

REGULATION ON INCREASING ADDED VALUE OF NICKEL AND MINERAL MINING BUSINESS OPPORTUNITIES AND CHALLENGES IN INDONESIA

REGULASI PENINGKATAN NILAI TAMBAH NIKEL DAN PELUANG SERTA TANTANGAN BISNIS PERTAMBANGAN MINERAL DI INDONESIA

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ABSTRACT

This study provides a doctrinal examination of Indonesia's legal framework regulating the increase of added value in nickel mining, with a particular focus on the coherence and enforceability of downstream mineral regulations. Employing a normative legal method combining statutory, conceptual, and analytical approaches, the research assesses the alignment between primary legislation—Law No. 4 of 2009 on Mineral and Coal Mining, as amended by Law No. 3 of 2020 and most recently by Law No. 2 of 2025—and its derivative instruments, including Government Regulation No. 23 of 2010 and successive ministerial regulations. Secondary legal materials, official government reports, international publications, and documented statistical data on nickel production and exports are examined to evaluate the extent to which the regulatory framework promotes domestic processing, legal certainty, and sustainable management of natural resources in accordance with the constitutional mandate of Article 33 of the 1945 Constitution. The findings indicate that regulatory interventions have substantively expanded domestic processing capacity and generated downstream investment, reaching approximately USD 5.03 billion, while increasing Indonesia's nickel export value from USD 1.3 billion in 2021 to USD 6.8 billion in 2023. However, despite these economic outcomes, significant normative inconsistencies persist, including fragmented regulatory mandates, inadequate harmonization between central and sectoral regulations, and limited institutional capacity in licensing and supervision. These weaknesses manifest in ore–smelter imbalances, unequal distribution of benefits, and escalating environmental degradation, particularly deforestation, marine sedimentation, and heavy-metal contamination around mining areas. Such conditions reveal a structural discrepancy between the normative objectives of downstreaming and the principles of environmental protection, community rights, and sustainable governance mandated by Article 33 of the 1945 Constitution. This research contributes to the legal discourse by demonstrating that Indonesia's nickel downstreaming framework remains predominantly instrumental and growth-oriented, lacking a coherent integration of environmental law, administrative accountability, and welfare-state obligations. Strengthening regulatory certainty requires harmonization of derivative regulations, binding environmental enforcement, and institutional safeguards to ensure equitable benefit distribution and long-term public welfare. These measures are crucial in operationalizing constitutional mandates and reinforcing the legitimacy of mineral governance in Indonesia.

Keywords: nickel mining, legal regulation, downstream policy, added value, environmental governance.

ABSTRAK

Penelitian ini menyajikan kajian doktrinal terhadap kerangka hukum Indonesia mengenai peningkatan nilai tambah nikel, dengan fokus pada koherensi dan daya laksana regulasi hilirisasi mineral. Metode penelitian yang digunakan adalah hukum normatif dengan pendekatan perundang-undangan, konseptual, dan analitis, untuk menilai keselarasan antara peraturan perundang-undangan utama, yaitu

Undang-Undang Nomor 4 Tahun 2009 tentang Pertambangan Mineral dan Batubara sebagaimana telah diubah dengan Undang-Undang Nomor 3 Tahun 2020 dan terakhir dengan Undang-Undang Nomor 2 Tahun 2025, dengan instrumen turunannya, termasuk Peraturan Pemerintah Nomor 23 Tahun 2010 beserta perubahannya serta berbagai Peraturan Menteri Energi dan Sumber Daya Mineral. Bahan hukum sekunder, laporan resmi pemerintah, publikasi internasional, serta data statistik terdokumentasi mengenai produksi dan ekspor nikel dianalisis untuk menilai sejauh mana kerangka regulasi tersebut mendorong pengolahan dalam negeri, menjamin kepastian hukum, dan mendukung pengelolaan sumber daya alam yang berkelanjutan sesuai dengan amanat Pasal 33 Undang-Undang Dasar Negara Republik Indonesia Tahun 1945. Hasil penelitian menunjukkan bahwa intervensi regulatif telah meningkatkan kapasitas pengolahan domestik dan mendorong investasi hilirisasi sebesar ±USD 5,03 miliar, serta menaikkan nilai ekspor nikel dari USD 1,3 miliar pada 2021 menjadi USD 6,8 miliar pada 2023. Namun demikian, terdapat inkonsistensi normatif yang signifikan, termasuk fragmentasi mandat regulasi, disharmoni antara aturan sektoral dan kewenangan pusat, serta keterbatasan kelembagaan dalam perizinan dan pengawasan. Kelemahan ini tercermin dari ketidakseimbangan pasokan bijih–smelter, distribusi manfaat yang tidak merata, serta eskalasi dampak lingkungan berupa deforestasi, sedimentasi laut, dan kontaminasi logam berat di sekitar kawasan pertambangan. Kondisi tersebut menunjukkan adanya kesenjangan struktural antara tujuan normatif kebijakan hilirisasi dan prinsip perlindungan lingkungan, hak masyarakat, serta tata kelola berkelanjutan sebagaimana diamanatkan Pasal 33 UUD 1945. Kontribusi penelitian ini terletak pada temuan bahwa kerangka hukum hilirisasi nikel di Indonesia masih bersifat instrumental dan berorientasi pertumbuhan, serta belum terintegrasi secara kohesif dengan hukum lingkungan, akuntabilitas administratif, dan kewajiban negara kesejahteraan. Penguatan kepastian hukum mensyaratkan harmonisasi regulasi turunan, penegakan lingkungan yang mengikat, serta perlindungan kelembagaan untuk memastikan distribusi manfaat yang adil dan kesejahteraan masyarakat jangka panjang. Langkah tersebut merupakan prasyarat dalam mengoperasionalkan mandat konstitusional dan memperkuat legitimasi tata kelola mineral di Indonesia.

Kata kunci: pertambangan nikel, regulasi hukum, kebijakan hilirisasi, nilai tambah, tata kelola lingkungan.

INTRODUCTION

Nickel plays a strategic role in Indonesia's economic transformation, particularly through mineral downstream policies mandated by the Mineral and Coal Mining Law. As one of the world's largest nickel resource, Indonesia has positioned downstream processing as a key instrument to increase domestic value added, strengthening industrialization, and enhancing state revenue (Radhica and Wibisana, 2023). Nevertheless, despite the progressive development of downstream regulations, significant legal and governance challenges remain particularly concerning environmental protection, regulatory clarity, compliance mechanisms, and the alignment of norms across different levels of government.

Previous studies on nickel downstream in Indonesia have predominantly focused on economic impacts, export performance, investment trends, or policy timelines. However, relatively limited attention has been paid to the legal dimensions that shape regulatory effectiveness, particularly issues of legal disharmony, overlapping norms, and enforcement gaps that may hinder the achievement of downstream policy

objectives. This study seeks to fill that gap by examining the coherence and effectiveness of Indonesia's nickel downstream regulatory framework from a normative legal perspective, while also identifying its structural weaknesses and implementation challenges.

A legal and policy-based analysis suggests that the implementation of export bans and downstream obligations requires carefully designed transitional instruments, including reasonable smelter construction timelines, clear technical standards, and transparent quota mechanisms to maintain ore supply stability and safeguard investment. Empirical observations derived from secondary data and official reports indicate varying levels of regulatory compliance, underscoring the need for refinement and harmonization of derivative regulations to ensure legal certainty and policy consistency.

Economic literature and industry-based academic studies emphasize that the rapid growth of global demand for lithium-ion batteries, particularly driven by the expansion of electric vehicle (EV) markets, has created substantial strategic opportunities for resource-rich countries such as Indonesia.

Konewka, Bednarz, and Czuba highlight that the increasing reliance of the global EV industry on critical minerals positions nickel as a key input in battery production, thereby increasing the importance of countries with abundant nickel reserves in the global supply chain. In this context, Indonesia is well positioned to leverage its nickel resource to move beyond raw material exports toward an integrated EV supply chain encompassing mining, refining, precursor and battery manufacturing, and downstream vehicle production. This integration is expected to generate higher added value, stimulate employment, attract foreign direct investment (FDI), and enhance technological capability through industrial upgrading. However, the realization of these opportunities requires substantial investment in energy infrastructure, logistics networks, and processing facilities, as well as coherent regulatory and fiscal frameworks that provide legal certainty and incentivizing long-term industrial commitments, including technology transfer and sustainable production practices (Konewka, Bednarz and Czuba, 2021).

Despite these prospects, downstream nickel processing faces multiple challenges. From a technical and financial perspective, downstream processing requires advanced technology, adequate smelter capacity, and substantial capital investment. Many domestic mining operators face difficulties in meeting these requirements without strategic partnerships or external financing.

Ore supply availability has also emerged as a critical issue. The rapid expansion of smelting capacity has raised concerns regarding the adequacy and quality of ore supply, the effectiveness of Work Plan and Budget (RKAB) implementations, and the risk of price volatility. These concerns are frequently reflected in debates over RKAB quota policies, particularly the choice between one-year and three-year allocation mechanisms.

From a fiscal perspective, frequent regulatory changes and increases in royalty rates have the potential to compress producers' margins and reduce investment attractiveness. Recent adjustments to royalty schemes have further contributed to business uncertainty, reinforcing the importance of stable and predictable fiscal governance.

Environmental and social impacts constitute another major challenge. Nickel mining activities, such as land clearing, marine sedimentation, and deforestation, pose significant risks to ecosystems and the livelihoods of coastal and local communities. These impacts have drawn criticism from academics and environmental organizations, accompanied by calls for stronger environmental impact assessments (AMDAL), improved coastal governance, and stricter regulatory oversight, particularly in high-biodiversity areas (Khalil and Broughel, 2025).

Governance and legal certainty issues further complicate implementation. Overlapping regulations, rapid policy changes, and the need for effective inter-ministerial coordination continue to hinder consistent law enforcement. Several studies have highlighted weaknesses in policy coordination, incentive structures, and transitional mechanisms within Indonesia's downstream regulatory framework.

Nickel, as a strategic mineral resource, must be managed by the state for the greatest prosperity of the people in accordance with the welfare state principle and social justice mandate enshrined in Pancasila and Article 33 paragraph (3) of the 1945 Constitution of Indonesia (UUD 1945). To operationalize this constitutional mandate, mining governance has been regulated through statutory instruments, including Law No. 11 of 1967 and its successor, Law No. 4 of 2009 on Mineral and Coal Mining (Pemerintah Republik Indonesia, 1967, 2009).

Law No. 4 of 2009 marked a significant shift by emphasizing the obligation to increase the added value of minerals through domestic processing and refining, as reflected in Articles 95C, 102, 103, 104, and 170. The law was subsequently implemented through Government Regulation (PP) No. 23 of 2010, which prioritizes the fulfillment of domestic mineral needs by holders of Mining Business Permits (IUP) and holders of Special Mining Business Permits (IUPK) (Presiden Republik Indonesia, 2010). This regulation has undergone several amendments up to 2018, reflecting Indonesia's transition from a raw mineral exporter to a downstream-oriented mining economy.

Nevertheless, challenges persist, particularly regarding ore quality variation. While downstream facilities typically require nickel ore containing above 2% Ni, Indonesia still possesses substantial volumes of lower-grade ore (Fadlillah and Wahyuni, 2023). To address this issue, the government introduced Regulation of the Minister of Energy and Mineral Resources/ESDM Ministerial Regulation No. 5 of 2017, which later replaced by ESDM Ministerial Regulation No. 25 of 2018 (Menteri Energi dan Sumber Daya Mineral, 2017, 2018) regulates the utilization of low-grade ore and associated minerals.

Recent study has also framed Indonesia's nickel downstreaming policy within a broader geopolitical and global value chain perspective through the concept of *nickel diplomacy*. Mubarak and Kartini argue that Indonesia's export restrictions and downstreaming agenda function not only as economic instruments to increase domestic value added, but also as strategic tools to strengthen Indonesia's bargaining position in the global battery and electric vehicle supply chain by leveraging its vast nickel reserves and production capacity (Mubarak and Kartini, 2024). Their study emphasizes Indonesia's efforts to forge strategic partnerships, attract investment, and promote sustainable energy industries in response to rising global demand for critical minerals. However, this literature remains largely focused on international competitiveness and diplomatic strategy, with limited attention to the normative coherence of domestic nickel regulations and their alignment with environmental protection, social justice, and the constitutional mandate of Article 33 of the 1945 Constitution. As such, a doctrinal legal assessment is still required to evaluate whether nickel downstream policies that enhance Indonesia's global influence also effectively fulfill the welfare-oriented objectives mandated by the Constitution.

From a policy and economic governance perspective, Pambudi (2025) highlights that the downstreaming agenda—particularly following the export ban on raw nickel ore—has been strategically positioned as a state-led instrument to enhance national competitiveness and accelerate industrial upgrading. Pambudi demonstrates that this policy has successfully increased domestic processing capacity and export value. However, he also identifies regulatory

volatility, overlapping policy instruments, and weak institutional coordination as persistent obstacles that undermine legal certainty for industry permit holders (Pambudi, 2025). Notably, this analysis remains largely confined to policy effectiveness and economic indicators, with limited engagement in examining the normative coherence of the legal framework itself, particularly its alignment with environmental protection, social justice, and the constitutional mandate of the welfare state under Article 33 of the 1945 Constitution.

Similarly, Putra and Samputra (2023) argue that the export ban of nickel ore and downstream obligations have contributed to increased domestic value addition and industrial growth. Nevertheless, their findings reveal imbalances between economic gains and social-environmental consequences, as well as risks of unequal benefit distribution and increasing dependence on large-scale investors, indicating governance weaknesses within downstream policy implementation Putra and Samputra (2023).

Normative legal study offers a contrasting emphasis. Dewi and Azzahra (2022) highlight the regulatory disharmony within Indonesia's mining legal framework, both vertically and horizontally. Their study demonstrates that overlapping regulations, frequent policy changes, and inconsistencies between statutory norms and implementing regulations undermine legal certainty and weaken the effectiveness of mining governance (Dewi and Azzahra, 2022).

Environmental and socio-legal analyses further reinforce these concerns. Farawansa and Gultom (2024) show that despite the formal incorporation of sustainability principles into mining regulations, environmental degradation and social conflicts persist due to weak enforcement, inadequate supervision, and insufficient post-mining rehabilitation mechanisms. This condition illustrates a structural gap between normative legal commitments and regulatory practice in the mining sector (Farawansa and Gultom, 2024).

Overall, the existing literature provides substantial insights into the economic rationality, industrial benefits, and policy effectiveness of nickel downstream policies in Indonesia (Putra and Samputra, 2023; Mubarak and Kartini, 2024; Pambudi, 2025).

However, most studies remain focused on economic performance and policy outcomes, while relatively limited attention has given to a comprehensive doctrinal and normative evaluation of regulatory coherence, legal certainty, and alignment with constitutional mandates, particularly Article 33 of the 1945 Constitution (Dewi and Azzahra, 2022; Farawansa and Gultom, 2024). Consequently, a significant gap remains in the literature concerning how fragmented regulatory design and law enforcement deficits may structurally impede the realization of sustainable and equitable mineral governance. This study seeks to address this gap through a normative legal analysis of nickel value-addition regulations, focusing on regulatory consistency, governance challenges, and their implications for sustainable and welfare-oriented resource management in Indonesia.

Existing studies on nickel downstreaming in Indonesia largely emphasize economic performance, investment inflows, export growth, and geopolitical strategy within global value chains. While several scholars have discussed policy effectiveness and industrial outcomes, relatively limited attention has been paid to a systematic normative legal assessment of regulatory coherence, disharmony, and enforcement gaps, particularly in relation to environmental protection and the constitutional mandate of Article 33 of the 1945 Constitution. This article contributes to the literature by offering a doctrinal legal analysis that integrates downstream policy evaluation with welfare-state principles and environmental governance, thereby identifying structural legal weaknesses that may hinder equitable and sustainable mineral resource management. By positioning regulatory disharmony and the gap between legal norms and implementation as key analytical issues, this study provides a novel legal perspective beyond predominantly economic and policy-oriented analyses.

Accordingly, this study is guided by three principal research questions. First, how has Indonesia's regulatory framework on nickel mining and value addition evolved, and to what extent does it demonstrate coherence and alignment with the government's normative objectives for downstream industrial development? Second, how effective are nickel downstream policies in

generating sustainable added value, business opportunities particularly in the EV battery supply chain and long term industrial growth? Third, what are the key challenges constrain the implementation of value-added regulations, including technical and financial limitations, fiscal and licensing uncertainties, ore supply imbalances, and environmental and social impacts, and how can regulatory governance be strengthened to address these issues?

By addressing these questions, this article aims to analyze the coherence, effectiveness, and policy implications of Indonesia's nickel value addition regulations and to formulate regulatory enhancements capable of strengthening downstream development, ensuring legal certainty, and promoting sustainable economic, social, and environmental outcomes.

METHOD

This study employs a normative legal research approach focusing on the analysis of laws and regulations governing nickel mining and downstream activities in Indonesia. Using both statutory and analytical approach, the research examines legal norms, regulatory principles, and the consistency of their application within the national mining governance framework, as commonly applied in doctrinal legal research (Suyanto, 2022). The study relies exclusively on secondary data obtained through comprehensive literature review, including Law No. 4 of 2009 on Mineral and Coal Mining and its derivative regulations, relevant government policies, official reports, academic journal articles, and international publications such as those published by the International Nickel Study Group (INSG). References to regulatory "effectiveness" are understood in a normative and impact-oriented sense, namely the assessment of regulatory coherence, legal certainty, and policy outcomes based on documented secondary data rather than empirical field research. Based on this normative analysis, this study formulates policy-oriented recommendations, including strengthening regulatory and licensing governance, enhancing workforce capacity in downstream industries, and improving environmental management mechanisms to support a more effective, equitable, and sustainable nickel

downstream regulatory framework in Indonesia.

RESULTS AND DISCUSSION

Development of Mining Regulations

Within the framework of normative legal research, this study positions the development of mining regulations not merely as a chronological description of policy evolution, but as a doctrinal assessment of regulatory coherence governing nickel mining and downstreaming in Indonesia. The primary normative question addressed in this section is whether the legal norms regulating the increase in mineral added value particularly those concerning nickel are systematically coherent, both vertically (between statutes, government regulations, and ministerial regulations) and horizontally (among regulations at the same hierarchical level), when examined through the lens of legislative principles legal certainty, and regulatory consistency. This approach aligns with normative legal theory which views legislation as a structured system of norms that must avoid contradiction, overlap, and fragmentation in order to function effectively as an instrument of public governance and welfare realization. Accordingly, the discussion on regulatory development serves to evaluate whether successive mining regulations form a harmonized legal framework or instead generate normative tensions that may undermine policy implementation and legal predictability.

The history of the regulations regarding the Increase in Added Value (PNT) of minerals and coal in Indonesia has been a long journey, starting since the issuance of Government Regulation instead of Law (Perpu) No. 37 of 1960 concerning Mining and Law No. 44 Prp of 1960 (Pemerintah Republik Indonesia, 1960) on Oil and Gas Mining which replaced the Indische Mijwet of 1899 issued by the Dutch East Indies government. In Law No. 37 Prp of 1960, mining business activities such as exploration, exploitation, processing, and refining have been specifically regulated. Furthermore, on December 2, 1967, Law No. 11 of 1967 concerning on the Main Provisions of Mining was issued, which replaced the previous law and continued to regulate added value activities of mineral, as explained in

Chapter 4 Article 14. A further step was the issuance of PP No. 32 of 1969 on the implementation of Law No. 11 of 1967, which provided further details regarding mining authority, including processing and refining activities. In 1986, the government issued Government Regulation/ PP No. 17 of 1986 which provided the authority to regulate the industry, including the processing of nickel ore into ingots. Significant changes occurred in 2009, with the issuance of Law No. 4 of 2009 concerning Mineral and Coal Mining which emphasizes the importance of sustainable, environmentally friendly mineral resource management and providing added economic value. To support the implementation of Law No. 4 of 2009, the government issued PP No. 23 of 2010 which emphasized the obligation to process and refine mining products domestically. In supporting this policy, ESDM Ministerial Regulation No. 7 of 2012 was also issued, which requires mining companies to process raw minerals domestically before exporting them (Menteri Energi dan Sumber Daya Mineral, 2012b).

The policy of increasing the added value of minerals continues to develop through various regulations, such as ESDM Ministerial Regulation No. 11 of 2012 (Menteri Energi dan Sumber Daya Mineral, 2012a) and ESDM Ministerial Regulation No. 1 of 2014, which further tightened requirements for mineral processing and refining. In 2017, Government Regulation/ PP No. 1 of 2017 amended Government Regulation/ PP No. 23 of 2010, supported by ESDM Ministerial Regulations No. 5 and No. 6 of 2017 concerning procedures for the sale processed and refined minerals. The strengthening of downstream policy was subsequently reinforced through Law No. 3 of 2020 as an amendment to Law No. 4 of 2009, and most recently updated through Law No. 2 of 2025, which reaffirms the strategic role of state-owned company (BUMN), the obligation to manage minerals and coal through domestic processing and refining, and the objective of increasing mineral added value (Pemerintah Republik Indonesia, 2020, 2025). Through this evolving regulatory framework, Indonesia demonstrates its commitment to managing mineral resources optimally to support environmental sustainability and community welfare, in line with the principles of a welfare state (Direktorat Jenderal Mineral dan Batubara, 2022).

The welfare state emphasizes the role of the state in protecting society from social risks and ensuring welfare through resource management and redistributive policies. This principle is reflected in Article 33 of the 1945 Constitution, which mandates that natural resources must be managed by the state for the prosperity of the people. The management of mineral resources, such as nickel, is key to achieving this ideal, regulated in Law No. 4 of 2009 concerning Mineral and Coal Mining (Pemerintah Republik Indonesia, 2009). Law No. 4 of 2009 is in line with the principles of a welfare state, as stated in Article 2 on principles and objectives, Article 3 on management direction, Article 5 on state control of resources, Article 102 regulates the obligation to increase added value, and Article 103 concerns on processing and refining. This law prioritizes equitable distribution of benefits and redistribution of resources for the welfare of the community (Pemerintah Republik Indonesia, 2009).

On March 7, Government Regulation/ PP No. 08 of 2018 concerning the Fifth Amendment to PP No. 23 of 2010 was enacted (Pemerintah RI, 2018). PP No. 23 of 2010 Article 5 Paragraph (5) and Article 65 Paragraph (2) regulate the contribution of mining business permit holders in supporting the development of communities around mining area in line with the goals of the welfare state, namely reducing economic inequality between social groups (Presiden Republik Indonesia, 2010). This step emphasizes the importance of corporate social responsibility to reduce regional inequality. To implement the provisions in Article 96 and Article 111 (PP No. 23 of 2010), a ESDM Ministerial Regulation on added value of mineral is required, so that on February 6, 2012, ESDM Ministerial Regulation No. 7 of 2012 was stipulated on added value of mineral through mineral processing and refining activities (Menteri Energi dan Sumber Daya Mineral, 2012b). ESDM Ministerial Regulation No. 7 of 2012 regulates the obligation to transfer foreign capital shares to local participants to strengthen the national industries and increase the role of the communities in managing natural resources (Menteri Energi dan Sumber Daya Mineral, 2018). The issue that has not been discussed in Indonesia mining regulations to realize a welfare state is the development of a more inclusive social structure through various dimensional

interventions including gender and class (Amor, Susanti and Herlusia, 2020).

To realize a sustainable welfare state, the focus must include economic, sustainability, and environmental aspects. Related regulations include Law No. 4 of 2009, Government Regulation/PP No. 23 of 2010, ESDM Ministerial Regulation No. 7 of 2012, and Government Regulation/PP No. 24 of 2012. Law No. 4 of 2009 regulates the obligations of Mining Business Permits (IUP) holders and Special Mining Business Permits (IUPK) holders for environmental management, including reclamation and post-mining (Articles 95-100), and imposes criminal sanctions for violations (Article 161). Law No. 32 of 2009 establishes the principles of environmental management, while Government Regulation/PP No. 78 of 2010 regulates the technical aspects of reclamation, post-mining, and guarantee funds (Pemerintah Republik Indonesia, 2009).

On March 7, PP No. 08 of 2018 concerning the Fifth Amendment to PP No. 23 of 2010 was enacted (Pemerintah Republik Indonesia, 2018). Government Regulation Number 23 of 2010, as a derivative of Law Number 4 of 2009, regulates the technical and operational aspects of mining, including environmental protection. Article 63 requires IUP and IUPK holders to implement environmental management, reclamation, and post-mining at every stage of business activities. Article 76 Paragraph 3 regulates the provision of reclamation and post-mining funds in a joint account as a guarantee for environmental recovery, ensuring that obligations are still carried out even though the company faces financial constraints. Article 86 Paragraph 2 requires the involvement of local communities in the planning and evaluation of environmental management to prevent social conflict and ecological impacts.

On February 6th, 2012, ESDM Ministerial Regulation No. 7 of 2012 concerning added value of minerals was issued through mineral processing and refining activities (Menteri Energi dan Sumber Daya Mineral, 2012b). ESDM Ministerial Regulation also requires Mining Business Permits (IUP) holders and Special Mining Business Permits (IUPK) holders to process and refine mining products domestically. By processing and refining domestically, Indonesia can more easily

control and minimize environmental impacts and impose administrative sanctions in the form of written warnings, temporary suspension and revocation of IUP Production Operations, IUPK Production Operations, Special IUP Production Operations (Menteri Energi dan Sumber Daya Mineral, 2018). Changes to the value added of Tin regulation aim to increase economic efficiency and resource optimization through domestic processing. ESDM Ministerial Regulation No. 7 of 2012 Articles 3 and 4 require the refining of minerals, including Tin, before export, with certain minimum limits. The revised ESDM Ministerial Regulation No. 11 of 2012 Article 8 clarifies export permit procedures, while Article 9 regulates sanctions for violations. ESDM Regulation No. 20 of 2013 Article 2 limits the export of raw minerals, with a temporary exception (Article 5) for companies that build refining facilities. ESDM Ministerial Regulation No. 1 of 2014 Article 2 emphasizes the obligation to refine according to minimum content, and Article 3 gives the government the authority to revoke export permits for violators. These regulations support the effective increase in the added value of Tin.

ESDM Ministerial Regulation No. 25 of 2018 contains several provisions that are conceptually aligned with ideas commonly associated with Richard Posner's Economic Analysis of Law, particularly in promoting economic efficiency through the utilization of mining by-products such as Tin Slag. This orientation is reflected in Article 5, which obliges mining companies to utilize by-products; Article 7, which requires that by-product management comply with technical and environmentally sound standards; Article 9, which provides incentives for companies that optimally utilize by-products; and Article 12, which stipulates administrative sanctions for non-compliance (Menteri Energi dan Sumber Daya Mineral, 2018). Through these provisions, ESDM Ministerial Regulation No. 25 of 2018 demonstrates a regulatory emphasis on efficiency, resource optimization, and waste reduction within mining activities.

Despite this conceptual alignment, this study does not employ Economic Analysis of Law (EAL) as its analytical approach. EAL relies on econometric methods, statistical measurement, and efficiency tests such as Pareto or Kaldor Hicks criteria to evaluate

legal outcomes. These methodological tools are not applied in this research. References to efficiency and optimization in this study are understood strictly from a normative legal perspective, namely as regulatory objectives embedded in legal norms rather than as empirically measured economic outcomes. Accordingly, the analysis focuses on assessing the normative coherence, legal rationality, and regulatory consistency of nickel downstreaming regulations, rather than evaluating their efficiency through EAL based methodologies.

The regulation of increasing added value (PNT) of Tin is a form of social engineering to create justice and public welfare through Law No. 4 of 2009, ESDM Ministerial Regulation No. 5 of 2017, ESDM Ministerial Regulation No. 25 of 2018. Law No. 4 of 2009 Article 2 related to the management of minerals and coal is carried out based on the principles of benefit, justice, and balance, Article 5 Paragraph (1) concerning state control and supervision over mines, Article 33 concerning the obligation of companies to process and refine mining products before export. Furthermore, in PP No. 23 of 2010 (Implementing Regulations of Law No. 4 of 2009) Article 17 contains regarding IUP and IUPK Holders are required to build mineral refining facilities in the territory of Indonesia, Article 25 Paragraph (1) related to obligation of mining companies to prioritize local workers in mining operations. ESDM Ministerial Regulation No. 7 of 2012 Article 3 related to the minimum limit for domestic mineral processing and refining, then ESDM Ministerial Regulation No. 1 of 2014 Article 4 emphasizes the obligation of mining business permit holders to build refining facilities in Indonesia with technical standards. Regulations on increasing added value (PNT) must function to create a balance between social needs and individual interests.

Law No. 4 of 2009 concerning Mineral and Coal Mining (Minerba) Article 33 paragraph (3) which means that natural resources in the country are used for the prosperity of the people. Article 102 and Article 103 concerning that mining business permit holders are required to increase added value. ESDM Ministerial Regulation No. 1 of 2014 Article 9 paragraph (1) requires Holders of Mining Business Permits (IUP) Production Operations and Special Mining Business Permits (IUPK) Production Operations are

required to process and/or refine mining products domestically. ESDM Ministerial Regulation No. 25 of 2018 Article 22 paragraph (1) and Article 23 paragraph (2) emphasize holders of IUP Production Operations or IUPK Production Operations that produce by-products are required to manage and utilize by-products by laws and regulations that comply efficiency and environmental sustainability principles.

Development of Nickel Downstream Business

Around 90% of Indonesia's nickel reserves are located in the Sulawesi and Maluku, specifically 39% of them in Maluku. Based on the 2023 Bank Indonesia report, the average economic growth of North Maluku was above 20%, supported by nickel-related export-import policies. However, data from the Central Statistics Agency (BPS) noted that as many as 83,800 residents of North Maluku were still classified as poor in March 2023 (Forum Studi Halmahera (FOSHAL), Trend Asia (TA) and Yayasan Lembaga Bantuan Hukum Indonesia (YLBHI), 2024).

Secondary data published by BPS indicate that nickel exports increased from 2009 to 2013 but decreased in 2014 after the enactment of ESDM Ministerial Regulation No. 01 of 2014 concerning the ban on export of raw mineral starting January 12, 2014 (Setiawan and Horman, 2022). This ban impacts on low-grade nickel, which is difficult to refine domestically because smelters in Indonesia are designed for ore with a minimum grade of 2%. In 2017, ESDM Ministerial Regulation No. 05 of 2017 was stipulated, which in Article 9 paragraph 2 explains the utilization of metal minerals with certain criteria processing and refining for metal minerals with certain criteria such as nickel with a grade of less than 1.7% (Menteri Energi dan Sumber Daya Mineral, 2017).

Export permits for nickel with a content of <1.7% are only given to companies building smelters, evaluated every six months, and limited according to smelter capacity. This policy supports downstream sector while allowing time for smelter construction, as a full export ban could hamper the process (Humas Minerba, 2019). The mineral added value policy also encourages investment in the Industrial sector. As of October 2017, Metal Processing and Refining has recorded the

completed investment for the construction of domestic Nickel refining facilities has reached ±5.03 billion USD (±Rp 68 trillion). The investment has succeeded in constructing 13 Nickel refining facilities with various products produced, namely NPI, FeNi, and Ni-Hydroxide, and capable to refine 34 million tons domestic Nickel ore (Pribadi, 2020; Tangkudung and Kaseger, 2024). Based on the business-as-usual (BAU) scenario, nickel processing operations located in Central Sulawesi, Southeast Sulawesi, and North Maluku could only contribute to GDP of USD 4 billion (around IDR 62.8 trillion) in the last fifth year, which coincides with the construction phase. After that, the economic contribution will decline. The agriculture and fisheries sectors in Central Sulawesi, Southeast Sulawesi, and North Maluku have the potential to lose added value of more than USD 387.1 million (IDR 6 trillion) over 15 years. In addition, the uncontrolled growth of the nickel industry could lead to more than 3,800 deaths in 2025 and almost 5,000 death cases in 2030 (Myllyvirta *et al.*, 2024). Emissions from smelters and captive power plants are estimated to cause an annual economic burden of USD 2.63 billion (IDR 40.7 trillion) in 2025, which could increase to USD 3.42 billion (IDR 53 trillion) in 2030 without significant emissions mitigation (Myllyvirta *et al.*, 2024).

The Indonesian government has officially implemented a policy to ban the export of low-grade nickel ore below 1.7% since January 1, 2020, based on the Regulation of the Minister of Energy and Mineral Resources No. 11 of 2019 concerning Mineral and Coal Mining Business (Santoso *et al.*, 2023). Based on the Regulation of the Minister of Energy and Mineral Resources No. 11 of 2019 concerning the second amendment to the Regulation of the Minister of Energy and Mineral Resources No. 25 of 2018 concerning Coal Mining and Mineral Business (Menteri Energi dan Sumber Daya Mineral, 2019) decided to stop nickel ore export activities starting from January 1, 2020 (Hadad, Novianty and Adolf, 2022).

Indonesia's nickel ore export ban was imposed under the 2009 Mining Law, which requires local processing and refining of ore before export. The policy was implemented in 2014, revoked in 2017, and reinstated on January 1, 2020. There are three main reasons behind the ban: first, the mining sector will contribute 12% to Indonesia's GDP

in 2022, with nickel being a significant contributor; second, nickel is an crucial input for the domestic steel industry, which is still struggling to meet national demand; and third, as the supports to Indonesia's strategy in developing electric vehicle (EV) battery production (Ibnu Khaldun, 2024).

Nickel downstream sector has had significant positive impacts, such as increasing export value from USD 1.3 billion in 2021 to USD 6.8 billion in 2023, while simultaneously increasing tax revenues. In 2023, nickel contributed 2.6% of Indonesia's total export value. Nickel production also increased sharply, with four major companies, namely Antam, Merdeka Battery Material (MBMA), Trimegah Bangun Persada/ TBP (Harita), and Vale reaching a total production of 353,000 tons in 2023, up from 130,600 tons in 2021. Indonesia is now the largest nickel producer, with mine production reaching 1.8 million tons or 50.5% of global production in 2023. Utilization of nickel itself is mostly for stainless steel (65%) and EV batteries (17%). Although nickel prices had soared in 2022 due to geopolitical issues and production disruptions, abundant nickel supplies from Indonesia in 2023 and declining demand from the EV sector and China caused nickel prices to decline again (Peh, 2024).

Harita Nickel completed the Rotary Kiln Electric Furnace (RKEF) smelter project for Ferronickel and High-Pressure Acid Leaching (HPAL) for Mixed Hydroxide Precipitate (MHP) supporting a significant increase in metal production. Ferronickel production increased by 300.2%, from 25,372 tons of nickel in 2022 to 101,538 tons of nickel, while MHP production increased by 50.4%, from 42,310 tons of nickel to 63,655 tons of nickel. Mining operations produced 20.75 million wmt of nickel ore, up 93.7% from 10.72 million mt in 2022. Ore production consisted of 6.09 million mt of saprolite (up 37.7%) and 14.66 million wmt of limonite (up 133.1%). Nickel ore sales also grew to 15.38 million wmt, up 97.9% from 7.77 million wmt, consisting of 6.30 million wmt of saprolite (up 234.9%) and 9.08 million wmt of limonite (up 54.2%). The increased production and sales volumes helped overcome nickel price fluctuations. Revenue reached IDR23.86 trillion, up 149.4% from IDR9.57 trillion in 2022. Although the contribution of associates profits decreased 45.9% to IDR1.58 trillion, net profit grew 54.0%, reaching IDR7.07 trillion compared to

IDR4.59 trillion in the previous year (PT Trimegah Bangun Persada, 2023).

Mining Industry Indonesia (Mind ID), as a holding company for state-owned mining companies, is committed to support downstream and industrialization to realize the vision of "Indonesia Emas 2045". Optimizing local raw materials by domestic manufacturers is important to prevent a decline in the industrialization sector, including limiting nickel ore supply. Downstreaming requires strategic synergy between the mining and manufacturing sectors for the sustainability of value added product and national economic benefits (Shiddiq, 2025). In 2023, the average nickel price on the LME fell by 15% compared to 2022, influenced by the surplus of nickel from Indonesia in the form of matte intermediate and Mixed Nickel-Cobalt Hydroxide (MHP), which is used for battery production in China. This surplus initially emerged in 2022 in the form of Nickel Pig Iron (NPI) Class II for stainless steel, but in 2023 expanded into excess nickel sulfate (McRae, 2024).

Downstream nickel sector supports economic growth and increases the added value of local products (Myllyvirta *et al.*, 2024). Although North Maluku's economic growth reached 20%, BPS data for 2024 recorded that 83,800 residents were still poor (Badan Pusat Statistik Provinsi Maluku Utara, 2023). This inequality indicates that the benefits of nickel downstreaming are not evenly distributed. The government needs to ensure that the benefits are felt by the community through education, training, and inclusive infrastructure.

Despite the significant increase in export value, production capacity, and investment inflows following the implementation of nickel downstreaming regulations, secondary data indicate that these economic gains have not been evenly translated into improvements in regional welfare, particularly in nickel-producing regions such as North Maluku. This gap underscores the normative challenge in aligning downstreaming policies with the constitutional mandate of Article 33 of the 1945 Constitution, which emphasizes the equitable distribution of benefits from natural resource management. Accordingly, the effectiveness of nickel downstreaming cannot be assessed solely through aggregate economic indicators, but must also be

evaluated in terms of regulatory design and governance mechanisms that ensure inclusive and sustainable development outcomes.

Challenges in Implementing Value-Added Regulations

Every year, the manufacturing sector in Indonesia, including the downstream process, requires around 16,000 competent workers to support the industry sustainability. On the other hand, the government's policy of stopping nickel exports has drawn opposition at the World Trade Organization (WTO). Although Indonesia lost the lawsuit, the downstream program continues as a national priority. To attract more investors, Indonesia needs to develop investor and market-friendly policies, especially through improving the licensing system to be more efficient. In addition, the government is also encouraging the expansion of international cooperation to open up new export market opportunities and increase investment. Countries in Europe and Africa are currently the main targets due to their large and strategic market potential for Indonesian exports (Artha, Anindita and Iskandar, 2023).

Data from Global Forest Watch since 2001-2022 reported that Central Halmahera Regency has lost 26,100 hectares of tree cover, 56,300 hectares for East Halmahera and 58 nickel concession permit in North Maluku with an area of 262,743 hectares, not including the IWIP and Harita Areas. Nickel mining operations have resulted in damage to water quality in Weda Bay due to the operations of PT IWIP, Buli Bay due to PT ANTAM, and Obi Island due to the operations of PT Harita Nikel (Wardhani and Djamhari, 2024). PT Harita Nikel also destroyed nutmeg, clove, coconut plantations, fishing in Lelilef Sawai Village, increased the number of Acute Respiratory Illness (ARI) sufferers to 10,579 in 2021, and 25 people died due to a smelter explosion and fire.

PT Weda Bay Nickel caused 7 floods from August 2020 to 2023 in the villages of Lelilef Sawai, Lelilef Waibulan, Sagea, Kulo Jaya, Woerajana, Woekob and Lokulamo. ANTAM also damaged the islands around Buli Bay, namely Pakal Island which is 179 hectares wide, Gee Island which is 693 hectares wide and Mabuli Island which is 236 hectares wide. PT Indo Bumi Nikel in Subaim, Wasile

District also cut off the dam flow for rice field irrigation in Dakaino Village which contributed to Halmahera losing rice field production of more than 25,000 tons in the last five years (Forum Studi Halmahera (FOSHAL), Trend Asia (TA) and Yayasan Lembaga Bantuan Hukum Indonesia (YLBHI), 2024).

The nickel downstream industry center causes water pollution and damages the contents of the underwater ecosystem. Fish and shellfish which are the staple foods of the North Maluku community have been exposed to heavy metals, making them very dangerous to consume. Data collected from FOSHAL related to the operation of PT IWIP using 6,560 megawatts Coal Fired Power Plant (PLTU) as its energy source. The combustion of coal used for power plants produces pollutants that have dangerous and large impacts compared to pollutants produced by other pollutant sources (Forum Studi Halmahera (FOSHAL), Trend Asia (TA) and Yayasan Lembaga Bantuan Hukum Indonesia (YLBHI), 2024).

The implementation of Law No. 3 of 2020, as subsequently amended by Law No. 2 of 2025, has had significant implications for communities and the environment. The centralization of mining authority under the revised Minerba framework has reduced avenues for local communities to submit complaints to regional governments, contributing to social dissatisfaction and increasing the risk of criminalization of residents who oppose mining activities. At the same time, mining companies may continue operations despite environmental damage, benefit from fiscal incentives such as reduced or zero royalty schemes, and implement labor termination practices with limited protection for workers. These conditions widen socio-economic disparities and weaken labor welfare. From a normative perspective, such outcomes are inconsistent with utilitarian principles, as the distribution of benefits tends to favor capital owners rather than producing the greatest benefit for society as a whole.

From the perspective of Environmental Justice Theory, nickel downstreaming should be assessed not only in terms of economic efficiency, but also in relation to the fair distribution of environmental risks and benefits, recognition of affected communities, and meaningful participation in decision-making processes (Schlosberg, 2007).

Environmental justice emphasizes that communities living in and around mining areas should not disproportionately bear environmental burdens while receiving limited socio-economic benefits (Pellow, 2025).

In the context of nickel downstreaming in Indonesia, large-scale mining and smelter operations have resulted in deforestation, marine pollution, fisheries degradation, and increased greenhouse gas emissions from coal-fired power plants. Such impacts reflect patterns of environmental burden concentration in peripheral and resource-dependent regions. These conditions undermine the constitutional right to a healthy environment and contradict to Indonesia's commitments under the Paris Agreement to reduce greenhouse gas emissions and pursue sustainable development (United Nations Framework Convention on Climate Change, 2015).

Furthermore, limited involvement of local and indigenous communities in licensing, AMDAL approval, and downstream decision-making processes reveals a deficit in procedural environmental justice. The exclusion or marginalization of community participation contradicts the principle of Free, Prior, and Informed Consent (FPIC), as recognized in international environmental and human rights instruments, particularly the United Nations Declaration on the Rights of Indigenous Peoples (United Nation, 2007).

The implementation of Law Number 3 of 2020 has brought several significant impacts, both for society and the environment. Mining companies also benefited significantly from this policy implementation, including the possibility of obtaining a 0% royalty guarantee, which ultimately reduces state revenue from the mining sector. This policy tends to provide incentives to mining companies, but on the other hand, it can create economic inequality between companies and the surrounding community. Another significant impact is the ease with which companies can terminate the employment (PHK), which is certainly detrimental to workers. This can create economic instability for workers who depend on the mining sector as their main source of livelihood. Overall, the implementation of this law poses major challenges related to the protection of community rights, environmental sustainability, and the welfare

of workers in the mining sector (Darongke, Rumimpunu and Roeroe, 2022).

Based on the welfare state theory, the policy of halting nickel exports and down streaming aims to increase domestic added value and create jobs. However, this policy does not fully reflect the principles of social justice. Mining companies benefit from incentives such as 0% royalties, while local communities face environmental pollution, loss of productive land, and economic instability due to easy layoffs. This inequality shows that the policies taken favor investors rather than the welfare of local communities.

CONCLUSION AND SUGGESTIONS

Conclusion

Mining regulations in Indonesia have evolved from the era of Law No. 37 Prp of 1960 to the current framework under Law No. 4 of 2009, as amended by Law No. 3 of 2020 and most recently by Law No. 2 of 2025. The primary objective of this regulatory evolution are to increase the added value of mineral resources through domestic processing and refining, strengthen downstream industrial development, and ensure environmental sustainability. Law No. 4 of 2009 marked a critical milestone by mandating sustainable mining management, followed by implementing regulations such as Government Regulation No. 23 of 2010 and Ministerial Regulation No. 7 of 2012. These instruments also include corporate social responsibility obligations aimed at reducing economic disparities. In parallel, environmental regulations, including Law No. 32 of 2009 and Government Regulation No. 78 of 2010, reinforce mandatory reclamation, post-mining obligations, and the management of environmental impacts arising from mining activities.

The principle of the welfare state, as listed in Article 33 of the 1945 Constitution, is reflected in this policy, with a focus on equitable distribution of resource benefits. However, from a normative perspective, the fulfillment of Article 33 remains conditional, as existing regulations have not yet provided sufficiently clear and enforceable mechanisms to ensure that revenues from nickel mining, including fiscal transfers, royalties, and community development

programs, are effectively utilized to improve the welfare of local communities in mining regions. In this context, Article 33 functions not only as a constitutional foundation for downstream policy but also as a normative instrument to restrain excessive capital-oriented exploitation, the effectiveness of which depends on regulatory enforcement and redistributive governance.

Indonesia has 90% of its nickel reserves in Sulawesi and Maluku, specifically 39% in Maluku. Downstream policies, especially the ban on raw ore exports (ESDM Ministerial Regulations 01/2014 and 11/2019), have encouraged the construction of smelters with an investment of USD 5.03 billion until 2017. Domestic nickel production increased sharply, from 130,600 tons (2021) to 353,000 tons (2023), contributing up to USD 4 billion (IDR 62.8 trillion) to GDP. The value of nickel exports jumped from USD 1.3 billion (2021) to USD 6.8 billion (2023), supporting industrialization and the development of EV batteries. Companies such as Harita Nikel recorded a significant increase in production, generating revenues of IDR 23.86 trillion in 2023.

However, these economic achievements have not been accompanied by proportional improvements in environmental quality and social welfare at the local level. Environmental and social challenges persist, including ecosystem degradation, negative impacts on the agriculture and fisheries sectors estimated at IDR 6 trillion over 15 years, and economic inequality that continues to affect communities in nickel-producing regions. Environmental impacts include deforestation linked to 58 mining concessions in Halmahera, water pollution in Weda Bay, Buli Bay, and Obi Island, and the accumulation of heavy metals that threaten marine ecosystems (Myllyvirta *et al.*, 2024). Socio-economic impacts include the criminalization of communities opposing mining activities, constraints on citizens' rights to protest, unequal royalty distribution, and labor practices that reduce the welfare of mine workers. These conditions indicate that downstreaming has generated structural social and environmental risks that cannot be ignored in assessing regulatory success.

Overall, the downstream policy aims to encourage domestic industrialization, strengthen added value, and improve

efficiency in natural resource management. Nevertheless, based on normative analysis, this study concludes that the current regulatory framework has been more successful in facilitating investment and industrial expansion than in fully realizing the welfare state mandate of Article 33 of the 1945 Constitution. Therefore, the effectiveness of nickel downstreaming cannot be assessed solely through increases in production, exports, or investment inflows, but must also be evaluated based on its capacity to ensure equitable benefit distribution, environmental sustainability, and social justice.

Based on the normative analysis, this study proposes concrete regulatory improvements to strengthen the governance of nickel downstreaming in Indonesia. First, mining regulations must be harmonized both vertically and horizontally by establishing explicit normative linkages between Law No. 4 of 2009 as amended by Law No. 3 of 2020 and Law No. 2 of 2025, Government Regulation No. 23 of 2010 and its amendments, and sectoral Ministerial Regulations governing RKAB, fiscal obligations, and downstream requirements. This harmonization should be realized through mandatory provisions stipulating that the approval and renewal of RKAB shall be legally contingent upon compliance with downstream performance obligations, environmental permits, and fiscal responsibilities, thereby eliminating overlapping authority and fragmented regulatory enforcement.

Second, environmental governance norms must be strengthened by explicitly integrating AMDAL approval, reclamation guarantees, and post-mining plans into the licensing and RKAB regime. Regulatory instruments should require that the issuance and extension of mining permits be conditioned on verified fulfillment of environmental obligations, including reclamation and post-mining commitments. In addition, periodic environmental audits conducted by independent and accredited institutions should be normatively mandated as a prerequisite for permit renewal, ensuring that environmental protection functions as a substantive legal requirement rather than a formal administrative procedure.

Third, the regulatory framework must ensure that revenues generated from nickel mining, including royalties, non-tax state revenue

(PNBP), and community development funds, are normatively linked to measurable welfare outcomes for local communities in mining regions. This may be achieved through binding legal norms that allocate a defined portion of mining revenues for local development programs in health, education, environmental restoration, and economic diversification, supported by transparent allocation mechanisms and accountability standards. Such regulatory design would strengthen the redistributive function of mining governance and align nickel downstreaming policy with the constitutional mandate of Article 33 of the 1945 Constitution and the principles of the welfare state.

Finally, to ensure that redistributive and environmental protection norms can be implemented effectively without undermining investment certainty, clearer transitional instruments in downstream policy are required, including realistic timelines for smelter development, transparent technical standards for ore utilization, and proportionate sanctions for non-compliance. These transitional norms are crucial to balance investment certainty with environmental protection and social justice, ensuring that nickel downstreaming not only promotes industrial growth but also delivers equitable, sustainable, and constitutionally compliant outcomes.

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