

Revitalizing Vocational Education in Indonesia: Implementation of Link and Match Program and Its Impact on the Graduates Quality

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Abstract

Vocational education in Indonesia faces ongoing challenges in aligning the competencies of vocational high school graduates with industry requirements, highlighting a persistent gap between policy formulation and practical implementation. This study investigates the implementation of link-and-match-based vocational education revitalization and its effects on the quality of vocational high school graduates. A qualitative narrative literature review and policy document analysis were conducted using 20 sources, including 14 scholarly articles and six official documents, four of which are Indonesian vocational policy documents. Sources were identified through searches of scholarly databases and official repositories, and were screened for relevance to vocational policy implementation, school–industry partnerships, regulatory governance, and graduate outcomes. Data analysis employed thematic policy analysis and cross-source synthesis, involving data reduction, thematic categorization, interpretation using Edwards III's policy implementation framework, and synthesis across sources. The analysis indicates a shift from SMK-specific revitalization toward an integrated vocational governance framework encompassing labor-market planning, competency alignment, work-based learning, quality assurance, coordination, and funding. Nevertheless, implementation remains inconsistent due to variations in policy communication, practical facilities, teacher competence, institutional resources, industry access, stakeholder commitment, and bureaucratic coordination. Link and match is found to enhance graduates' technical competencies, non-technical skills, and work readiness more effectively when school–industry partnerships are structured, sustained, and integrated into curriculum development, instruction, assessment, and recruitment. This study advances the conceptualization of link and match as a multidimensional policy implementation process that requires coordinated support from the entire vocational education ecosystem, rather than merely curriculum alignment or administrative cooperation.

Keywords: graduate quality, link and match, policy implementation, school–industry partnership, vocational education,

Introduction

Vocational education occupies a pivotal position in human resource development policies, primarily because it focuses on cultivating graduates with the requisite skills, productivity, and competitiveness aligned with evolving economic and technological demands. Policies aimed at revitalizing vocational education in Indonesia are strategically formulated to enhance access, quality, relevance, alignment with labor-market needs, quality assurance, stakeholder coordination, and funding (Coordinating Ministry for Human Development and

Cultural Affairs., 2022a; 2022b; Republic Indonesia, 2016) This strategic orientation supports the broader national agenda to enhance competitiveness, which considers vocational education, higher education, government synergy, industry partnerships, and incentive frameworks as integral components of strengthening Indonesia's human capital (Indrawati & Kuncoro, 2021). Within this framework, the "link and match" policy has emerged as a fundamental normative principle, emphasizing the alignment of educational curricula with the needs of the business and industrial sectors. Active industry involvement is essential for aligning curricula, developing competencies, fostering work-culture-based learning, and assessing student outcomes (Yoto et al., 2024). Globally, the transformation of technical and vocational education and training (TVET) is recognized as a comprehensive process that demands enhanced governance, the establishment of lifelong learning pathways, and ongoing engagement from employers and social partners (Unesco, 2022).

While policies aimed at revitalizing vocational education are grounded in regulatory and programmatic frameworks, empirical observations reveal a gap between policy aspirations and actual implementation outcomes. Research on the operationalization of "link and match" initiatives within vocational high schools (SMK) suggests that industry-class policies have the potential to improve learning quality, skill competencies, and graduate employability, contingent upon active engagement and commitment from industry stakeholders, associations, and governmental bodies (Saryadi et al., 2024). Several strategic approaches to vocational education have been explored for preparing graduates for the Society 5.0 era, including enhancing quality through competency certification examinations (Nafista et al., 2026). Recent policy analysis also indicates that technological and artificial intelligence disruption requires more adaptive vocational curricula and stronger institutional readiness (Muis et al., 2025). Nonetheless, evidence also indicates that Indonesian vocational education graduates do not consistently experience higher wages or improved working conditions relative to their counterparts from general education, especially when issues related to program quality and regional disparities remain insufficiently addressed (Choi et al., 2024). Official labor-market data underscore the challenges associated with implementation. In February 2022, Indonesia's overall open unemployment rate was 5.83%, whereas vocational high school graduates experienced the highest unemployment rate among educational groups at 10.38% (Republik Indonesia, 2022). International evidence further demonstrates that industry linkage enhances graduate employability only when curriculum relevance, institutional coordination, adequate resources, quality assurance, and sustained stakeholder participation are addressed collectively (Kebede et al., 2024). Consequently, the quality of graduates from vocational high schools (SMK) constitutes a critical focal point for analysis within the framework of vocational revitalization policies grounded in the principles of "link and match".

Previous policy-analysis studies have identified communication challenges, limited access to quality vocational services, shortages of qualified teachers, inadequate facilities, and weak stakeholder coordination as barriers to effective vocational policy implementation (Muharam & Afrilia, 2025). Research on partnership management has highlighted the importance of planning, implementation, monitoring, coordination, and evaluation in preparing vocational graduates for employment (Mahmudah, 2022). International studies indicate that vocational reform is influenced by complex policy networks that include government, educational institutions, industry actors, and supporting infrastructures (Hardy & Liu, 2022). Comparative evidence further identifies the integration of teaching and practice, multi-skilling, teacher development, and policy reform as key directions for vocational reform (Zhao & Selvaratnam, 2024). However, these studies typically address policy networks, reform directions, partnership management, or regional implementation barriers in isolation. They do

not sufficiently explain how regulatory design, implementation capacity, school–industry relations, and uneven graduate outcomes interact within a unified policy implementation framework in Indonesia. This gap in the literature constitutes the research problem addressed in the present study.

This research utilizes George C. Edwards III’s policy implementation framework, which attributes policy effectiveness to communication, resources, implementers’ dispositions, and bureaucratic structures (Edwards III, 1980). This framework is particularly relevant because link-and-match-based vocational revitalization requires coordination among central and local governments, vocational schools, teachers, industry partners, and certification agencies. In contrast to previous studies that address policy networks, vocational reform directions, industry-linkage mechanisms, or regional implementation barriers in isolation, this research integrates regulatory design, implementation conditions, stakeholder relationships, and disparities in graduate quality within a unified analytical framework. The study’s contribution is to conceptualize link and match not solely as curriculum alignment or administrative cooperation, but as a multidimensional policy implementation process. Therefore, this research investigates how link-and-match-based vocational revitalization policies are constructed and implemented, and explores the reasons why their implementation has not consistently resulted in equitable improvements in vocational high school graduate quality.

Metode

A qualitative narrative literature review and policy document analysis were conducted to investigate the construction and implementation of link-and-match-based vocational education revitalization and its association with the quality of vocational high school graduates in Indonesia. The literature review synthesized empirical and conceptual evidence regarding vocational policy implementation, school–industry partnerships, and graduate outcomes. The policy document analysis focused on the objectives, institutional mandates, implementation instruments, and governance structures outlined in Indonesian vocational regulations. The analysis was grounded in George C. Edwards III’s policy implementation framework, emphasizing communication, resources, implementers’ dispositions, and bureaucratic structures.

The scholarly literature search was conducted from April to May 2026 using Google Scholar, GARUDA, Dimensions, and Crossref. Combinations of Indonesian and English keywords were employed, including “vocational education revitalization,” “link and match,” “vocational policy implementation,” “school–industry partnership,” “Vocational High School Centers of Excellence,” “Teaching Factory,” “vocational graduate quality,” “revitalisasi pendidikan vokasi,” “kebijakan link and match,” “kemitraan SMK dan industri,” and “mutu lulusan SMK.” The search focused on scholarly publications issued between 2021 and May 2026, while additional relevant studies were identified through reference-list screening. Indonesian policy documents were identified separately through targeted searches of official government legal-document repositories. The policy corpus comprised Presidential Instruction No. 9 of 2016, Presidential Regulation No. 68 of 2022, Coordinating Ministerial Regulation No. 5 of 2022, and Coordinating Ministerial Regulation No. 6 of 2022.

Scholarly sources were included if they (1) addressed vocational education in Indonesia or offered relevant international perspectives on technical and vocational education and training (TVET) policy implementation and school–industry partnerships; (2) discussed vocational policy, link-and-match implementation, school–industry collaboration, vocational reform, or graduate quality; (3) were published between 2021 and May 2026; (4) were

available in full text in Indonesian or English; and (5) provided evidence pertinent to the research questions and analytical framework. Sources were excluded if they were duplicates, unrelated to vocational policy implementation or graduate outcomes, unavailable in full text, or lacked sufficient analytical information. Policy documents were included if they directly established objectives, mandates, coordination arrangements, implementation mechanisms, or national strategies for vocational education revitalization. Foundational regulations issued before 2021 were retained if they remained essential for tracing the development of the policy framework. The database search initially identified 129 scholarly records. Following duplicate removal, title and abstract screening, relevance assessment, and full-text examination, 14 scholarly articles were retained. Additionally, six official sources—comprising one official statistical source, one international TVET strategy, and four Indonesian policy documents—were purposively included, resulting in a final corpus of 20 sources.

A structured document analysis matrix was employed for data extraction. For scholarly articles, the matrix captured source identity, research context, program or policy focus, mechanisms of school–industry partnership, implementation barriers, graduate-quality indicators, and principal findings. For policy documents, the matrix included the legal basis, policy objectives, responsible institutions, implementation instruments, coordination structures, resource provisions, industry roles, quality-assurance mechanisms, monitoring requirements, and anticipated implications for graduate quality. For the official statistical source, the matrix documented the survey period, indicator definitions, disaggregation by educational attainment, and the relative position of vocational high school graduates compared to other educational groups. The extracted evidence was subsequently organized into three principal themes: vocational education revitalization, link-and-match implementation, and the quality of vocational high school graduates.

The analysis of evidence followed four distinct stages. Initially, relevant statements, findings, policy mandates, and implementation mechanisms were extracted in alignment with the research questions. Subsequently, the evidence was coded into recurring categories, such as curriculum alignment, labor-market information, work-based learning, teacher capacity, facilities, competency certification, industry participation, institutional coordination, monitoring, and graduate outcomes. In the third stage, these categories were interpreted using Edwards III's dimensions of communication, resources, implementers' dispositions, and bureaucratic structures. Finally, evidence from scholarly studies, official statistics, the UNESCO strategy, and Indonesian policy documents was synthesized across sources. Convergent evidence was used to identify common implementation patterns, while discrepancies between normative policy provisions and reported empirical outcomes were maintained to elucidate the gap between policy design and graduate quality.

The credibility of the analysis was enhanced through source triangulation and systematic documentation of the review process. Policy provisions were systematically compared across four Indonesian regulations to identify continuity, expansion, and changes within the vocational governance framework. These normative provisions were then evaluated against national and international research as well as official statistical evidence to determine whether reported implementation conditions aligned with the intended policy mechanisms. An audit trail was established using search records, screening criteria, source-selection notes, a document analysis matrix, coding categories, and analytical memos. The analysis explicitly differentiated between policy prescriptions and empirical evidence to ensure that regulatory intentions were not misconstrued as evidence of successful implementation.

Results

A thematic matrix was employed to analyze the 20 selected sources. Initial categories, based on the research questions, included vocational education revitalization, link-and-match implementation, and graduate quality. These categories were refined by identifying recurring patterns, similarities, and differences across the sources. Evidence was synthesized through cross-source comparison, with convergent findings identified as common patterns and divergent findings retained to explain variations in policy implementation. This approach produced three analytical themes: the direction and implementation of vocational education revitalization, the depth of link-and-match partnerships, and the determinants of vocational graduate quality. The themes were interpreted using Edwards III's dimensions of communication, resources, implementers' dispositions, and bureaucratic structures.

Revitalization of Vocational Education

The cross-source synthesis showed that vocational education revitalization was consistently framed as an effort to align education with technological development and labor-market needs. The selected sources converged on four major policy directions: improving curriculum relevance, strengthening practice-based learning, expanding industry participation, and reinforcing competency assurance. However, the evidence also revealed that these directions were implemented unevenly because schools differed in institutional capacity, practical facilities, teacher readiness, and access to industry partners. Vocational revitalization therefore emerged not merely as a collection of national programs, but as a policy process whose outcomes depend on the capacity of schools and stakeholders to translate policy objectives into learning practices. This pattern is consistent with international evidence emphasizing governance reform, the integration of teaching and practice, teacher development, and institutional responsiveness in vocational education transformation (Unesco, 2022; Zhao & Selvaratnam, 2024).

Analysis of policy documents indicates a progressive expansion of Indonesia's vocational governance framework. Presidential Instruction No. 9 of 2016 established a revitalization agenda for vocational high schools (SMK) through curriculum alignment with graduate-user needs, labor-demand mapping, teacher development, fieldwork placements, Teaching Factories, competency standards, certification, and differentiated regional responsibilities. Presidential Regulation No. 68 of 2022 subsequently broadened this agenda into an integrated system of vocational education and training, encompassing labor-market information, competency-based provision, curriculum and industry alignment, quality assurance, regional implementation, monitoring, evaluation, and funding. Coordinating Ministerial Regulation No. 5 of 2022 institutionalized the governance structure by establishing the National Coordination Team, its implementing team, sectoral working groups, and divisions responsible for standards, research and innovation, institutions, and industry cooperation. Coordinating Ministerial Regulation No. 6 of 2022 further operationalized the framework into a national strategy that addresses implementation, quality assurance, stakeholder roles, financing, regulation, monitoring, evaluation, and an action plan. Collectively, these documents illustrate a transition from sector-specific instructions to a more integrated and coordinated vocational governance architecture (Republic of Indonesia, 2016, 2022; Coordinating Ministry for Human Development and Cultural Affairs, 2022a, 2022b).

Analysis of the four policy documents indicates that a link and match was established through a set of interconnected instruments rather than a single partnership program. These instruments comprise labor-market mapping, curriculum and competency-standard alignment, student fieldwork placements, teacher and instructor internships, Teaching Factories, industry

participation in facilities and learning, competency certification, graduate tracking, and both national and regional coordination. The policy design positions industry as a partner in planning, learning, assessment, certification, and workforce transition. However, the documents specify the expected roles and mechanisms without providing evidence of effective implementation. The impact on graduate quality remains contingent upon the availability of qualified teachers, sufficient facilities, regional funding, reliable labor-market information, sustained industry engagement, and coordination across administrative levels.

Applying Edwards III's framework, the regulations exhibit robust formal communication through policy mandates, national strategies, coordination teams, reporting mechanisms, and labor-market information systems. The regulations also specify essential resources, such as teachers, industry practitioners, facilities, competency standards, certification systems, and both public and non-governmental funding. However, the dispositions of implementers remain crucial, as many mechanisms rely on the active participation of ministries, regional governments, KADIN, industry associations, and individual companies. Although the bureaucratic structure became more clearly institutionalized after 2022, the participation of numerous national, sectoral, and regional actors may increase coordination complexity. Therefore, the principal regulatory paradox lies not in the absence of implementation instruments, but in the risk that a comprehensive national framework generates uneven outcomes when institutional capacity and industry access vary across schools and regions.

Multiple sources indicate that the comprehensive regulatory framework has not resulted in consistent implementation across schools and regions. While certain vocational schools have established substantive industry partnerships, others are limited by inadequate facilities, insufficient numbers of qualified teachers, and restricted industry networks. These disparities suggest that graduate quality is influenced primarily by institutional capacity rather than by policy adoption alone (Maharani et al., 2024). Table 1 summarizes the relationship between the Indonesian regulatory framework, its implementation instruments, and the expected implications for graduate quality.

Table 1. Summary of Findings on the Revitalization of Link-and-Match-Based Vocational Education

Aspect	Policy or Program	Key Finding	Relationship to Vocational Graduate Quality
Vocational Education Regulations	Presidential Instruction No. 9 of 2016; Presidential Regulation No. 68 of 2022; Coordinating Ministerial Regulations Nos. 5 and 6 of 2022	The framework evolved from SMK-specific revitalization toward an integrated system covering labor-market planning, competency standards, industry alignment, quality assurance, coordination, regional implementation, monitoring, and funding.	The regulations provide mechanisms for improving relevance and competence, but their effects depend on school resources, regional capacity, industry participation, and implementation coordination.
Vocational School Programs	Centers of Excellence for Vocational High	Vocational programs are designed to expose students to real-world	Graduates are likely to possess stronger technical

	Schools, Teaching Factories, industry- linked classes, on- the-job training, and competency certification	work experiences through practice-based learning and industry standards	competencies and practical experience if the programs are implemented consistently
School- Industry Partnershi ps	Curriculum alignment, student internships, teacher internships, industry guest lecturers, joint assessments, and graduate recruitment	Structured partnerships help schools understand industry needs and enrich students' learning experiences	Graduates' employability improves when collaboration goes beyond administrative matters to encompass the learning process
Implement ation Challenges	Limited practical training facilities, varying teacher capabilities, weak school-industry communication, and disparities in industry access	Not all vocational high schools have the same resources and industry networks, resulting in uneven policy implementation	The quality of vocational high school graduates varies because schools have different implementation capabilities
Policy Paradoxes	Vocational education policies are robust in terms of regulations, but graduate outcomes remain uneven	The gap between policy design and on-the- ground implementation is still evident in the variation in graduate quality and work readiness	Revitalizing vocational education will not automatically resolve issues regarding graduate quality without strengthening governance

Collectively, the evidence presented in Table 1 demonstrates a sequential relationship among policy direction, implementation mechanisms, and graduate outcomes. Regulations and vocational programs establish the intended trajectory of reform; however, their impact on graduate quality is mediated by institutional resources and the extent of school–industry collaboration. The sources consistently indicate that active industry partnerships, sufficient practical facilities, and qualified teachers contribute to stronger graduate competencies. Nevertheless, the availability of these conditions varies across schools and regions. This synthesis clarifies why comparable national policies may yield divergent outcomes at the institutional level.

Link and Match

The cross-source comparison showed that link and match operated along a continuum from administrative cooperation to pedagogical integration. At the administrative level, partnerships were generally limited to memoranda of understanding and internship placement. More substantive forms of collaboration included curriculum co-development, industry guest instructors, workplace-based projects, joint competency assessments, certification, and graduate recruitment. Evidence from the selected studies suggested that the stronger forms

of collaboration were more closely associated with graduate work readiness because industry participated directly in the learning and assessment processes. Link-and-match was synthesized as a continuing partnership process rather than a single program or formal agreement. International evidence supports this interpretation by framing industry linkage as a collaborative process encompassing qualification standards, curriculum development, workplace training, apprenticeships, and graduate transition to employment (Kebede et al., 2024).

Research indicated that the effectiveness of link-and-match programs is significantly enhanced through the establishment of structured partnerships between educational institutions and industry stakeholders. Such partnerships are characterized by collaborative planning, clearly delineated roles and responsibilities, the integration of practical training activities, and systematic evaluation of student learning outcomes. A study examining the preparedness of vocational high school graduates for workforce integration found that the partnership framework encompasses planning, organization, implementation, monitoring, coordination, and evaluation (Mahmudah, 2022). Additionally, empirical data suggest that industry support is vital for enriching students' experiential learning, particularly through hands-on training in real-world environments. In certain contexts, incorporating industry-based classes and work placements can create experiences that more closely mirror corporate standards and practices. The findings further underscore that industry involvement extends beyond providing internship opportunities; it also serves as a collaborative partner in the development of students' competencies and skill sets.

Cross-source evidence showed that variations in the depth of school–industry collaboration directly contributed to uneven graduate outcomes. Multiple studies suggested that interactions between educational institutions and industry have often lacked substantive engagement, remaining predominantly at an administrative level and failing to integrate into the learning process. Empirical findings on the implementation of vocational education across various regions highlight ineffective communication channels, challenges in establishing and maintaining industry partnerships, discrepancies between vocational curricula and the actual work tasks encountered during internships, and limited internship placement durations (Maharani et al., 2024). These observations indicated that while the policy emphasizes linkages and matches, its implementation often fails to foster robust, meaningful relationships between schools and industry partners. Consequently, the issue of graduate quality from vocational high schools is contingent not solely on the existence of cooperative arrangements but also on the quality, intensity, and sustainability of such partnerships. Table 2 summarizes the cross-source synthesis of the main factors linking vocational policy implementation, industry partnerships, and graduate quality.

Table 2. Cross-Source Synthesis of Vocational Education Implementation

Analytical theme	Synthesized finding	Key sources
Policy and governance	TVET reform requires coordinated policies, institutional networks, teacher development, and responsive governance. Differences in implementation capacity produce uneven outcomes.	(Republic of Indonesia (2016, 2022); Coordinating Ministry for Human Development and Cultural Affairs (2022a, 2022b); UNESCO (2022))

Industry linkage	Curriculum alignment, internships, workplace learning, joint assessment, and shared responsibility strengthen practical competence and school-to-work transition.	(Kebede et al., 2024; Mahmudah, 2022; Saryadi et al., 2024)
Implementation conditions	Facilities, teacher competence, communication, resources, and stakeholder coordination determine whether link and match becomes substantive or remains administrative.	(Maharani et al., 2024; Muharam & Afrilia, 2025)
Graduate outcomes	Vocational participation does not automatically guarantee employability, higher wages, or better working conditions; outcomes depend on program quality and employment access.	(Choi et al., 2024; Putra, 2023)

Table 2 shows that graduate quality is shaped by the interaction of policy governance, institutional capacity, and the depth of industry involvement. Across the sources, stronger outcomes were associated with relevant curricula, workplace learning, competent teachers, adequate resources, and sustained coordination. However, vocational programs did not automatically produce better employment outcomes when these implementation conditions were weak.

Quality of Vocational High School Graduates

Evidence concerning graduate quality was synthesized into four interconnected dimensions: technical competence, non-technical competence, practical experience, and employment readiness. The sources did not treat these dimensions as separate outcomes. Instead, they indicated that technical skills were strengthened through relevant curricula, practical facilities, and industrial training, while non-technical competencies developed through teamwork, workplace discipline, communication, and adaptation to industrial culture. Employment readiness emerged from the interaction of these dimensions rather than from academic completion alone. The synthesis therefore indicates that graduate quality is shaped by the overall learning ecosystem and the extent to which school-based learning reflects actual workplace conditions.

Official statistical evidence underscores the importance of labor-market absorption as an indicator of graduate quality. In February 2022, the national open unemployment rate was 5.83%, while vocational high school graduates exhibited the highest unemployment rate among educational groups at 10.38% (Badan Pusat Statistik, 2022). Although these figures do not establish a direct causal relationship between vocational policy implementation and unemployment, they indicate that vocational education credentials alone are insufficient for successful labor-market transition. This finding highlights that graduate outcomes are influenced by program quality, practical learning opportunities, industry access, certification, and institutional implementation capacity.

Findings from the existing literature suggested that the availability of practical training facilities significantly influences the quality of vocational high school graduates, the engagement of vocational educators, the presence of competency certification, and ongoing collaborations with industry stakeholders. Research on vocational education and decent work in Indonesia indicated that secondary vocational education graduates do not consistently attain higher wages or improved working conditions than their counterparts with general education, except in contexts where sufficient support for on-the-job training and employment access is provided (Choi et al., 2024). These findings implied that graduate quality is inherently linked to the overall effectiveness of vocational education delivery. Multiple studies identify industrial

internship experiences and competency certifications as crucial indicators of graduates' preparedness for workforce integration. Nonetheless, achieving these indicators depended on schools' capacity to offer relevant curricula, adequate facilities, and sustainable partnerships with industry.

Integrating the three themes revealed that differences in graduate quality originated from the interaction between policy design, implementation capacity, and the depth of school–industry partnerships. The sources consistently showed that national policies had established a clear direction for vocational revitalization, but schools differed in their ability to provide relevant curricula, practical facilities, competent teachers, industrial placements, and competency certification. Consequently, the existence of link-and-match policies did not automatically produce equivalent graduate outcomes. The analytical synthesis demonstrates that graduate quality is an implementation outcome shaped by communication, resources, stakeholder commitment, and institutional coordination rather than by regulatory design alone.

Discussion

The findings demonstrate that link-and-match-based vocational education revitalization has established a clear policy direction but has not produced equally strong outcomes across vocational schools. This study agrees with the general view that programs such as Vocational High School Centers of Excellence, Teaching Factories, industry-based classes, fieldwork placements, and competency certification can strengthen the relevance of vocational learning. However, this agreement is conditional. The synthesized evidence indicates that these programs improve graduate quality only when schools possess adequate facilities, competent teachers, active industry partners, and effective coordination mechanisms. The researcher therefore rejects the assumption that the existence of policies and programs alone is sufficient to ensure graduate quality. The central argument of this study is that graduate outcomes are determined by the interaction between policy design, implementation capacity, and the depth of school–industry collaboration.

The present study supports the findings of Saryadi et al. (2024) who demonstrated that industry-based classes can enhance student competence and graduate employability when supported by industry, professional associations, and government commitment. The current results further confirm that direct industry involvement strengthens practical learning and facilitates students' transition into employment. However, this study extends previous conclusions by contending that industry-based classes should not be regarded as an independent determinant of graduate quality. Their effectiveness is contingent upon curriculum alignment, teacher preparedness, adequate practical facilities, robust assessment systems, and sustained industry participation. In the absence of these conditions, industry-based classes may function merely as symbolic programs with limited impact on learning outcomes.

This study also partially concurs with Riyanto et al. (2025), who highlight the role of Teaching Factories, hybrid training, Learning Management Systems, Enterprise Resource Planning, and pentahelix collaboration in enhancing graduate readiness for the industry 4.0 era. These mechanisms can offer vocational students more relevant and technology-oriented learning experiences. However, the present findings refine this perspective by asserting that technological and programmatic innovations cannot compensate for disparities in institutional capacity. Teaching Factories and digital systems yield limited benefits when schools lack qualified instructors, sufficient operational funding, industrial partnerships, or appropriate

infrastructure. Consequently, program innovation should be accompanied by equitable resource allocation and comprehensive implementation support.

Table 3. Comparison of Research Findings with Previous Literature

Theme/Program	Finding	Previous Study	Relevance
Vocational Education Revitalization	Vocational revitalization is directed through industry partnerships, Teaching Factories, industry-based classes, workplace training, and competency certification.	Muharam & Afrilia (2025) emphasize co-design, co-teaching, co-training, co-assessment, and co-recruitment in integrating vocational education and industry.	This study agrees with industry integration but places greater emphasis on differences in schools' implementation capacity.
Link and Match	Link and match should extend beyond administrative cooperation to curriculum alignment, practical learning, assessment, and graduate recruitment.	Saryadi et al. (2024) show that industry-based classes can strengthen competence and employability when supported by industry and government commitment.	This study agrees with their findings but argues that effectiveness depends on the depth and continuity of collaboration.
School-Industry Partnerships	Structured partnerships enrich learning and help schools respond to industry needs.	Mahmudah (2022) emphasize planning, implementation, monitoring, coordination, and evaluation in partnership management.	This study agrees that partnerships should be managed as a continuous process rather than as formal agreements alone.
Teaching Factory	Teaching Factories help align vocational learning with workplace environments, but their success depends on facilities, teacher competence, and industry engagement.	Riyanto et al. (2025) identify Teaching Factories and technology-supported training as mechanisms for improving work readiness.	This study agrees with their potential contribution but emphasizes the need for broader ecosystem support.
Quality of Graduate quality		Choi et al. (2024)	This study positions

Vocational High School Graduates	remains uneven because schools differ in implementation capacity and industry access.	show that vocational graduates do not automatically obtain better labor-market outcomes than general education graduates.	graduate quality as an implementation outcome rather than an automatic consequence of vocational education.
Graduates' Employability	Employability improves through relevant workplace learning, active partnerships, appropriate facilities, and industry-standard assessment.	Putra (2023) argues that TVET can bridge education and employment when vocational institutions are adequately strengthened.	This study agrees but extends employability to include adaptability, critical thinking, ethics, and long-term professional capacity.

Table 3 demonstrates general alignment with previous research on the significance of school–industry collaboration, practice-oriented learning, and graduate employability. However, explanations attributing graduate quality primarily to the existence of specific vocational programs are not fully supported. Cross-source synthesis reveals that identical programs may yield varying outcomes due to differences in school resources, teacher competence, partnership intensity, and bureaucratic support. Consequently, vocational graduate quality is positioned as an implementation outcome rather than a direct result of program participation. This perspective advances prior studies by integrating regulations, implementation conditions, stakeholder relationships, and employment outcomes within a unified policy-analysis framework.

The findings from policy documents support Edwards III's argument that policy effectiveness is determined by communication, resources, implementers' dispositions, and bureaucratic structures. With respect to communication, the Indonesian regulatory framework outlines policy directions through the SMK development roadmap, labor-demand mapping, a national vocational strategy, labor-market information, coordination mechanisms, and periodic reporting. In terms of resources, the regulations specify teachers, industry practitioners, practical facilities, competency standards, certification systems, and both national and regional funding as essential for implementation. The dispositions of implementers are critical, as curriculum alignment, workplace learning, certification, infrastructure support, and graduate recruitment rely on the sustained commitment of ministries, regional governments, KADIN, professional associations, and industry partners. Bureaucratic structures have been reinforced through the creation of the National Coordination Team, implementing divisions, sectoral working groups, and regional coordination teams (Republic of Indonesia, 2016, 2022; Coordinating Ministry for Human Development and Cultural Affairs, 2022a, 2022b). This study advances Edwards III's framework by highlighting the dynamic interaction among these dimensions. Resource disparities can undermine stakeholder commitment, while fragmented communication may diminish the effectiveness of an otherwise comprehensive coordination structure. Consequently, disparities in graduate quality result from the cumulative interaction of policy dimensions rather than from a single implementation barrier.

This analysis challenges the regulatory direction established in the four policy documents, recognizing that vocational quality depends on curriculum relevance, teacher competence, workplace learning, certification, industry participation, and coordinated governance. However, this concurrence is conditional. The study rejects the assumption that regulatory completeness necessarily indicates successful implementation. While the policy documents outline expected responsibilities and mechanisms, they do not provide direct evidence that all vocational schools have equal resources, industry access, teacher capacity, or regional support. Consequently, the regulatory framework should be viewed as an implementation architecture whose effectiveness requires evaluation through empirical evidence.

Consistent with Putra (2023), this study finds that Technical and Vocational Education and Training can reduce the gap between education and employment by equipping young people with relevant occupational competencies. Robust vocational institutions may enhance employability and support graduates' long-term competitiveness. However, this study challenges the assumption that alignment with immediate labor-market demand should serve as the sole criterion for vocational success. Overemphasis on short-term job placement risks narrowing vocational education to the preparation of workers for current industrial needs. It is argued that the link-and-match approach should also foster adaptability, critical thinking, professional ethics, entrepreneurship, and the capacity to respond to technological and occupational change. Therefore, graduate quality should encompass both employment readiness and long-term professional adaptability.

The findings challenge the assumption with Maharani et al. (2024) that communication problems, limited access to quality vocational services, teacher shortages, and weak stakeholder coordination contribute to the gap between policy and implementation. These empirical problems contrast with the relatively comprehensive institutional arrangements established by the Indonesian regulations. The policies assign responsibilities for curriculum alignment, teacher provision, workplace learning, certification, funding, regional coordination, and monitoring, but empirical evidence indicates that these responsibilities are not implemented with equal capacity across schools and regions. This study therefore extends Maharani's regional analysis by identifying a broader regulatory paradox: the policy framework is increasingly integrated, while implementation capacity remains institutionally and geographically uneven. Accordingly, implementation failure should not be attributed solely to individual schools but also to variations in regional resources, industry concentration, administrative support, and interinstitutional coordination.

Consistent with the findings of Muharam & Afrilia (2025), effective integration of vocational education and industry should be developed through co-design, co-teaching, co-training, co-assessment, and co-recruitment. These collaborative mechanisms offer a more robust foundation for aligning educational outcomes with industry needs than partnerships limited to memoranda of understanding or internship placements. This study extends the existing approach by emphasizing that industry participation must remain accountable to educational objectives. While industry partners should enhance curriculum relevance and facilitate authentic workplace learning, schools and government agencies must ensure that educational goals are not subordinated to immediate corporate labor demands. A balanced governance model is therefore essential, integrating national competency standards, regional adaptation, industrial participation, and the overarching educational mission of cultivating adaptable, ethical, and socially responsible graduates.

The integration of regulatory and empirical evidence represents a significant contribution of this research. While previous studies typically focus on individual programs,

school–industry partnerships, or regional implementation barriers, the present analysis examines the evolution of Indonesia’s policy framework from an SMK-specific revitalization directive to a comprehensive national vocational governance system. The findings indicate that link and match is institutionally established through labor-market planning, curriculum and competency alignment, work-based learning, teacher development, quality assurance, certification, coordination, and graduate tracking. Accordingly, this study conceptualizes link and match as both a pedagogical partnership and a governance mechanism. Its effectiveness should be evaluated not only by the presence of programs or formal agreements but also by the ability of institutions to implement regulatory mandates that yield consistent learning and employment outcomes.

The primary limitations of this research stem from its reliance on literature review and policy document analysis. As a result, the findings do not directly reflect the lived experiences of key stakeholders, such as school principals, vocational educators, students, graduates, industry representatives, and local government officials. These constraints do not undermine the study's overall significance but rather underscore areas requiring further scholarly investigation. Future research could adopt a comparative case study methodology across different regions to analyze the implementation of link and match initiatives in vocational high schools (SMK) in technologically advanced areas, developing regions, and zones with limited industrial infrastructure. Additionally, subsequent studies might empirically assess the impact of Teaching Factories, industry-based classes, competency certification, and internship programs on graduates' career trajectories. Such approaches would facilitate a transition from normative policy analysis to an evidence-based understanding of policy functioning, identify beneficiaries and marginalized groups, and explore avenues to enhance the quality of SMK graduates in a manner that is both equitable and sustainable. Further investigations employing cross-regional field data were recommended to systematically map variations in implementation processes, school experiences, industry engagement, and employment outcomes among graduates, thereby enriching the empirical foundation of vocational education studies.

Conclusion

This study advances vocational education policy research by illustrating the evolution of Indonesia’s vocational framework from an SMK-specific revitalization directive to a comprehensive governance structure that includes labor-market planning, competency standards, industry alignment, quality assurance, national and regional coordination, monitoring, and funding. The primary contribution is integrating this regulatory evolution with empirical data on school capacity, industry partnerships, and graduate outcomes. The findings indicate that graduate quality does not result automatically from regulatory expansion or program participation; rather, it emerges from the interplay of policy communication, institutional resources, stakeholder commitment, and bureaucratic coordination.

Conceptually, this study reframes link and match from a curriculum-alignment initiative to a multidimensional policy implementation process. In practical terms, it recommends that policy evaluation extend beyond quantifying programs, formal agreements, or participating schools, and instead assess the substantive quality of workplace learning, teacher competence, industry involvement, certification, regional support, and graduate transition outcomes. While the policy framework is comprehensive, differentiated implementation support remains essential for schools with limited resources and restricted industry access. Given the reliance on literature and policy document analysis, further comparative field

research is required to investigate how the regulatory framework functions across schools and regions with varying institutional and industrial contexts.

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