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INVESTMENT IN THE MINERAL INDUSTRY SECTOR (NICKEL) AND INDONESIA'S ECONOMIC TRANSFORMATION

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ABSTRACT

Nickel, as a strategic mineral, holds an important position in the development of value-added industries, particularly through downstreaming policies and the construction of an electric vehicle battery ecosystem. This research employs a descriptive qualitative approach supported by secondary quantitative data, obtained through literature reviews, official statistical documentation, and interviews with relevant stakeholders. The research findings indicate that investment in the nickel sector significantly contributes to increasing the added value of the commodity, expanding processing capacity through smelter construction, diversifying exports of processed mineral products, and strengthening the battery industry supply chain. Additionally, investment also creates jobs, increases regional income, and drives the growth of industrial areas in nickel-producing regions. Nevertheless, this study also identified a number of challenges, particularly regarding legal certainty, environmental impact, dependence on foreign technology, and socio-economic inequality in mining areas. Overall, this study concludes that investment in the nickel industry sector is an important catalyst in Indonesia's economic transformation towards a more value-added and future-oriented economic structure. However, the success of this transformation requires policy synergy, strengthened governance, and the application of sustainability principles to ensure that economic benefits are achieved optimally and sustainably.

1. Introduction

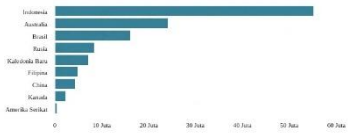
Indonesia is one of the countries with very large potential for mineral resources, particularly nickel (Syafira et al., 2023). Data from various international organisations show that Indonesia has one of the largest nickel reserves and production in the world, making this commodity a strategic asset in national economic development. As global demand for electric vehicle (EV) batteries and clean energy technology increases, nickel has become a critical mineral that will determine the future direction of the industry's

development.

The Indonesian government has positioned the mineral sector, particularly nickel, as a crucial pillar in its economic transformation agenda. This is evident through mineral downstreaming policies, the ban on raw ore exports, and the promotion of investment in smelter development, refining industries, and the battery and electric vehicle ecosystem. The policy aims not only to increase economic added value but also to strengthen the competitiveness of the national industry within the global supply chain. Investment in the nickel sector plays a strategic role in driving Indonesia's economic transformation from a raw commodity-based economy towards a high-value-added economy. The entry of both domestic and foreign investment into the nickel processing and refining industry has contributed to job creation, increased state revenue, technology transfer, and the development of industrial infrastructure. Additionally, this investment is also key to realising Indonesia's ambition to become a major player in the global battery and electric vehicle industry.

The natural resources contained within the Indonesian earth, particularly nickel, can become a commodity of natural wealth that can position Indonesia as a strategic country in the nickel industry. This position should have an impact on improving the welfare of the Indonesian people and increasing state revenue from nickel industry production. Good management, transparency, and law enforcement against legal violations in the nickel industry are important points for maintaining and increasing investor and public trust in the management of the nickel industry in Indonesia (Tamburaka, 2025).

Fig 1. Largest nickel reserve data in the world in 2023



Source: Databoks 2024

Based on Fig 1, it is explained that Indonesia held the world's largest nickel reserves in 2023. Indonesia's role in the nickel industry is very important internationally, so the management of nickel industry investment must be handled considering domestic needs and national sovereignty (Santoso et al., 2023). However, the development of investment in the nickel sector also presents a number of challenges. Issues related to environmental impact, resource sustainability, mining governance, and legal certainty for investors are important matters that must be addressed to ensure that economic transformation proceeds inclusively and sustainably. Thus, a study on the role of investment in the nickel industry sector in Indonesia's economic transformation is highly relevant for understanding the extent to which this sector can drive economic growth, industrialisation, and national technological independence. Through this understanding, it is hoped that policy recommendations will emerge that can strengthen the contribution of investment in the nickel industry, while also maintaining a balance between increasing economic added value, environmental sustainability, and community welfare

2. Literatur Review

Investment in the mineral industry sector (nickel) within Indonesia's economic transformation requires concepts and systems that can provide legal certainty and protection for both investors and the state. This can be based on the principles and objectives of the industry in building the economy.

a) The wealth of nickel resources and its strategic position

Indonesia holds a central position in the world's nickel supply with large

reserves and production, making nickel a strategic commodity for resource-based industrialisation. This geological condition forms the basis of the argument that investment in domestic nickel processing can be a driver of economic structural transformation from raw commodity exports towards value-added industries.

b) Downstream policy and investment incentives

Since the ban on raw ore exports (gradually implemented since 2014 and effectively tightened in 2020), the government has implemented a downstreaming policy that encourages the development of smelters, refining facilities, and the EV battery supply chain domestically. This policy is aimed at attracting foreign and domestic capital so that value-added processing and manufacturing occur in Indonesia, not just at the extraction stage. Policy studies show that export bans are a major driver of investment in processing facilities, but they also present implementation challenges and legal uncertainty.

c) Investment trends and downstream development (empirical evidence)

In recent years, there has been a surge in investment in smelter, refining, and some battery raw material projects (e.g., anodes, battery cells). A concrete example: the investment in an anode plant and the launch of a battery cell plant (Hyundai and LG) demonstrate progress towards EV value chain integration in Indonesia. However, domestic battery capacity is still relatively small compared to global capacity at a certain stage, so there is a gap between policy ambition and current real capacity. Additionally, several major projects were also cancelled or postponed, highlighting investment risks and commercial uncertainty.

d) Economic contribution: value added, employment, and FDI

Literature indicates the potential for significant economic contributions from downstreaming, including increased export value-added, higher government revenue, the creation of technical/manufacturing jobs, and technology transfer through foreign direct investment. Economic analysis emphasises that if the downstream chain is successfully developed (from processing to battery active materials to cell manufacturing), the country has the opportunity to capture a larger margin than simply exporting ore. However, empirical evidence also warns that these benefits are not automatic and depend on the ownership structure of the investment, local content policies, and the capacity of the workforce and technology.

e) Environmental, social, and sustainability issues

Numerous studies and field reports highlight the environmental and social impacts of nickel mining and processing in coastal and forest areas, including mangrove degradation, water and soil pollution, and public health risks. The process of processing laterite (commonly in Indonesia) and some refining technologies (e.g., HPAL and smelting) have a significant emission and energy consumption footprint, sparking debate about the trade-off between industrial development and sustainability/climate goals. Therefore, the literature emphasises the need for the implementation of environmentally friendly mining and processing practices, governance oversight, and social compensation for affected communities.

f) Technical, market, and geopolitical challenges

Some studies highlight technical issues (limitations in refining capacity

for EV-grade batteries, the need for low-carbon technology), market challenges (nickel price fluctuations, changes in battery technology, e.g., the shift from LFP to NMC), and geopolitical factors (dependence on foreign investors and technology; policy competition from other countries). Reliance on large foreign investment also raises the issue of how much value added will remain domestically versus how much will be transferred abroad.

g) Policy evaluation and research gaps

Literature assesses that the downstreaming policy successfully boosted investment in industrial structures, but its effectiveness varied: success requires policy synergy (environmental protection, human resource development, appropriate fiscal incentives, regulatory certainty). Frequently cited research gaps include: long-term quantitative economic analysis of downstreaming net benefits; comparative studies of battery value chains; and research on low-emission technologies for laterite processing.

h) Implications for Indonesia's economic transformation

The combined evidence suggests that investment in the nickel sector has the potential to be transformative, driving industrialisation, diversifying the export base, and developing a green technology ecosystem, but the benefits are not automatic. The success of the transformation depends on how investment is directed (domestic value added), the handling of environmental/social externalities, and the strengthening of institutional and technological capacity. Literature recommends a balanced policy between attracting investment, maximising local content, and ensuring sustainability standards

3. Methodology

This research uses a descriptive qualitative approach with supporting quantitative data. The qualitative approach is used to deeply understand the role of investment and the downstream policy process, including the perspectives of stakeholders. Quantitative data is used to support interpretation, for example, the development of investment value, nickel production, smelter capacity, exports, and economic transformation indicators. The scope of the research includes: a) National policies related to nickel mining and downstreaming, b) Nickel industrial regions, such as Southeast Sulawesi, Central Sulawesi, and North Maluku (smelter and battery industry areas), c) National data on investment and performance of the mineral industry. Data analysis using the Miles and Huberman analysis model, including: 1) Selecting important data related to the role of investment, the dynamics of downstreaming policies, and their impact, 2) Creating matrices, categorising, and identifying pattern findings, 3) Concluding how investment affects economic transformation.

4. Result and Discussion

Results

1) Legal Rules Regarding Investment in the Mineral Industry Sector (Nickel)

Investment in the mineral sector, including nickel, is regulated through various laws and regulations covering mining, investment, environmental protection, labour, and integrated licensing (Hartana, 2017). The main laws and regulations in the mining sector are Law Number 3 of 2020 concerning Amendments to Law Number 4 of 2009 concerning Mineral and Coal Mining (Minerba Law). This law serves as the main basis for the implementation of nickel mining in Indonesia, with several key points including: 1) The state controls and manages minerals for the greatest possible prosperity of the people, 2) Permits are granted through Mining Business Permits (IUP), IUPK, and Special Mining Business Permits for Production Operations (IUPK-OP), 3) The obligation for downstreaming and the prohibition of nickel ore exports to increase

domestic added value, 4) Affirmation of the obligation for reclamation and post-mining, 5) Strengthening the role of the central government in post-Omnibus Law permitting.

The derivative rules of the Mineral and Coal Mining Law are Government Regulation Number 96 of 2021 concerning the Implementation of Mineral and Coal Mining Business Activities, which technically regulates a) procedures for granting WIUP, IUP, and IUPK, b) obligations for domestic processing and refining, c) provisions for guidance and supervision, and d) management of production, sales, and exports. There are regulations from the Minister of Energy and Mineral Resources (ESDM) regarding nickel downstreaming, or key regulations: a) Regulation of the Minister of Energy and Mineral Resources No. 11/2023 concerning the Management of Minerals and Coal, b) Regulation of the Minister of Energy and Mineral Resources Number 25 of 2018 (as amended) concerning the Mining of Minerals and Coal, c) Regulations on mineral trading, refining, and export restrictions, d) The obligation to build smelters as a condition for export and permit extension.

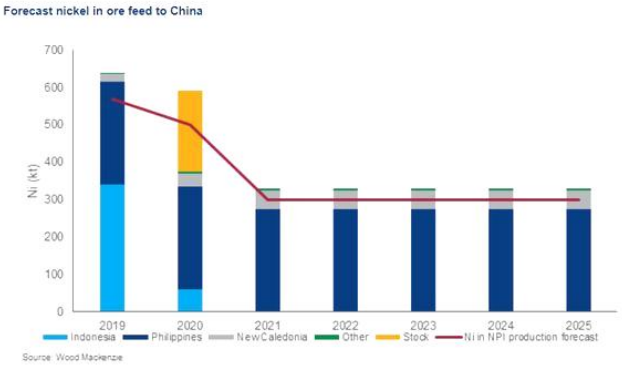
These regulations serve as an important foundation for investors and the government to drive national economic transformation through the optimisation of nickel resources, particularly to support the battery industry and the electric vehicle ecosystem. The current reality is that there is a discrepancy between regulations and their implementation in the nickel sector, particularly in the granting of permits for nickel industrial activities, which disregards the rights of communities affected by the existing nickel industry (Hasan, 2024). The management of the nickel industry's investment must be based on established norms to ensure legal certainty and protection for business actors and the community directly affected by the nickel industry. Business development must prioritise the principle of sustainable business development to ensure the management and results of natural resources in the future (Wahanisa & Adiyatma, 2021).

Figure 2. Data on IUP and OP for Operating Nickel Smelters

Source: Indonesia's Nickel Investment Opportunities, Ministry of Energy and Mineral Resources; Quoted from Kompas Research and Development/IWN

Based on the data in Fig. 2, it is explained that the potential nickel reserves outside the mining operation areas in Indonesia reach 4.5 billion tonnes. This amount is very large, being more than 30 times the world's nickel reserves, and currently, nickel smelters that have been operating since 2020 are located in the Sulawesi, Maluku, and Papua regions (Fauziyyah & Paksi, 2023).

Figure 3. Indonesian Nickel Export Data to China



Source: CNBC Indonesia, Photo: Wood Mackenzie 2019

Based on the data in Fig. 3, it explains that nickel export data since 2019 has decreased to anticipate domestic nickel reserve needs and balance, and to increase the added value of domestic nickel reserves. However, the negative impact of the ban could lead to illegal actions by nickel industry business owners to illegally export nickel (Tsirwiyati, 2023).

2) The Role of Investment in the Mineral Industry Sector (Nickel) in Indonesia's Economic Transformation

Investment in the nickel sector, both Domestic Investment (PMDN) and Foreign Investment (PMA), has a direct contribution to the implementation of mineral downstreaming policies (Putri, 2025). The implementation of the raw ore export ban since 2014 and the re-strengthening of the policy in 2020 have forced the formation of a domestic processing industry structure. The influx of large-scale investment from global companies is driving the development of RKEF (Rotary Kiln-Electric Furnace) and HPAL (High Pressure Acid Leaching) smelters. The smelter and refining facility will serve as the foundation for Indonesia's transition from a resource-based economy to a processing-based economy. Before the downstreaming policy, most of Indonesia's nickel exports were in the form of raw ore with low economic value. Investment in processing capacity is changing the character of Indonesia's exports. Downstream products such as ferronickel, nickel pig iron, and battery raw materials have a much higher selling value (Hutabarat, 2024). This diversification increases the value of Indonesia's exports in the base metals sector and contributes to a trade balance surplus. Expanding the nickel value chain is an important part of the national strategy to reduce volatility in global commodity prices, improve macroeconomic stability, and broaden the country's revenue base.

Large investments in the nickel sector not only affect the export structure but also contribute to labour absorption, both directly and indirectly. Indonesia's economic transformation is directed towards a future industrial ecosystem, including the electric vehicle (EV) battery industry. Nickel is a key component in the production of NMC (Nickel-Manganese-Cobalt) technology batteries. Investments from global companies such as the Korean and Chinese battery consortiums pave the way for a more complete supply chain: a) from mining, b) to nickel processing (MHP, precursor, cathode), c) to battery cell factories.

Investment in the nickel sector generates a multiplier effect for regional development (Domański & Gwosdz, 2010). The development of industrial areas such as in Morowali, Konawe, and Central Halmahera has spurred the growth of road, port, and electricity infrastructure, supporting small and

medium-sized enterprises (MSMEs), labour migration, and increased local economic activity. However, a number of social challenges have also emerged, including disparities between local and foreign workers, rapid urbanisation without adequate social infrastructure (housing, sanitation, healthcare), and social risks such as land conflicts and changes in the social structure of local communities. Nickel investments are often criticised for their potential to cause widespread environmental impacts, including deforestation and habitat damage from mining land clearing, water and air pollution from smelting processes, high carbon emissions, particularly from coal-based smelters, and hazardous waste from HPAL refining processes (Mudd & Jowitt, 2022). It is crucial to ensure environmental sustainability in the management of nickel industry investments as a consistent effort to achieve an industry that does not damage existing environmental ecosystems (Hasna, 2025).

Environmental issues are becoming one of the important indicators of sustainable economic transformation (Salamatov et al., 2019). Without good governance, downstream processing aimed at supporting clean energy can actually create an environmental paradox (Ciptaswara, 2022): producing green products through environmentally unfriendly processes. Therefore, the role of investment must be directed towards: Low-carbon purification technology, Land reclamation and mine rehabilitation, Strict environmental monitoring, and ESG (Environmental, Social, and Governance) compliance. Legal certainty and regulatory stability are key factors for successful investment in the mineral sector. Policies such as the Minerba Law, Downstreaming Regulations, and fiscal incentives have driven investment growth

5. Conclusion

Investment in the nickel mineral industry sector plays a strategic role in driving Indonesia's economic transformation. First, investment directly contributes to accelerating downstreaming through the construction of smelters and refining facilities, enabling Indonesia to transition from an exporter of raw ore to a producer of high-value-added processed products such as ferronickel, NPI, MHP, and battery raw materials. This change not only increases export value but also strengthens the structure of the national industry. Second, investment drives the creation of new value chains in the energy and future technology industries, particularly the electric vehicle battery industry. The presence of domestic and foreign investors strengthens Indonesia's position in the global supply chain and opens up opportunities for developing green technology-based manufacturing industries. This shows that the nickel sector serves as a gateway to innovation-based economic transformation and sustainable industries. Third, investment in the nickel sector has a significant socio-economic impact on producing areas, such as job creation, increased community income, and industrial zone growth. However, challenges such as environmental impact, dependence on foreign technology, social inequality, and the need for local human resource capacity still require serious attention to ensure the sustainability of this industry's development. Fourth, the success of economic transformation through nickel investment is highly influenced by regulatory certainty, the consistency of downstreaming policies, and transparent and accountable mining governance. Without strong environmental and social management, downstreaming has the potential to create a development paradox that contradicts sustainability goals.

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