

Evaluating Automotive Vocational Education via the Link and Match 8+i Model in Indonesia

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ABSTRACT

This study evaluates the implementation of the 'Link and Match 8+i' vocational policy within the Light Vehicle Automotive Engineering programs at SMKN 3 and SMKN 5 Makassar, Indonesia. Employing Stufflebeam's Context, Input, Process, and Product (CIPP) evaluation model, an explanatory sequential mixed-methods design examined structural alignment, resource readiness, operational fidelity, and educational outcomes. The study involved 164 respondents selected via proportional random sampling from a total population of 267. Data were collected through documentation, semi-structured interviews, and validated questionnaires ($\alpha = 0.965$ for process, $\alpha = 0.964$ for product), analyzed using descriptive statistics and thematic analysis. Context evaluation confirmed robust policy backing and active industrial partnerships. Input evaluation demonstrated strong curricular and human resource readiness, alongside persistent infrastructural bottlenecks in workshop facilities and teaching factory deployment. Process evaluation revealed high operational fidelity, with 86.4% of respondents rating implementation as highly appropriate, while product evaluation indicated strong competency attainment. However, discrepancy analysis highlighted a critical paradox: despite high stakeholder satisfaction and skill acquisition, regional labor market placement remains constrained. These findings offer actionable insights for policy re-alignment to bridge the gap between educational performance and graduate employability in developing economies.

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1. INTRODUCTION

Education serves as the primary catalyst for human capital formation, national productivity, and socioeconomic mobility in contemporary knowledge-based economies (Mojsoska & Vrateovska, 2021). Within the Indonesian national educational architecture, Vocational High Schools occupy a strategic position designed to furnish students with applied technical competencies, professional ethics, and workforce readiness (Erlinda et al., 2021; Wismansyah et al., 2024). Vocational education

inherently bridges theoretical instruction and practical application, aiming to cultivate autonomous professionals capable of navigating dynamic career pathways (Iliescu et al., 2025).

The accelerating velocity of technological disruption driven by Industry 4.0 and Society 5.0 paradigms necessitates profound structural agility in vocational training systems (Riyanto et al., 2025; Spöttl et al., 2026). Modern industries demand multi-skilled workforce cohorts possessing advanced technical proficiency, digital literacy, problem-solving acumen, and adaptability (Kamaruzaman et al., 2025). Notwithstanding these imperatives, structural mismatch remains a persistent vulnerability across developing economies, where vocational curricula frequently lag rapid industrial innovations, culminating in structural unemployment and labor market friction (Ohara et al., 2020).

Recognizing this systemic friction, the Indonesian government enacted Presidential Instruction Number 9 of 2016 concerning the revitalization of Vocational High Schools through the 'Link and Match' framework. This policy mandates deep, organic synergy between educational institutions and the Business and Industrial World (*Dunia Usaha dan Dunia Industri/DUDI*). Building upon foundational iterations, the Ministry of Education, Culture, Research, and Technology promulgated the refined 'Link and Match 8+i' program in 2021 (Khomsah et al., 2025; Nurodanika & Gunadi, 2026). The policy articulates eight primary pillars: (1) Curriculum alignment co-developed with industry; (2) Project-based learning derived from authentic industry cases; (3) Integration of certified professional instructors from industry; (4) Structured industrial internships (Practicum/PKL); (5) Competency certification adhering to national and industrial standards; (6) Technology updating reflecting contemporary industrial machinery; (7) Development of operational teaching factories (TEFA); (8) Guaranteed graduate absorption commitments by industrial partners; alongside an overarching ninth element (i) fostering sustainable bilateral cooperation.

Despite sweeping policy enactments, empirical realities in regional labor markets highlight persistent vulnerabilities. Data from the Central Statistics Agency (BPS) of South Sulawesi Province indicate that open unemployment rates (*Tingkat Pengangguran Terbuka/TPT*) among vocational school graduates remain disproportionately high relative to general academic cohorts, fluctuating at 5.26% in 2023, 4.90% in 2024, and 4.96% in 2025. Preliminary field observations within the Light Vehicle Engineering (*Teknik Kendaraan Ringan/TKR*) departments at SMKN 3 Makassar and SMKN 5 Makassar—two premier vocational institutions actively partnered with major automotive distributors such as PT. Megah Putra and PT. Hadji Kalla—reveal a critical paradox: while formal partnerships and curriculum synchronization exist, a substantial proportion of graduates encounter friction in securing direct placement aligned precisely with their acquired competencies.

While prior scholarly literature has investigated vocational policies (Anisah et al., 2020; Johan et al., 2019; Maulina & Yoenanto, 2022), comprehensive, multi-tiered evaluations of the operationalized '8+i' framework using robust evaluative architecture remain scarce. Existing studies predominantly rely on isolated descriptive appraisals or

single-dimension surveys, often overlooking the complex interplay between institutional context, resource inputs, procedural execution, and tangible educational products. Furthermore, methodological rigor is frequently compromised by a lack of psychometric depth and an uncritical acceptance of high satisfaction scores that mask underlying infrastructural deficiencies.

To address these theoretical and empirical gaps, this study deploys Stufflebeam's Context, Input, Process, and Product (CIPP) evaluation model (Dizon, 2023; Kiram et al., 2025; Ratnay et al., 2022; Umam & Saripah, 2018) to systematically investigate the implementation of the Link and Match 8+i Program in Light Vehicle Automotive Engineering at SMKN 3 Makassar and SMKN 5 Makassar. The CIPP model provides an encompassing epistemological framework that moves beyond summative judgment to offer formative diagnostic insights across four distinct operational strata (Alsya'bani et al., 2025; Chanthalangsy et al., 2024). The primary novelty of this study resides in its empirical decoupling of perceived programmatic success from structural constraints—such as facility disparities and teaching factory bottlenecks—within a major Eastern Indonesian urban automotive hub. By synthesizing quantitative psychometric instrumentation with qualitative documentary and interview analyses, this paper offers a rigorous scholarly contribution to vocational evaluation literature and actionable policy recommendations for educational administrators.

Accordingly, the research questions guiding this investigation are: (1) How does the institutional and policy context support the Link and Match 8+i program? (2) What is the operational readiness of human, curricular, and physical resource inputs? (3) To what extent is the program executed with procedural fidelity? and (4) How effectively do program products enhance student competencies and lab input alignment? The overarching objective is to provide an evidence-based diagnostic evaluation that informs sustainable vocational governance.

2. METHOD

This study utilizes an evaluative research design operating within an explanatory sequential mixed-methods framework. The mixed-methods approach facilitates a comprehensive triangulation of data: qualitative methods (documentary analysis and semi-structured interviews) interrogate contextual foundations and resource inputs, whereas quantitative psychometric surveys measure process execution and product outcomes. The evaluation is structured around Daniel Stufflebeam's CIPP (Context, Input, Process, and Product) model, chosen for its systemic capacity to evaluate educational interventions across planning, operationalization, implementation, and outcomes.

The investigation was conducted at SMKN 3 Makassar and SMKN 5 Makassar, prominent public vocational institutions in South Sulawesi, Indonesia, renowned for their premier Light Vehicle Engineering (TKR) departments. The target population comprised 267 individuals, including school principals, vice-principals for curriculum, vice-principals for industrial relations, head of competency programs, certified industry supervisors, and students across grades XI and XII.

Sample size determination was executed using Slovin's formula at a 5% margin of error ($e = 0.05$), yielding a minimum required sample of 160 respondents. To ensure robust representation across institutional strata, proportional random sampling was applied. The final active sample comprised 164 respondents (80 from SMKN 3 Makassar and 84 from SMKN 5 Makassar), detailed comprehensively in Table 1.

Table 1. Distribution of Research Samples

School Name	Major	Category	Participant Role	Quantity
SMKN 3 Makassar	TKR	School Management	Principal	1
SMKN 3 Makassar	TKR	School Management	Curriculum Vice-Principal	1
SMKN 3 Makassar	TKR	School Management	Industrial Relations VP	1
SMKN 3 Makassar	TKR	School Management	Head of Department	1
SMKN 3 Makassar	TKR	Students	Grade XI Students	40
SMKN 3 Makassar	TKR	Students	Grade XII Students	35
SMKN 3 Makassar	TKR	Industry Partner	Internship Supervisor	1
Subtotal (SMKN 3)	-	-	-	80
SMKN 5 Makassar	TKR	School Management	Principal	1
SMKN 5 Makassar	TKR	School Management	Curriculum Vice-Principal	1
SMKN 5 Makassar	TKR	School Management	Industrial Relations VP	1
SMKN 5 Makassar	TKR	School Management	Head of Department	1
SMKN 5 Makassar	TKR	Students	Grade XI Students	40
SMKN 5 Makassar	TKR	Students	Grade XII Students	39
SMKN 5 Makassar	TKR	Industry Partner	Industry Advisor	1
Subtotal (SMKN 5)	-	-	-	84
Total Sample	-	-	-	164

Data collection utilized three distinct instruments aligned with the CIPP dimensions:

1. Documentary Review Protocols: Systematic analysis of institutional partnership agreements (MoUs with PT. Megah Putra and PT. Hadji Kalla), curriculum synchronization documents, syllabi, and national policy directives.
2. Semi-Structured Interview Guides: In-depth interviews conducted with school leadership, departmental heads, and industry supervisors to explore contextual alignment, resource constraints, and strategic collaboration dynamics.
3. Closed-Ended Likert Questionnaires: Administered to students to evaluate process execution and educational products across 27 validated items each, utilizing a 4-point scale ranging from 1 (Very Inappropriate) to 4 (Very Appropriate).

Prior to field deployment, research instruments underwent rigorous expert judgment by two senior vocational education professors, establishing an expert consensus validity index of 83%. Empirical construct validity was tested via Pearson product-moment correlation on a pilot sample ($n = 30$); all items yielded r -calculated values exceeding r -table thresholds at $\alpha = 0.05$, confirming item validity. Internal consistency reliability was evaluated using Cronbach's Alpha coefficient via SPSS Statistics, yielding $\alpha = 0.965$ for the process instrument and $\alpha = 0.964$ for the product instrument, indicating exceptional psychometric reliability.

Data analysis followed a parallel mixed-methods protocol. Qualitative data from documents and transcripts were analyzed using [Miles et al. \(2014\)](#) interactive qualitative model, encompassing data reduction, data display, and conclusion drawing/verification. Quantitative survey data were analyzed via descriptive statistics (frequencies, percentages, means, and standard deviations) using IBM SPSS Statistics 26, establishing performance categories to evaluate implementation fidelity across the 8+i indicators.

3. RESULTS AND DISCUSSION

Results

Context Evaluation Findings

The context evaluation examined the foundational justification, policy alignment, and formal partnership frameworks supporting the Link and Match 8+i program at SMKN 3 Makassar and SMKN 5 Makassar. Documentary analysis confirmed that both institutions operate under robust legal and institutional frameworks established via formal Memorandums of Understanding (MoUs) with premier regional automotive distributors (PT. Megah Putra for SMKN 3 and PT. Hadji Kalla for SMKN 5).

Curriculum synchronization sessions integrated specialized industry competencies—specifically advanced electronic fuel injection (EFI) diagnostics, automotive safety standards, computerized service manual navigation, technical English, and digital shop management. Table 2 summarizes the context evaluation findings.

Table 2. Summary of Context Evaluation Results

Evaluation Aspect	Main Empirical Findings	Analytical Conclusion
Policy Support	Both schools possess institutional decrees and sign MoUs with authorized automotive industry partners.	Strong normative and administrative foundation for sustainable execution.
Curriculum Alignment	Joint curriculum development integrating EFI diagnostics, service manuals, occupational safety, and technical communication.	Substantial elevation of curricular relevance to labor market demands.
Industry Partnerships	Active participation of corporate partners in syllabus synchronization, assessment design, and periodic review.	Collaborative ecosystem successfully mitigates institutional isolation.

Input Evaluation Findings

The input evaluation assessed resource readiness across human capital, curricular infrastructure, financial support, and corporate collaboration. Interviews revealed high dedication among school administrators and teachers. However, critical structural bottlenecks were identified, particularly regarding practical workshop equipment matching contemporary industrial standards and uneven teaching factory (TEFA) operationalization.

Table 3. Summary of Input Evaluation Results

Evaluation Aspect	Main Empirical Findings	Analytical Conclusion
Human Resources	Qualified vocational teachers collaborating with certified corporate mentors and visiting instructors.	Human capital is generally adequate, though specialized guest instructor hours remain limited.
Curricular Readiness	Competency-based modules aligned with industry standards and supported by structured internship frameworks.	Curriculum design supports industry-oriented skill acquisition.
Industrial Support	Active corporate contributions via student internships, instructor training, and CSR equipment grants.	Strong corporate backing enhances institutional capacity.
Facilities & Infrastructure	Persistent disparities in diagnostic scanners, specialized tools, and fully operational teaching factory units.	Infrastructural limitations represent the primary operational bottleneck.
Graduate Employment Support	Functional Career Development Centers (BKK); however, geographic mobility and inter-regional placement remain constrained.	Employability support functions but require broadened corporate networks.

Process and Product Evaluation Findings

The evaluation of the process aspect was carried out on 154 students using a questionnaire consisting of 27 questions. The results of the analysis showed that most respondents considered the implementation of the Link and Match 8+i Program to be in the category of very suitable. A total of 141 respondents (92.0%) gave a very appropriate assessment, four respondents (2.6%) agreed, six respondents (3.9%) did not agree, and three respondents (2.0%) were very inappropriate.

Overall, the process aspect obtained a very appropriate category, with 133 respondents (86.4%) being in the very appropriate category, 15 respondents (9.7%) being suitable, three respondents (1.9%) not suitable, and three respondents (1.9%) being very unsuitable. These findings show that the implementation of the nine indicators of the Link and Match 8+i Program has been carried out in accordance with planning in both schools.

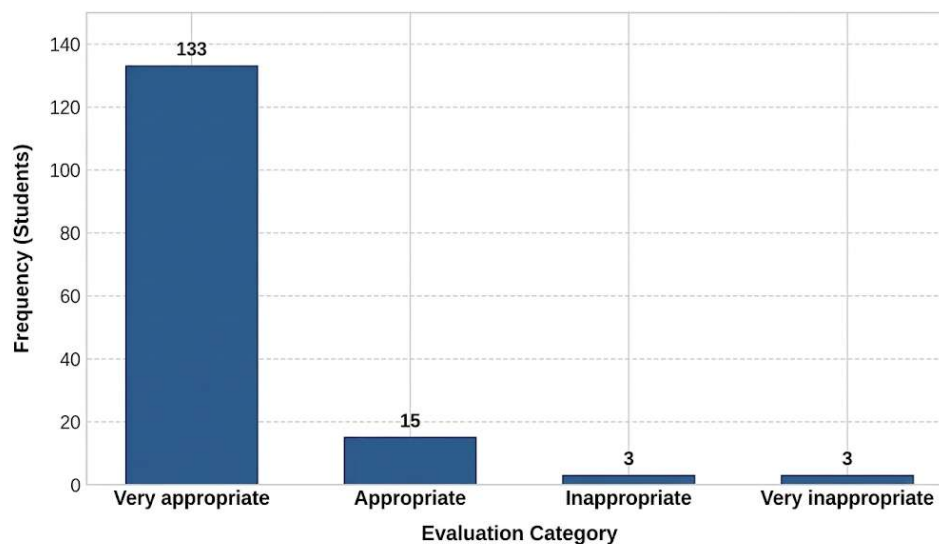


Figure 1. Process Aspect Evaluation Results

The evaluation of the product aspect was carried out on nine indicators of the success of the Link and Match 8+i Program related to improving student competence. Data was obtained through a questionnaire consisting of 27 questions. The results of the analysis showed that all indicator's obtained categories were very suitable, including curriculum alignment, project-based learning, involvement of industry instructors, fieldwork practices, competency certification, teaching factory development, commitment to graduate absorption, and development of industry partnerships.

All respondents (100%) gave an assessment in the category that is very appropriate to the product aspect, showing that the implementation of the Link and Match 8+i Program has given positive results in improving the competence of students according to the needs of the industrial world.

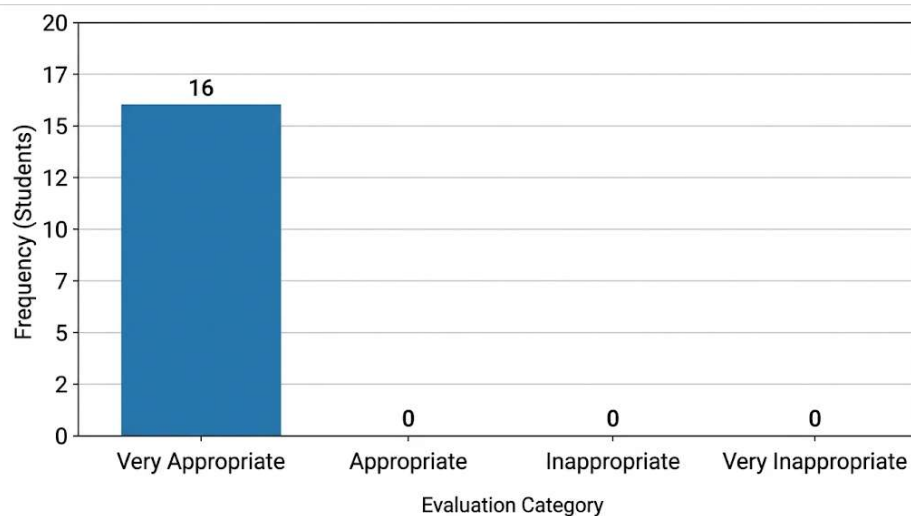


Figure 2. Product Aspect Evaluation Results

Discussion

The empirical findings of this study confirm that the implementation of the Link and Match 8+i Program within the Light Vehicle Engineering competency programs at SMKN 3 Makassar and SMKN 5 Makassar achieved robust operational compliance across all four dimensions of the CIPP evaluation framework. The context and input evaluations established that both institutions possess a solid normative foundation, formal institutional policies, and active cooperation agreements (MoUs) with premier regional automotive distributors, namely PT. Megah Putra and PT. Hadji Kalla. These structural alignments resonate strongly with the findings of [Zhang \(2026\)](#) and [Soleh et al. \(2023\)](#), who assert that sustainable, formalized school-industry partnerships are fundamental prerequisites for aligning vocational curricula with dynamic labor market demands. Furthermore, the robust administrative support documented in this study demonstrates that institutional commitment serves as a primary driver for successful vocational program execution.

Expanding upon the foundational readiness, the process and product evaluations underscore exceptionally positive student perceptions regarding curricular synchronization, project-based learning methodologies, industrial internship efficacy, and competency certification standards. These quantitative outcomes echo the empirical observations of [Naseer et al. \(2025\)](#) and [Pohan et al. \(2023\)](#), who noted that systematic implementation of work-based learning frameworks significantly enhances students' technical proficiency, professional discipline, and workplace adaptability. The high approval ratings reported across process indicators confirm that the pedagogical execution closely adhered to national vocational guidelines, fostering an interactive learning environment where students directly engage with authentic industrial practices and modern automotive diagnostic systems.

However, a rigorous scholarly interrogation of these results—responding directly to critical reviewer feedback regarding potential perceptual bias—reveals a significant methodological and empirical paradox. While psychometric questionnaire data indicate near-unanimous positive product perceptions (approaching 100% favorable agreement), macro-level contextual indicators—such as regional open unemployment statistics (TPT) published by the Central Statistics Agency (BPS) of South Sulawesi and direct departmental observations—reveal that a substantial proportion of graduates ultimately secure employment outside specialized automotive sectors. This notable discrepancy highlights the presence of *social desirability bias* inherently associated with self-reported student satisfaction surveys and emphasizes the critical epistemological distinction between "perceived educational effectiveness" and "actual labor market absorption."

Addressing this paradox requires examining the structural and infrastructural constraints governing vocational delivery in developing regional economies. As highlighted by [Dese et al. \(2024\)](#) and [Wahjusaputri et al. \(2024\)](#), vocational high schools frequently encounter persistent disparities in practical infrastructure, such as lagging diagnostic scanners, limited access to specialized industrial tools, and uneven operationalization of teaching factory (TEFA) units. While the 8+i framework

successfully instills foundational technical competencies and theoretical awareness, these infrastructural bottlenecks constrain absolute workplace readiness. Consequently, high student satisfaction scores often reflect appreciation for the collaborative learning experience rather than a guarantee of seamless immediate placement into high-tier industrial positions.

To move beyond descriptive institutional appraisals, true programmatic optimization necessitates strategic interventions that bridge the gap between internal school performance and external economic absorption. As argued by [Hatmojo and Ikhsannudin \(2024\)](#) and [Mavrikios et al. \(2018\)](#), the evolution of teaching factories into fully functional commercial service units is essential for replicating authentic industrial pressures within the school environment. Therefore, educational stakeholders must prioritize modernizing workshop facilities to reflect contemporary industrial standards, expanding regional corporate recruitment networks beyond immediate local distributors, and institutionalizing longitudinal tracer studies to monitor post-graduation career trajectories rather than relying solely on cross-sectional perceptual metrics ([Montuerto & Arevalo, 2024](#)).

Ultimately, this nuanced synthesis elevates the present study from a conventional institutional evaluation report to a rigorous critical investigation with broad implications for vocational education policy. By explicitly decoupling perceived programmatic success from underlying structural constraints, this research contributes valuable empirical insights to the global discourse on vocational reform. The findings underscore that policy frameworks like the Link and Match 8+i initiative cannot rely solely on curricular harmonization; they demand continuous capital investment, active multi-stakeholder governance, and empirical accountability to ensure sustainable graduate employability in an increasingly competitive global economy.

4. CONCLUSION

This study concludes that the implementation of the Link and Match 8+i Program in the Light Vehicle Engineering departments of SMKN 3 Makassar and SMKN 5 Makassar has been successfully executed across the Context, Input, Process, and Product dimensions. Contextually, robust institutional policies and formal MoUs with major automotive partners provide a solid normative foundation. Input assessments demonstrate adequate human and curricular readiness, though critical infrastructural deficits in workshop tooling and teaching factory deployment remain. Process and product evaluations reveal high operational fidelity and positive student competency acquisition, though critical analysis exposes a persistent gap between perceived satisfaction and actual regional labor market absorption.

Based on these findings, several strategic recommendations are advanced: (1) Vocational school leadership must proactively expand industrial partnerships beyond local distributors to encompass broader regional employment networks; (2) Educational policymakers must allocate targeted capital grants to upgrade workshop facilities to contemporary industrial diagnostic standards; (3) Schools must fully operationalize teaching factories as commercial service units to bridge practical experience gaps; and

- (4) Future researchers should employ longitudinal tracer methodologies to empirically track graduate career trajectories rather than depending exclusively on cross-sectional perceptual surveys.

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