



Analysis of Vocational Education Policy in the Context of Artificial Intelligence Disruption and Its Implications for the Merdeka Curriculum

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Abstract

This study aims to analyze vocational education policy in Indonesia in the context of Artificial Intelligence (AI) disruption and to examine its implications for the implementation of the Merdeka Curriculum. Employing a descriptive qualitative approach and content analysis of policy documents, scholarly publications, and research reports, this study explores the dynamics of vocational education policy in response to the digital transformation driven by AI. The findings reveal that Indonesia's vocational education policy is still in its early stages of integrating AI technologies into curricula and instructional practices. Although the Merdeka Curriculum offers flexibility, it has not yet systematically incorporated AI-related competencies, leaving graduates inadequately prepared for the increasingly digitized labor market. Compared to countries such as Germany and South Korea, Indonesia lags behind in establishing AI-based vocational training through strong industry-education collaboration. To address these challenges, three strategic actions are recommended: revising the curriculum to include AI literacy, strengthening industry partnerships through dual training programs and teacher certification, and investing in equitable digital infrastructure. This study offers both conceptual and practical contributions to the development of adaptive, responsive, and future-oriented vocational education policies in the era of technological disruption.

Keywords: Artificial Intelligence, education policy, merdeka Curriculum, vocational education.

1. Introduction

Vocational education plays a strategic role in the development of competent human resources (Raihansyah, Abqari, Alwafy, Syafa'at, & Denny Oktavina Radianto, 2024; Suparyati & Habsya, 2024), particularly in addressing the ever-changing demands of the labor market. Amidst the rapid advancement of digital technologies, especially Artificial Intelligence (AI), vocational education faces transformational challenges that are not only structural but also epistemological in nature. The disruption brought about by AI has prompted fundamental changes in the world of work through automation, the integration of intelligent systems, and the emergence of new types of jobs requiring adaptive and transformative skills (Chhatre,

2025; Mula & Ristiani, 2025). In this context, it becomes increasingly urgent to reassess the direction and substance of vocational education policies to ensure that the educational system does not fall behind in the face of accelerating change.

One of the national education policy responses to these global challenges is the implementation of the *Merdeka Curriculum* (Suyana, Dalmeri, Sugiharto, & Jupriadi, 2024), which emphasizes flexibility, independent learning, and adaptation to local contexts (Fatawi, 2024; Rasyad, Suklani, & Kambali, 2025; Trilaksono, 2024). This curriculum provides space for educational institutions, including vocational education providers, to design learning experiences that are more relevant to the demands of the labor market and technological advancements. However, despite its potential, the *Merdeka Curriculum* still faces implementation challenges, particularly in aligning learning outcomes with the needs of AI-driven industries (Firdaus, Putri, Rachman, & Siliwangi, 2025; Suharyo, Subyantoro, & Pristiwati, 2024). A gap still exists between the competencies taught in educational institutions and the skills required by increasingly digitalized businesses and industries (commonly referred to as DUDI).

In response to this era of disruption, vocational education is expected not only to adopt new technologies but also to develop curricula that are dynamic, contextual, and collaborative with various stakeholders (Purnamawati et al., 2022). Vocational curricula must be capable of equipping learners with 21st-century skills, such as critical thinking, technological adaptability, and advanced digital literacy (Purnamawati et al., 2022). Therefore, a thorough examination of vocational education policy in the context of AI disruption is necessary to assess the extent to which current policies can drive systemic educational transformation.

This study aims to critically analyze vocational education policy in Indonesia within the context of AI disruption, while also evaluating the implementation of the *Merdeka Curriculum* in relation to the readiness of vocational education. The findings of this research are expected to contribute both empirically and conceptually to policymakers, education practitioners, and other stakeholders in designing vocational education policies that are more adaptive, responsive, and sustainable. In addition, this study seeks to enrich academic discourse on vocational education policy innovation in the midst of disruptive technological developments, while promoting the establishment of an inclusive and future-oriented education system.

2. Method

This study employs a descriptive qualitative approach to gain an in-depth understanding of the dynamics of vocational education policy in Indonesia in response to the disruption caused by Artificial Intelligence (AI) and the implementation of the *Merdeka Curriculum*. This approach allows the researcher to

explore policy phenomena within a complex and dynamic social context. As emphasized by Moleong (2017), the qualitative approach enables the interpretation of actions and policies based on the perspectives of actors and their surrounding environment. Accordingly, this research does not rely on numerical data but focuses on interpreting meanings, patterns, and trends within policy documents and narratives. The data for this study were obtained from secondary sources, including official government policy documents, scholarly publications, research reports, and relevant articles discussing vocational education, AI, and the *Merdeka Curriculum*. Data collection was conducted through a literature review, which, according to Zed (2008), is crucial in socio-policy research as it facilitates the systematic, critical, and contextual analysis of texts.

Data analysis was conducted using content analysis, a technique that emphasizes systematic interpretation of textual content. As Burhan Bungin asserts, this method is well-suited for qualitative studies aiming to uncover implicit meanings in texts, including public policy. The analysis process involved identifying themes, coding, and grouping data into key focuses such as vocational education policy direction, the impact of AI on the labor market, and challenges in implementing the *Merdeka Curriculum* in vocational education. The analysis was interpretive and reflective, aiming to identify interrelated elements and derive relevant policy recommendations. To ensure data validity and reliability, source triangulation was employed, which involves cross-checking data from various documents and literature to maintain accuracy and consistency, as suggested by (Sugiyono, 2018).

3. Results and Discussion

3.1 Vocational Education Policy Response to AI Disruption

Based on the analysis, it was found that the current vocational education policy in Indonesia is still in the adaptation phase to anticipate changes brought by advanced technologies such as the Internet of Things and artificial intelligence (AI) (Latifah, Yulastri, Yuliana, & Fiandra, 2024). The government has issued several significant policies, such as the revitalization program for Vocational High Schools (SMK), as mandated in Presidential Instruction No. 9 of 2016, aimed at enhancing the quality of vocational education to make it more relevant to labor market demands. However, field implementation shows that the utilization of disruptive technologies such as AI remains suboptimal and has yet to become a primary focus (Munsarif, Sam'an, & Safuan, 2025).

Supriadi (2018) argues that the policy approach thus far has tended to be centralized and has not provided sufficient space for innovation tailored to regional conditions and industrial developments. As a result, vocational education curricula are insufficiently adaptive to the rapid pace of technological change, particularly in

the integration of AI and automation systems. Existing policies have not fully addressed the need for curriculum alignment with emerging technologies, nor have they provided a structured strategy for developing educators' competencies in digital and AI domains.

According to data from the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) in 2023, only around 35 percent of SMKs have implemented technology-based learning programs, and among those, the use of AI remains minimal (Payamta, 2025). The shortage of educators competent in technological fields and inadequate infrastructure facilities are key barriers to the implementation of AI in vocational education settings (Fitri & Dilia, 2024; Ubihatun, Aliyya, Wira, Ardhelia, & Radianto, 2024). This condition further widens the gap between graduates' competencies and the increasingly digitalized labor market demands.

Compared to vocational education policies in countries such as Germany, South Korea, and Finland, Indonesia still lags in systematically integrating AI into its vocational learning systems. In Germany, for example, the dual vocational training system has begun incorporating AI-based learning modules involving close collaboration between educational institutions and industry sectors (Rott, Lao, Petridou, & Schmidt-Hertha, 2022). South Korea has even developed a national policy on AI education targeting specialized training for vocational teachers in AI and information technology (Kim & Kwon, 2023; Lee & Jeong, 2023). The lack of benchmarking against these successful international practices indicates that Indonesia's vocational education policy has not fully learned from global experiences.

In the context of the Merdeka Curriculum, the AI disruption should serve as a momentum to strengthen curriculum flexibility and contextualization within educational institutions (Zulkhi, Kiska, Saputri, Kurniawan, & Hendrawati, 2024), particularly in vocational education. Unfortunately, there is still no clear strategy for integrating AI as an essential component of vocational learning outcomes. Project-based learning, which is one of the pillars of the Merdeka Curriculum, is still rarely directed toward exploring digital technologies or AI applications in the workplace. Moreover, available teaching modules have not sufficiently accommodated advanced digital skills that are increasingly demanded by the AI-based job market, such as machine learning, data analysis, or the application of AI in industrial automation. This indicates that the Merdeka Curriculum has not yet been fully responsive to the transformational demands posed by AI disruption.

Therefore, a thorough review of the policy content and implementation of the Merdeka Curriculum is required to make it more responsive to the development of disruptive technologies. A more decentralized policy approach, collaborative with

industry, and aligned with global trends can be a strategic step in strengthening the resilience of the vocational education system in the era of artificial intelligence.

3.2 The Gap Between the Education Sector and the Labor Market

The disruption caused by artificial intelligence (AI) has fundamentally transformed the global labor landscape, including in Indonesia. This technology not only brings efficiency and automation but also exerts significant pressure on the sustainability of various types of routine and manual jobs. According to the World Economic Forum (2023), AI and automation are projected to replace approximately 85 million jobs by 2025 (A. Dewi, 2025). This transformation necessitates that vocational education systems adopt new, more adaptive, and technology-oriented approaches.

Wahyuno (2021) asserts that vocational education systems must reconstruct their curricula to instill digital literacy, critical thinking, human-machine collaboration, and other complex skill sets. Nevertheless, an evaluation of the *Kurikulum Merdeka* and current vocational curricula reveals a discrepancy between curricular content and actual labor market demands. A study conducted by Benešová & Tupa (2017) highlights a considerable gap between the skills possessed by vocational graduates and those required by industries in the era of Industry 4.0. The study found that only about 30% of vocational graduates possess skills aligned with industry needs, such as operating advanced technologies, analyzing big data, and applying critical thinking to solve complex problems. This indicates that both the readiness of infrastructure and the capacity of teaching personnel to integrate disruptive technology content into the learning process remain uneven. Moreover, curriculum policies still tend to follow a top-down approach from central authorities, often neglecting local needs and regional industrial dynamics.

Perspectives from industry practitioners further underscore the urgency of transforming vocational education. In an interview with the HR Manager of an automotive manufacturing company in Karawang, it was revealed that vocational high school graduates continue to face skill gaps, particularly in mastering industrial software, basic programming languages, and understanding automation-based work systems. This indicates a disconnect between the education sector and the business and industrial world (*Dunia Usaha dan Dunia Industri*, or DUDI). Fadillah (2020) emphasizes the importance of developing a national education roadmap that positions AI as the foundation of 21st-century skills. Meanwhile, Sutrisno (2022) argues that the government must treat AI as a strategic variable in formulating labor policies. Therefore, vocational education must be systematically directed toward developing digital competencies such as coding, cyber-physical systems, and big data

analytics in order to remain relevant and competitive within a technology-driven economic transformation.

3.3. The Merdeka Curriculum and Its Implementation Challenges in Vocational Education

The *Merdeka Curriculum*, developed in response to the need for national education transformation, opens opportunities for the implementation of more contextual, flexible, and competence-oriented learning approaches (Anisa, Qodriyah, Azizah, & Hufron, 2025). One of its key characteristics—project-based learning (M. R. Dewi, 2022)—is particularly relevant to vocational education, which emphasizes practical skills and workplace readiness. This approach enables teachers and educational institutions to adapt learning materials to local needs and emerging technological developments, including artificial intelligence (AI). However, field implementation reveals a gap between curriculum design and its practical execution.

Various challenges have emerged in the implementation of the *Merdeka Curriculum* within vocational education institutions. Based on findings from multiple studies, many vocational schools still lack adequate digital laboratory facilities (Irwanto, 2023; Sanimah, Haniyyah, & Rambe, 2024), demonstrate limited integration of technology into the learning process (Raihansyah et al., 2024), and suffer from a shortage of teaching staff trained to incorporate disruptive technologies into their instruction (Zukna & Sassi, 2024). Teacher training has not been evenly distributed, particularly in disadvantaged, frontier, and outermost regions (known as 3T areas) (Hardiasanti & Trihantoyo, 2021). Furthermore, the curriculum content remains general in nature and has not yet fully accommodated the rapidly evolving needs for digital and AI-related competencies. This raises concerns that without substantive curriculum updates, vocational education may lag behind the increasingly digitized labor market.

The lack of synergy between vocational education institutions and the industrial sector also poses a critical issue (Angriani, Indrawan, Fransiska, & Naimah, 2025). For the *Merdeka Curriculum* to go beyond being merely a normative policy, active engagement from all stakeholders—including industry, local governments, and professional technology communities—is essential. Without a collaborative and systemic approach, the implementation of the *Merdeka Curriculum* in vocational education is at risk of failing to address the substantive challenges posed by AI disruption. Therefore, a comprehensive evaluation of the vocational education ecosystem's readiness is necessary, along with a reformulation of implementation strategies that are more adaptive to technological change and labor market demands.

3.4. Opportunities and Policy Recommendations

The disruption caused by artificial intelligence (AI) does not only present challenges but also opens strategic opportunities to reform vocational education in Indonesia in a more progressive and relevant manner (Falaq, Nafi'a, & Damayanti, 2023). One of the key opportunities lies in strengthening the curriculum structure to make it more responsive to the dynamics of AI-based digital skill demands. Currently, the *Merdeka Curriculum* at the vocational level still tends to focus on soft skill development and local contextualization, yet it has not fully incorporated the systematic integration of disruptive technologies such as machine learning, data analytics, or industrial automation. Therefore, a review of the learning outcome framework is necessary to include foundational AI competencies, an introduction to technology ethics, and simulation-based digital practices, as well as the Internet of Things (IoT).

World Economic Forum (2023) report emphasizes that technological literacy and AI understanding will become crucial competencies within the next 5–10 years. In response, curriculum development must be accompanied by project-based learning designs that allow students to engage directly in solving real-world problems through digital technology. Hence, the government, through the Ministry of Education, Culture, Research, and Technology (*Kemendikbudristek*) and the National Professional Certification Agency (*BNSP*), should promote the formulation of national guidelines for adaptive AI modules tailored to sector-based vocational education.

Furthermore, the success of vocational education transformation also depends on teacher quality and cross-sectoral synergy. Therefore, intensive micro-credential training programs aligned with industry needs should be encouraged. Dual training programs between vocational institutions and technology-based companies must also be formalized through tripartite partnerships involving the government, industry, and educational institutions. Beyond enhancing learning relevance, this collaboration can serve as a mechanism to ensure continuous upskilling for educators and students alike. With a data-driven, contextual, and collaborative approach, vocational education in Indonesia can transform into a system that is more adaptive to disruptive technological advancements while remaining aligned with global labor market demands.

4. Conclusion

The study reveals that Indonesia's vocational education policies are still in the early stages of adapting to AI disruption, with limited integration of advanced technologies into curricula and teaching practices. While initiatives like the SMK revitalization program (Presidential Instruction No. 9/2016) aim to enhance

vocational training, implementation gaps persist, including inadequate digital infrastructure, a shortage of skilled educators, and misalignment with industry demands. Compared to countries like Germany and South Korea, which systematically incorporate AI into vocational training through industry collaboration, Indonesia lags in adopting global best practices. The Merdeka Curriculum, though designed for flexibility, lacks clear strategies for embedding AI competencies, leaving graduates ill-prepared for a rapidly digitizing job market.

To address these gaps, policymakers should prioritize three key actions: (1) revising the Merdeka Curriculum to include AI literacy, machine learning, and data analytics as core competencies, (2) strengthening industry-education partnerships through dual training programs and micro-credentialing for teachers, and (3) investing in equitable digital infrastructure, particularly in underserved regions. A decentralized, data-driven approach – aligned with global benchmarks – will ensure vocational education meets both local and industrial needs. Without systemic reforms, Indonesia risks widening the skills gap and diminishing workforce competitiveness in the AI era.

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