time constraints, partner commitment variability). However, both schools demonstrated adaptive capacities in managing these challenges. For example, SMKN 2 Cilaku constructed on-campus production facilities (mini-coop) to compensate for limited access to large-scale livestock industries, while SMKN 1 Cikalongkulon established formal agreements with industry associations rather than individual companies to stabilize partnership commitments.

Table 4. Implementation Challenges in Link and Match Programs

Challenge Category	Specific Issues	Impact on Program
Limited DUDI Partners	Insufficient industry variety in Cianjur region, especially for IT and Visual Communication Design programs	Restricted internship placement options; limited curriculum input diversity
Competency Gaps	Rapid technological changes outpacing curriculum updates	Graduates require additional industry-specific training
Facility Limitations	Outdated practical equipment due to budget constraints	Reduced learning authenticity; lower student confidence in technology mastery
Certification Constraints	SMKN 2 Cilaku lacks BNSP-licensed LSP	Certificates less recognized by employers; additional verification required
Fluctuating DUDI Commitment	Partner absorption capacity varies with economic conditions	Uncertain graduate placement; inconsistent recruitment timelines
Teacher Workload	Heavy administrative burdens limit innovation time	Reduced capacity for industry coordination and curriculum development

Graduate Employability Outcomes

The implementation of link and match programs demonstrably enhanced graduate work readiness across multiple dimensions. Graduate absorption data for the 2024 academic year indicated that SMKN 2 Cilaku achieved 68% graduate employment within six months of graduation, while SMKN 1 Cikalongkulon reached 74%, both approximating or exceeding the targeted 70% threshold.

Table 5 illustrates specific employability competencies developed through link and match implementation.

Table 5. Graduate Employability Competency Development

Competency Domain	Development Indicators	Supporting Evidence
Hard Skills Mastery	Technical competencies aligned with industry standards	82% of employers rated graduates as "competent" or "highly competent" in technical skills (employer survey data)
Work Culture Understanding	Familiarity with industrial discipline, targets, organizational systems	90% of graduates reported confidence in workplace adaptation (alumni survey)
Soft Skills Development	Enhanced communication, collaboration, time management	Internship supervisor evaluations averaged 8.2/10 for interpersonal competencies
Self-Confidence	Reduced workplace adjustment anxiety	75% of graduates felt "prepared" or "very prepared" for employment
Competency Certification	Formal proof enhancing competitiveness	BNSP-certified graduates secured employment 2.3 months faster on average
Clear Career Pathways	Employment security through partner commitments	45% of graduates employed by internship host companies
Professional Networks	Industry practitioner connections facilitating job opportunities	38% of graduates found employment through network referrals
Enhanced Competitiveness	Combination of competencies increasing employer desirability	65% of partner companies expressed preference for program graduates

Qualitative evidence from DUDI representatives corroborated these quantitative indicators. An industry supervisor stated, "Students from SMKN 2 Cilaku arrive already familiar with our work environment. Upon graduation, they require minimal adjustment time, allowing them to contribute productively almost immediately" (Industry Supervisor, PT. Sierad Produce, personal communication, August 28, 2025). Similarly, an employer at SMKN 1 Cikalongkulon's partner company noted, "What distinguishes these graduates is not just technical capability but their professional attitude—punctuality, communication skills, problem-solving orientation. These qualities come from authentic work experience during their studies" (HR Manager, PT. Asputra Perkasa Makmur, personal communication, September 12, 2025).

An unexpected finding involved entrepreneurial outcomes. While not explicitly measured as a research objective, interview data revealed that approximately 15% of graduates from both schools pursued self-employment, establishing small businesses in areas related to their vocational training. This suggests that link and match programs may foster entrepreneurial capabilities alongside employment readiness, opening alternative career pathways for graduates.

Discussion

This study's findings demonstrate that systematic link and match management, grounded in Robbins and Coulter's (2009) management function framework, effectively enhances vocational school graduate employability. The following discussion interprets these results within theoretical contexts, connects findings to existing literature, identifies novel contributions, and acknowledges research limitations.

The planning processes observed at both research sites align with education-employment linkage theory, which emphasizes that vocational education relevance can only be achieved through power-sharing between education and employment systems in curriculum design, application, and updating (Rageth & Renold, 2020; Caves et al., 2021). The early involvement of DUDI representatives—exemplified by PT. Paranje's co-development of curriculum and physical infrastructure at SMKN 2

Cilaku—represents what Rageth and Renold (2020) characterize as "maximal linkage," where equal power-sharing produces optimal youth labor market outcomes. This finding supports Bolli et al. (2018) and Caves et al. (2021), who argue that education-employment linkage is strongest when industry actors participate across the entire curriculum value chain. The establishment of measurable targets (70-80% graduate absorption within six months) reflects strategic planning principles where objectives must be specific, measurable, and time-bound (Robbins & Coulter, 2009).

However, an unexpected dimension emerged: the quality of industry involvement varied significantly by partner characteristics. Larger corporations provided formal commitments but limited personalized engagement, while smaller enterprises offered intensive mentorship but constrained technological exposure. This finding extends education-employment linkage theory by suggesting that partnership quality may be influenced by organizational scale and resource capacity, not merely by willingness to collaborate.

The organizational structures implemented at both schools transcend transactional relationships, evolving into strategic partnerships characterized by shared accountability and integrated decision-making. The daily communication mechanisms at SMKN 1 Cikalongkulon through WhatsApp groups exemplify organizational agility—the capacity to respond rapidly to environmental changes (Anderson & Ackerman Anderson, 2001). These findings resonate with Shah & Gillen (2024), who identified communication intensity as a critical success factor in education-industry collaborations. The organizational approach observed addresses Zhang and Zhao's (2021) assertion that partnership longevity correlates positively with vocational education outcomes, as sustained coordination mechanisms enable relationship deepening over time.

The integration of DUDI representatives within school organizational structures represents a significant departure from conventional advisory models where industry input remains peripheral. This structural integration reflects what Johnston and Brennan (1996) term "management-as-organizing" rather than "management-as-planning"—an adaptive, responsive approach prioritizing continuous coordination over rigid procedural adherence.

The comprehensive implementation of eight link and match pillars at both schools demonstrates systematic operationalization of policy frameworks. This finding contrasts with Winarto's (2024) observation that many Indonesian vocational schools implement link and match selectively. The holistic approach aligns with international research emphasizing that effective vocational education requires integrated interventions rather than isolated programs (Flynn et al., 2016; Pillay et al., 2017).

Teaching factory implementation warrants particular attention, as it represents pedagogical innovation integrating production-based learning with authentic business operations. Research demonstrates that teaching factories effectively bridge competency gaps between theoretical knowledge and practical industry requirements (Saputro et al., 2021; Prianto & Qomariyah, 2021). The teaching factories at both sites generated actual revenue while providing students with entrepreneurial experience. This authentic learning context supports experiential learning theory, which posits that meaningful learning occurs through concrete experiences, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984).

The six-month internship duration implemented at both schools exceeds international norms. Gessler et al. (2015) note that most European vocational systems allocate 3-4 months for work-based learning, suggesting that extended immersion may provide Indonesian students with compensatory experiential depth. However, the quality variation across internship sites introduces complexity. This suggests that internship effectiveness depends not solely on duration but on pedagogical design—specifically, how supervisory intensity and technological sophistication are balanced to optimize learning outcomes.

The competency certification disparity between schools illuminates a critical policy implementation gap. SMKN 1 Cikalongkulon's utilization of BNSP-licensed LSP certification yielded tangible employability advantages, with certified graduates securing employment 2.3 months faster on average. This finding corroborates Kamaludin et al. (2024) and Sholihah (2022), who emphasize that

nationally recognized certification significantly influences employer hiring decisions by providing standardized competency verification. The persistence of non-accredited certification at SMKN 2 Cilaku despite Center of Excellence status suggests that policy mandates alone are insufficient without accompanying infrastructure support and capacity building.

The participatory evaluation processes implemented at both schools embody feedback-based management principles (Robbins & Coulter, 2009), ensuring program responsiveness to evolving industry needs. The involvement of diverse stakeholders reflects comprehensive accountability mechanisms extending beyond institutional boundaries. This multi-stakeholder approach addresses a limitation identified in previous research where vocational school evaluations often exclude student and industry perspectives (Putra et al., 2020). The iterative nature of evaluation, with findings directly informing programmatic adjustments, exemplifies continuous improvement cycles central to quality management frameworks.

An unexpected dimension of evaluation involved shared ownership. Stakeholder participation in evaluation processes fostered collective responsibility for program success, transforming link and match from a school-managed initiative into a community-supported endeavor. This finding extends management literature by suggesting that participatory evaluation serves not only as a monitoring tool but also as a mechanism for building collaborative commitment among partners.

Despite systematic implementation and measurable successes, both schools confronted significant structural obstacles. The limited availability of diverse industry partners in Cianjur Regency reflects broader regional economic characteristics—many Indonesian districts outside major urban centers lack industrial variety, particularly in technology-intensive sectors. The competency gap challenge—where technological changes outpace curriculum updates—reflects a tension inherent in vocational education systems globally. Hanushek et al. (2017) observe that vocational education specificity, while facilitating short-term employment transitions, may reduce long-term adaptability as occupational requirements evolve. However, this study's findings suggest that systematic industry collaboration can mitigate this tension through continuous curriculum synchronization and teacher upskilling.

Both schools exhibited notable adaptive capacities in managing structural constraints. SMKN 2 Cilaku's construction of on-campus production facilities addressed limited access to large-scale livestock industries by creating authentic learning environments within institutional boundaries. SMKN 1 Cikalongkulon's strategy of partnering with industry associations rather than individual companies stabilized collaboration commitments despite economic fluctuations. These adaptive responses exemplify what organization scholars term "resourcefulness"—the capacity to achieve objectives despite resource limitations through creative problem-solving (Baker & Nelson, 2005).

The demonstrated enhancement of graduate employability across eight competency domains confirms that well-managed link and match programs translate into concrete labor market advantages. The 68-74% graduate absorption rates compare favorably with national statistics, where SMK graduate unemployment reached 10.42% in 2019 (Indonesian Central Bureau of Statistics, 2020). The competency development findings align with international employability frameworks emphasizing that workforce readiness encompasses technical skills, soft competencies, self-efficacy, and professional networks (Jackson & Wilton, 2016; Yorke, 2006). The integration of hard skills mastery, work culture understanding, and interpersonal competencies reflects what Holmes (2013) terms "graduate identity"—the capacity to perform effectively within occupational communities. The accelerated employment timeline for BNSP-certified graduates demonstrates how formal credentials signal competency to employers, reducing information asymmetries in hiring processes (Bol et al., 2019).

An unexpected finding involved entrepreneurial outcomes, with approximately 15% of graduates establishing self-employment ventures. While entrepreneurship was not explicitly incorporated as a research variable, this outcome suggests that authentic business exposure through teaching factories and internships may foster entrepreneurial self-efficacy. This finding extends research by Prianto &

Qomariyah (2021), who demonstrated that teaching factory-based learning strengthens entrepreneurial competencies among vocational students.

This study offers three theoretical contributions. First, it demonstrates that Robbins and Coulter's (2009) management function framework provides a robust analytical lens for examining education-industry partnerships. Second, it enriches education-employment linkage theory (Rageth & Renold, 2020) by documenting specific mechanisms through which power-sharing occurs in practice. Third, it identifies partnership quality dimensions—communication intensity, organizational integration, and certification—that mediate policy-employability relationships.

Practically, vocational schools should prioritize measurable partnership targets, frequent industry communication structures, comprehensive program implementation, BNSP-licensed certification access, and participatory evaluation mechanisms. Policymakers should provide targeted support for certification infrastructure, regional industry networks, and teacher professional development.

Study limitations include case study transferability constraints, temporal specificity, reliance on self-reported data, absence of control group comparisons, and unmeasured employment quality dimensions.

This research affirms that systematic link and match management significantly enhances graduate employability. The findings reveal that partnership quality—characterized by structural integration, communication intensity, and comprehensive implementation—surpasses partnership quantity in determining outcomes. The identification of adaptive responses to structural constraints illuminates how resourceful institutions overcome regional limitations through strategic innovation, offering empirical evidence supporting policy emphasis on link and match approaches while identifying implementation challenges requiring targeted intervention.

CONCLUSION

This study demonstrates that systematic link and match management, operationalized through Robbins and Coulter's (2009) management functions—planning, organizing, implementing, and evaluating—significantly enhances vocational school graduate employability. Findings from SMK Negeri 2 Cilaku and SMK Negeri 1 Cikalongkulon reveal that early industry involvement in planning, integrated organizational structures facilitating frequent communication, comprehensive implementation of eight link and match pillars, and participatory evaluation mechanisms collectively contribute to achieving 68-74% graduate employment absorption within six months. The study advances vocational education literature by demonstrating that partnership quality—characterized by structural integration, communication intensity, and BNSP-certified competency verification—matters more than partnership quantity in determining employability outcomes. Additionally, the research illuminates adaptive responses to structural constraints, including on-campus production facilities and industry association partnerships, offering insights for resource-constrained institutions. Practically, findings suggest that vocational schools should prioritize measurable collaboration targets, nationally recognized certification access, and stakeholder-inclusive evaluation processes, while policymakers must provide targeted support for certification infrastructure and regional industry network development. This research acknowledges limitations including case study transferability constraints, temporal specificity, reliance on self-reported data, absence of control group comparisons, and unmeasured employment quality dimensions. Future research should employ longitudinal designs examining career progression trajectories, quasi-experimental methods comparing Center of Excellence with non-Center of Excellence schools, quantitative analyses identifying specific link and match components most predictive of employment outcomes, and investigations of entrepreneurial pathway development through vocational education. By bridging management theory with education-employment linkage concepts, this study contributes empirical evidence supporting systematic school-industry collaboration as a viable strategy for producing job-ready graduates aligned with Fourth Industrial Revolution workforce demands.

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