Nickel Downstreaming in Indonesia: Reinventing Sustainable Industrial Policy and Developmental State in Building the Electric Vehicles Industry in ASEAN

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Abstract

The research aimed to fill the gap by analyzing Indonesia’s nickel downstreaming agenda by integrating the framework of the developmental state, industrial policy, and environmental, social, and governance (ESG) practices, considering the country’s unique resource-based industry, which differed significantly from the developmental state policies of resource-scarce East Asian countries. Nevertheless, today’s concept is contentious amidst the notion that it exclusively focuses on economic gain at the expense of other dimensions. Moreover, government intervention in the market for economic aims continues to garner heated debate among scholars. Indonesia’s nickel downstreaming policy epitomizes the growing nexus between these concepts. Through this policy, the government does not just aim to stimulate economic transformation but also contribute to global energy transition with a focus on promoting Electric Vehicle (EV) battery manufacturing. The research employed an integrative literature review to elucidate the relationship between developmental state theory, industrial policy, and ESG investing in the nickel downstream industry. It is found that the policy needs to be continuously refined so that its negative environmental and social externality can be addressed and it can serve as a better example of a new developmental state model. The Indonesian government’s endeavor to align industrial policy with ESG imperatives still leaves much room for improvement.

Keywords: nickel downstreaming, developmental state, industrial policy, ESG, SDGs
Introduction

Nations endowed with abundant natural resources often face the paradox of the resource curse, characterized by sluggish economic growth and social instability despite their wealth in resources such as oil, gas, and critical minerals (Smith & Waldner, 2021). To navigate these challenges, industrial policies have emerged as a crucial tool that can potentially stimulate growth and development (Rodrik, 2004). However, the implementation of such policies is also increasingly shaped by considerations of sustainability, encapsulated in Environmental, Social, and Governance (ESG) criteria (Zmente & Bistrova, 2021), imposing a new constraint for resource-rich countries. The critique also highlights that industrial policy based on a developmental state might not work in a contemporary global value chain-based world (Werner, Bair, & Fernández, 2014).

Indonesia, a significant global player in the nickel market, exemplifies this dynamic by introducing a ‘downstreaming policy’, a strategy to increase the added value of commodities owned by a country (Hamdani, 2023). Once reliant on raw mineral exports such as nickel to drive economic growth (INSG, 2022), the strategic shift towards downstream processing marks a pivotal move. This policy aims to bolster industrialization, particularly in sectors like Electric Vehicles (EVs), which aligns with global sustainability goals (Meckling, 2021). The policy also differs from the East Asian model of industrialization due to its focus on utilizing domestic natural resources (Hayashi, 2010).

Aligning with that ethos, it becomes paramount for Indonesia’s downstream policy, which is essential for garnering international acceptance and investor confidence. Navigating the delicate balance between mitigating deindustrialization threats, escaping the middle-income trap, and adhering to ESG principles, Indonesia confronts the challenge of steering its manufacturing sector’s development in concordance with climate change mitigation goals as outlined in the Paris Agreement.

Indonesia is poised to become a significant player in the environmentally friendly renewable energy industry, given its command of the world’s largest nickel reserves (21% of global reserves) and largest nickel refining capacity (roughly half of global capacity). Nickel’s pivotal role in energy storage technology, a cornerstone of the renewable energy sector, gains further prominence as Europe mandates the exclusive sale of electric cars by 2035. With electric vehicle (EV) batteries requiring high nickel content, as high as 80% for the cathodes of NMC batteries, Indonesia’s nickel resources assume critical importance in this transformative global shift. Existing research highlights challenges in policy execution in Indonesia, including inadequate infrastructure, technology access, skills gaps, and environmental considerations (Istiqomah, Suroso, & Wulandari, 2020).

The success also depends on an approach that aligns economic objectives with environmental and social sustainability. Sudarto and Pratomo (2019) highlight the importance of adopting green industry principles in nickel processing, incorporating environmentally friendly technologies, effective waste management, and ethical labor standards to ensure sustainability and minimize environmental and community impacts. Achieving this vision
requires a policy framework that fosters economic growth while meeting Sustainable
Development Goals (SDGs). Indonesia’s nickel downstreaming strategy should involve
targeted interventions in the manufacturing sector, tailored to the nation’s unique industrial
landscape.

To date, a limited volume of research has examined resource-based industrial (or
downstream) policy as part of the developmental state model in the context of raising
awareness of sustainability practices. Utilizing an integrative literature review, this research
aims to fill the gap by analyzing Indonesia’s nickel downstreaming agenda by integrating the
framework of the developmental state, industrial policy, and ESG practices, considering the
country’s unique resource-based industry, which differs significantly from the developmental
state policies of resource-scarce East Asian countries. The primary contribution of this
research is a proposal for a downstream policy model to promote high-quality, inclusive
economic growth while addressing sustainability concerns for resource-rich countries. The
researchers will also provide insights into Indonesia’s trajectory in the nickel downstream
sector and the implications for ASEAN nations.

Research Methodology

The research employs an integrative literature review to elucidate the relationship
between developmental state theory, industrial policy, and ESG investing in the nickel
downstream industry (Snyder, 2019). Following Knopf’s (2006) assertion that relevant reports
may come from diverse sources beyond academia, the researchers incorporate books,
academic journals, Indonesian regulations, and several economic indicators on these topics.
The review synthesizes findings in line with Torraco’s (2016) procedure, summarizing
primary conclusions, highlighting areas of consensus and disagreement, and identifying gaps
in the literature.

This research analysis emphasizes the strategic significance of nickel commodities
within the renewable energy industry. The researchers adopt an integrated approach that
merges theoretical frameworks with practical applications by exploring the interconnections
among developmental state theory, industrial policy, and ESG practices. The focus on the
nexus between these concepts is crucial for comprehending the strategic role of nickel
commodities. Positioned as an exemplar of successful downstreaming, this research findings
extend beyond economic growth to include job creation and Indonesia’s commitment to the
SDGs. This research contributes to the discourse by offering insights into the symbiotic
relationships among these pivotal elements, elucidating the holistic impact of strategic
downstreaming within the renewable energy sector.

Analytical Framework: Developmental State, Industrial Policy, and ESG

Castle (1992) argues that a developmental state can be identified by its ability to foster
and maintain development characterized by high economic growth and structural changes in
the production system, both domestically and internationally. On the other hand, Knight (2014) defines a developmental state as one where the government prioritizes economic growth and adopts institutional arrangements and incentive structures to achieve this goal. According to Johnson (1982), who first coined the term, this model emerged from the post-World War II economic resurgence of East Asian countries, especially Japan. Following the devastating Korean War, South Korea also replicated several key policy instruments from Japan for its economic transformation strategy, whereas China’s developmental state model began in the late 1970s with the implementation of economic reforms under Deng Xiaoping.

Johnson (1982) initially identifies elements of Japan’s developmental state model: extensive government intervention in development, active industrial policies for economic growth, and a central role for the state bureaucracy. Wong (2004) argues that the elements are similarly shared within East Asia, where states attempt to maximize national productivity through strategic market interventions. States are equipped with robust institutional capabilities to formulate and enforce targeted economic policies, especially in key industrial sectors. Wade (2018) goes even further by highlighting the importance of high investment rates, coordinated sectoral promotion, and strategies like export promotion and import substitution. Institutionally, limited central bank and financial sector independence and close state-industry relations are necessary for disciplined economic management matters. These states employ policies such as directed credit, fiscal incentives for investment, trade protection, and strategic negotiations with foreign investors. The researchers summarize other important similarities synthesized from various literature in Table 1.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Similarities in Policy Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D and innovation investment</td>
<td>The three selected countries recognize the importance of research and development (R&amp;D) and innovation in strengthening economic sectors. Governments encourage investment in R&amp;D, establish research institutes, and encourage public-private partnerships in terms of technological innovation.</td>
</tr>
<tr>
<td>National industry protection and promotion</td>
<td>Japan, China, and South Korea implement national industrial protection and promotion policies to improve the competitiveness and sustainability of key sectors. The government provides financial support, protection policies, and incentives to industries that are considered strategic for economic growth.</td>
</tr>
<tr>
<td>International trade and globalization</td>
<td>These three countries actively shape markets, establish trade partnerships, and participate in global supply chains to strengthen exports and develop economic relations with other countries.</td>
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</table>

There are subtle differences in the implementation of the development model. An example from Chang (2022) is when South Korea resorts to vigorous government trade protection to develop its nascent manufacturing base, including banning all importation of cars until the late 1980s. Korea provides hefty financing support through state-owned banks for national companies that diversify into strategic new sectors. It is worth noting that the
South Korean government’s support for their domestic industry also comes with high prices for the national companies who are obligated to meet various targets, primarily export targets. Only companies that demonstrate their competitiveness through a greater footprint in the international market continue to receive the government’s largesse. The government has no qualms about cutting loose companies that fail to meet their high standards. Seen from this perspective, Studwell (2013) observes that South Korean industrial policy is less about ‘picking winners’ than it is about ‘weeding out losers’.

Conversely, the Chinese government has shifted from a centrally planned economy to a more market-oriented socialist market economy. Bell (2017) explains that several Chinese policies and political situations have an important role in implementing this model, one of which is the long-term development plan policy. Keping (2010) discusses that China’s developmental state model can be a new paradigm in the development of developing countries. Some policies that can be applied by other developing countries are (1) paying great attention to research and development and technological innovation, (2) providing funds and financial support through state-owned banks, and (3) investing in infrastructure development, including transportation networks, energy, communications, and related sectors.

The East Asian developmental states are not without its weakness. Wong (2004) has noted that they are “social welfare laggards” as there are too few programs concerned with socioeconomic redistribution. Kim (2007) also argues that even though Korea experienced an economic miracle, its social policy and outcomes are underdeveloped, as real wage growth lags far behind productivity growth. Other than that, the success of the developmental state model in building industry has its flipside in creating environmental degradation (MacNeil & Paterson, 2012). Angel and Rock (2009) point out, however, that the market governance in East Asia is sensitive to the market demand for sustainable industry and there are directions toward green industry, thus, it does not need a new developmental model.

Industrial policy involves proactive government interventions aimed at correcting market failures and enhancing industrial capabilities to drive sustainable economic growth and development (Otsubo & Otchia, 2021). It includes selective interventions to steer production towards sectors with higher growth potential, impacting both targeted industries and downstream sectors (Pack & Saggi, 2006; Blonigen, 2016). This type of policy dates back to the 18th and 19th centuries when developed countries used it to build their industrial sectors (Landes, 2003). The impact of industrial policy, however, remains debated. Several mainstream economists, like Baldwin (1969), Krueger (1997), and Pack and Saggi (2006), typically oppose government intervention in industry, arguing that it can harm market efficiency more than market failures. In contrast, scholars such as Wade (1990), Amsden (1992), Rodrik (1995), Stiglitz (1996), and Chang (2006) highlight its role in East Asia’s rapid economic transformation.

Despite differing views, the use of industrial policy has risen from 381 countries in 2009 to 1,140 in 2018 (Juhasz et al., 2023). The developmental state model encompasses industrial policy as a strategic subset. Developed and developing countries widely implement structural
interventions to foster industrialization (Di Maio, 2014). In developing nations, state-led industrial policies often serve political objectives, contributing significantly to nationalist agendas (Tai & Ku, 2013). Historical examples include active governmental support for industrialization in Great Britain, the United States, Germany, and Japan during the 18th and 19th centuries (Landes, 2003). Similarly, developing countries have adopted similar strategies as part of their developmental processes (Reinert, 1999).

In Indonesian policy circles, industrialization has been viewed as the center of the development process since the 1950s. However, in the early years of independence from the 1950s until the mid-1960s, the progress of industrial development was relatively slow due to political turmoil and economic issues (Gunawan, Pratikto, & Dartanto, 2020). After the mid-1960s, Indonesia’s industrial development was more successful. However, unlike the East Asian countries, Indonesia’s success in manufacturing came with trade and investment liberalization, which encouraged foreign and domestic investment in the manufacturing sector. Since that period, Indonesia’s standard of living has significantly improved, the poverty rate has decreased significantly, and declining inequality has been maintained at a low level. As each government faces different challenges in development, it is necessary to dissect Indonesia’s industrialization policy divided into several periods, which have been summarized in Table 2.

Table 2: Types of culinary business established by Indonesian diasporas in Australia

<table>
<thead>
<tr>
<th>Period</th>
<th>Industrial Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early independence period (early 1950s-1965)</td>
<td>Nationalization of Dutch companies and development of the manufacturing sector</td>
</tr>
<tr>
<td>Mid-1960s period</td>
<td>Trade liberalization of foreign and domestic investment in the manufacturing sector</td>
</tr>
<tr>
<td>Industrialization period (1966-1996)</td>
<td>Haphazard pro-industrial policy such as import substitution, export orientation for industrialization, protection and support for certain industries</td>
</tr>
<tr>
<td>Period 2004 - 2014</td>
<td>Development of upstream and downstream industry synergy</td>
</tr>
<tr>
<td>Period 2015 - present</td>
<td>Development of inter-regional connectivity infrastructure and downstreaming of natural resources</td>
</tr>
</tbody>
</table>

While the Indonesian government also pursues a pro-industrialization policy, according to Studwell (2013) and Chang (2022), there are two areas where the government falls short, particularly compared to the more successful case of the East Asian tigers. The shortcomings are:
a. The East Asian tigers compel their domestic enterprises and conglomerates to enter higher-productivity manufacturing sectors, whereas Indonesia does not.

The East Asian governments resort to various measures to nudge their domestic enterprises and conglomerates to enter into new strategic manufacturing sectors. The measures may be deemed as ‘carrots’ and ‘sticks’. For instance, the South Korean government offers various carrots including in the form of government backed concessional credit for companies that diversify into new strategic sectors. However, the government also applies sticks, including summoning the leaders of the large Korean conglomerates or chaebols to government detention centers to really convey the importance of diversification as well as the government’s ability to penalize those who defy its instruction. With these policies, South Korean conglomerates do not have much choice but to diversify. For instance, Hyundai, which started as a construction contractor is nudged to diversify into shipbuilding and car manufacturing. The Indonesian government does not carry out a similar policy. Indonesian conglomerates are allowed to continue to expand their business and become dominant in traditional sectors such as mining or agriculture such as tobacco. The sticks and carrots that are prevalent in East Asia to push for diversification are lethargic at best in the context of Indonesia.

b. The East Asian tigers impose stringent conditionalities for their support towards national champions; the Indonesian government does not.

The policy of the East Asian governments to support domestic industry could have easily backfired. The conglomerates may have misused the close relations they enjoy with the government. Instead of diversifying as the government hoped, these conglomerates could have persuaded the government officials to continue giving the handouts they enjoy, including through bribery. This does not occur because the East Asian government has powerful strings attached to the incentives and support they provide to domestic industry. For instance, the South Korean government’s support for domestic industry, including trade protection, favorable bank loans, and subsidies, comes with robust export targets. Korean companies that fail to meet such targets are cut loose. In this regard, the South Korean government does not just ‘pick the winners’ but also ‘weed out losers’. The Indonesian government uses several policies that may look similar to those of its East Asian counterparts, but Jakarta does not insist on similar conditions. Without such conditionalities, Indonesian companies enjoy the benefits of government support without facing the kind of pressure their East Asian peers experienced to diversify.

Table 3 shows the comparison of industrial policy implementation in East Asian countries and Indonesia.
Table 3 shows the comparison of industrial policy implementation in East Asian countries and Indonesia

<table>
<thead>
<tr>
<th>Policy</th>
<th>Japan</th>
<th>South Korea</th>
<th>China</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection of domestic industries</td>
<td>Very strong, high import tariffs</td>
<td>Very strong, high import tariff</td>
<td>Very strong, provides trade protection and subsidies</td>
<td>Haphazard application of import tariffs and domestic component levels</td>
</tr>
<tr>
<td>Selecting strategic sectors and encouraging domestic companies to enter them</td>
<td>Very strong</td>
<td>Very strong</td>
<td>Strong</td>
<td>Weak</td>
</tr>
<tr>
<td>Financing support</td>
<td>Vigorous including through government banks</td>
<td>Vigorous including through government banks</td>
<td>Vigorous including through government banks and investment funds</td>
<td>Weak</td>
</tr>
<tr>
<td>Conditionalities</td>
<td>Robust, with demanding export targets</td>
<td>Robust, with demanding export targets</td>
<td>Adequate</td>
<td>Weak</td>
</tr>
<tr>
<td>Role of FDI (Foreign Direct Investment) to support industrialization</td>
<td>Hostile, FDI is very limited to provide room for the diversification of domestic enterprises</td>
<td>Hostile, FDI is very limited to provide room for the diversification of domestic enterprises</td>
<td>Very open to FDI with many onerous conditionalities including forming joint venture and undertaking technological transfer</td>
<td>Very open to FDI with minimum requirement for technological transfer</td>
</tr>
<tr>
<td>Involvement of SOE (State-Owned Enterprises) in the manufacturing</td>
<td>Not involved</td>
<td>Involved for some critical industries</td>
<td>Involved for most of the important upstream industries</td>
<td>Minimal involvement for manufacturing industry</td>
</tr>
<tr>
<td>Export promotion</td>
<td>Strong</td>
<td>Involved for some critical industries</td>
<td>Very Strong</td>
<td>Weak</td>
</tr>
</tbody>
</table>

While in the past, East Asian countries were primarily determined to achieve economic objectives, today, environmental, social, and governance (ESG) aspects have become an inseparable part of the company’s investment activities. ESG has been found to generate a considerable positive impact on company performance from research conducted by Buallay (2019) and Ahmad, Mobarek, and Roni (2021). Furthermore, Plastun et al. (2020) state that countries with higher ESG reporting obligation criteria tend to rank better in the Sustainable Development Goals Index, so policies to implement good ESG reporting may contribute to a country’s overall development level.
Particularly in attracting investment, the absence of good ESG reporting in Indonesia has the potential to make Indonesia less attractive for investment. Increasing shareholder pressure on ESG issues has made companies more cautious in making investment decisions on projects that lack clear transparency on ESG principles. However, the determination of integrated policies and a good framework when determining ESG criteria is very important, considering that the wrong implementation can have a negative impact on the response of investors and local governments, as research conducted by Narula (2012). Indonesia needs to have an appropriate ESG framework to encourage quality investment for sustainable development in accordance with the targets of the UN development goals. Some countries that can be used as a reference model for ESG include:

1. China: A rapidly developing country, China has a major impact on the global ESG scene. The Chinese government is working to address environmental issues and social challenges while improving corporate governance. The Chinese government has also set ambitious targets to reduce carbon emissions and promote renewable energy. However, China faces various challenges, including air and water pollution, high greenhouse gas emissions, and labor rights issues, including human rights issues.

2. Japan: With a long history of environmental awareness, Japan has made significant progress in sustainable practices and technologies. The Japanese government’s ESG policy focuses on emphasizing corporate governance that contributes to overall economic stability and reliability as well as progress in promoting social inclusion and diversity.

3. South Korea: Since 2018, the country has focused on implementing the Act on Resource Circulation policy to conserve the environment and adopt renewable energy and waste management (Choi & Levchenko, 2021). The South Korean government also emphasizes the importance of corporate governance in improving economic stability and transparency. In terms of social aspects, South Korea has addressed issues such as gender discrimination income gap, providing support to vulnerable groups and promoting social cohesion.

**Green Economic Transformation: Towards a New Developmental State**

In the past, the notions of developmental state, industrial policy, and ESG may have been detached from one another. Nevertheless, today, there are growing linkages between developmental state and industrial policy on the one hand and the ESG and sustainability imperative on the other.

The developmental state and industrial policy model, which primarily rests on economic growth alone, is ill-equipped to confront the global predicaments today as the repercussions of climate change and social inequality become too evident to ignore. Rapid industrialization is not only inadequate, but it might also even be counter-productive if it comes at the expense of sustainability. Moreover, there is a protracted criticism against state
interventions that some economists fervently believe to be inefficient at best and disastrous at worst. Government interference is alleged to carry a substantial risk of government failures, which will undermine economic development with its rent-seeking side effects.

Compliance with ESG standards may be increasingly popular, but there is also a growing understanding that business-as-usual approaches will not be enough. With the rampant market failures that have enabled the marginalization of environmental or social factors in economic development, even several neoclassical economists have underscored that government intervention in this regard is warranted and needed. Moreover, there is also criticism that ESG compliance will remain limited if it exclusively focuses on environmental sustainability while ignoring the short-term, more pressing needs of the impoverished population in many parts of the world. In other words, as important as the future environmental sustainability agenda is, the needs of the present basic economy also need to be addressed.

With such a backdrop, a rising nexus exists between the developmental state, industrial policy, and ESG principles. Modern developmental state and industrial policy need to take into account environmental elements as they help to legitimize government interventions, whereas ESG practices also need to take into consideration short-term economic needs as well as instruments to channel government measures to break the business-as-usual cycle. This might be summarized in Table 4.

<table>
<thead>
<tr>
<th>Coverage of Areas</th>
<th>Legitimacy for government intervention</th>
<th>Primarily economic</th>
<th>Primarily environmental and social</th>
<th>Economic, social and environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical ESG</td>
<td>Classical Development State and Industrial Policy</td>
<td>New Developmental State: Green Economic Transformation</td>
<td>Widespread legitimacy</td>
<td>Contentious legitimacy</td>
</tr>
</tbody>
</table>

The rise of new developmental states offers opportunities for developing countries like Indonesia, which is striving to promote structural transformation in a way that elicits more legitimacy as such goals are intertwined with social and environmental sustainability.
Strategic Position of Nickel Commodity

Advances in clean energy technologies are key to regulating environmental policies to encourage sustainable production and consumption behavior worldwide (Nassani et al., 2019). In 2020, energy demand from oil, gas, and coal decreased by 5% compared to the previous year due to the COVID-19 pandemic. Meanwhile, energy demand from new energy systems, such as renewable energy, remained constant.

Nickel is required to facilitate the successful implementation of new energy technologies. With unique properties that make it essential for a wide range of applications, nickel is used in many clean energy technologies, such as batteries for electric vehicles (EVs) and energy storage. Some emission reduction technologies may only require a small amount of nickel, but that small amount still plays an important role. Material engineering on nickel sulfate can produce high-performance energy storage devices, and according to Sameti and Haghighat (2018), energy storage systems play a very significant role in achieving the Net Zero Emission target compared to the conventional electricity system currently implemented.

Nickel’s strategic importance is underscored by its critical role in EV batteries, which are experiencing rapid demand growth. LIB (Lithium-ion) based batteries with high nickel content are the technology of choice for EVs as they offer the highest energy density on the market. Energy density is a priority for original equipment manufacturers (OEMs) as it determines the distance a vehicle can travel per battery charge. Additionally, nickel-containing cathodes in LIBs make the batteries smaller and lighter, leading to more efficient EVs capable of longer driving distances.

This aligns with data from the International Energy Agency (IEA), which estimates that by 2030, electric vehicle sales will reach 125 million units worldwide. The rapid growth of the electric car industry directly impacts the demand for batteries that use nickel as a key component. Nickel demand almost doubles over the period to 2050, driven by the rapid deployment of EV batteries.

Historically, nickel has been primarily used for alloys, including stainless steel and non-ferrous applications, but from 2020 to 2023, the clean energy sector will become the main driver of a 30% increase in overall nickel demand. By 2023, the share of clean energy applications in total nickel demand will cross 15%, with EV batteries being the major source of demand. Looking to the future, the demand for high-quality nickel raw materials is predicted to continue increasing, driven by the widespread adoption of electric vehicles in various countries and the substantial expansion of low-emissions power generation, such as wind and geothermal energy.

Nickel’s Strategic Position: Indonesia Case

Indonesia’s nickel industry is pivotal in the global transition to electric vehicles (EVs) and green industrial policies. Currently, 70% of nickel demand is for steel production, but with decarbonization, demand for EV batteries could rise from 6% in 2020 to one-third by
Recognizing this, Indonesia aims to attract investments to boost production capacity along the EV supply chain, leveraging its comparative advantage in nickel.

1. Indonesia holds the world’s largest nickel reserves, about 21% of the global total, estimated at 21 million metric tonnes. In 2022, Indonesia produced 1.6 million metric tonnes of nickel, far outpacing other countries. Major nickel reserves are concentrated in Eastern Indonesia, particularly Sulawesi, Maluku, and Papua.

2. Indonesia’s nickel is processed into battery-grade material through High-Pressure Acid Leach (HPAL) and Rotary Kiln-Electric Furnace (RKEF). HPAL, less carbon-intensive, is set to increase its share of production from 2% in 2023 to 15% by 2030, while RKEF’s share is projected to drop from 90% to 80%. This shift could reduce the carbon intensity of nickel production from 80 t CO2 per tonne to 75 t CO2 per tonne by 2030. However, the reliance on coal for energy could keep total emissions high despite cleaner processing methods (IEA, 2023).

3. Environmental impacts, including deforestation and land use, and challenges in managing hydrometallurgical waste highlight the need for sustainable practices. Indonesia’s efforts to integrate renewable energy and improve waste management are crucial for reducing the environmental footprint and aligning with global sustainability goals.

Furthermore, Indonesia has established the Indonesia Battery Corporation in 2021 to advance its position as a leading supplier of EV batteries, with a target to manufacture 140 gigawatt-hour (GWh) battery capacity by 2030. This initiative aims to capitalize on Indonesia’s role as the world’s largest nickel producer and enhance its involvement in the value chain of mineral supplies, thereby contributing significantly to global efforts in clean energy technology and critical minerals security.

**Indonesia’s policy in encouraging nickel downstreaming**

Indonesia’s downstream strategy is anchored on the 1945 Constitution, specifically in Article 33 paragraph (3), which states that the earth, water, and the wealth contained therein shall be controlled by the state and utilized to the greatest extent for the prosperity of the people. Nickel, as one of the natural resources, must then be controlled by the state and utilized for the greatest prosperity of the Indonesian people. In encouraging nickel downstream in Indonesia, the government has taken various policy steps through the establishment of regulations underlying industrial downstream in Indonesia. Government policy in the formation of industrial downstream regulations in Indonesia can be described as:

1. Law No. 4/2009 as amended by Law No. 3/2020 on the Amendment to Law No. 4/2009 on Mineral and Coal Mining
This law explicitly stipulates the obligation of every business entity operating in the mining sector to enrich the added value of minerals. A minimum threshold for processing and/or refining is also contained in this regulation, taking into account factors such as increased economic value and market needs. This regulation also includes the obligation to process and/or refine minerals produced from mining. Specifically for nickel, the government oversees the downstream process through supervision of processing and/or refining, including the enhancement of its added value.

2. Law No. 3/2014 on Industry

This regulation emphasizes increasing the added value of natural resources through the development of domestic processing industries. Steps taken to strengthen and deepen the national industrial structure include increasing the industry’s added value. In this context, the government has the authority to impose restrictions or even prohibitions on the export of natural resources. One example of this application is the government policy that encourages nickel downstream by implementing a ban on nickel exports in the form of raw materials in accordance with the direction of this regulation.

3. Government Regulation Number 96 of 2021 concerning the Implementation of Mineral and Coal Mining Business Activities

This regulation provides a more detailed legal framework for the implementation of mining business activities and processing of mining products. One of the things underlined in this regulation is the obligation to increase the added value of minerals, including nickel commodities. Explicitly regulated in this regulation is the obligation for business actors to carry out processing and/or refining to increase the added value of minerals mined domestically.

4. Minister of Energy and Mineral Resources Regulation Number 25 of 2018 on Mineral and Coal Mining Business has been amended several times, most recently by Minister of Energy and Mineral Resources Regulation Number 17 of 2020 concerning Third Amendment to Minister of Energy and Mineral Resources Regulation Number 25 of 2018 concerning Mineral and Coal Mining Business.

The Indonesian government’s downstream strategy also entails a ‘stick and carrot’ approach. The term ‘stick’ refers to negative incentives or sanctions given to companies or investors that do not comply with downstream investment policies or targets. Whereas ‘carrot’ refers to positive incentives or rewards given to companies or investors that meet or exceed downstream investment targets. Indonesia applies this ‘stick and carrot’ approach to develop an end-to-end EV supply chain for EV battery manufacturers and exporters. In the upstream (mining and processing), Indonesia utilizes its nickel reserves and applies restrictive measures in the form of export bans (stick), while in the middle (EV battery production) and downstream (EV production and EV adoption), Indonesia offers incentives in the form of tax incentives (carrot).
At the upstream end of the supply chain, Indonesia utilizes its abundant nickel reserves and applies restrictive measures, which are stipulated in Law No. 4/2009 on Mineral and Coal Mining as amended by Law No. 3/2020 on the Amendment to Law No. 4/2009 on Mineral and Coal Mining.

The harnessing of natural resources for economic development can also be found in other countries. One of the most notable benchmarks is China and its rare earth mineral downstream. Shen, Moomy, and Eggert (2020) show that China’s pro-industry policies have successfully promoted downstream processing industries. They examine the export restriction policy on raw rare earth minerals and find that this policy significantly increased the domestic processing of rare earth minerals. Figure 1 shows the increasing REM refinery in China and export restriction.

![Figure 1 Increasing REM Refinery in China and Export Restriction](source: Shen, Moomy, and Eggert (2020))

During the first decade of the export restriction implementation, China’s REM processing capacity increased by 15% annually. From 2004 to 2014, China’s share of global REM processing capacity rose from 43% to 70%. Since 2015, around 80% of China’s REM production has been processed domestically, with only a small portion exported in raw form. This policy leads to domestic REM prices being much lower than international prices, providing an indirect subsidy to downstream REM sectors with competitively priced raw materials. For example, in 2011, international REM prices were seven times higher than domestic prices in China.

Like China’s mineral export restriction, Indonesia’s most radical stick strategy was the raw nickel ore export ban imposed in 2014, which was relaxed in 2017 and eventually re-imposed in 2020. Amid fears of a global nickel supply shortage, the ban convinced foreign companies to set up processing plants in Indonesia. There are currently several nickel
processing projects being prepared in Indonesia, and these projects will be key to the future global nickel supply for batteries, at least in the near term.

In addition to the export ban, Indonesia is also considering imposing an export tax on nickel products with a nickel content of less than 70%. Such an export tax would be aimed, among others, at an intermediate product called mixed hydroxide precipitate (MHP, typically having a nickel content of 34% to 55%), which is the result of high-pressure acid leaching (HPAL) plants. The new or planned processing plants for the battery supply chain in Indonesia are HPAL plants and produce MHP. To avoid this envisaged tax, companies have to move up higher in the supply chain in Indonesia.

At the downstream segment of the supply chain, Indonesia uses a carrot strategy to offer incentives for EV consumers through Presidential Regulation No. 79/2023 on the acceleration of the battery electric vehicle program for road transportation educed parking fees, or lower electricity tariffs at charging stations. With the presidential regulation, both four and two-wheeled EV consumers may receive sizable incentives in the form of waiving luxury goods tax. Furthermore, under the new presidential regulation, the incentives do not just apply to EVs that are made locally but also to imported EVs as long as the manufacturers have a plan to produce their EVs locally in the future.

Currently, Indonesia has no domestic production of EV or EV battery cells and lags behind in EV adoption compared to leading markets in Europe, China, and the United States. However, the first domestically produced EV and EV battery cells are in sight: South Korean automaker Hyundai and battery giant LG Energy Solution (LGES, which supplies batteries to companies such as General Motors, Tesla, and Volkswagen) are currently building Indonesia’s first EV battery cell factory, with a planned annual production capacity of 10 GWh. At this gigafactory, LGES will produce their new nickel-rich battery cells, which contain 90% nickel in the cathode. The plant is expected to start production in 2024. These battery cells will be used by Hyundai and its affiliate Kia. According to the government, LGES’ $1.1 billion investment in this plant is part of a $9.8 billion overall EV battery cell investment deal.

There has also been an announcement that Chinese battery giant CATL (which supplies batteries to companies such as Tesla, BMW, and Volkswagen) plans to invest $5 billion in Indonesia. CATL’s recycling arm, Brunp, has invested in a nickel processing project led by Chinese battery material producer GEM.

Transforming raw natural resources into value-added products has become a heated topic of debate. Governments should consider intensifying current economic policies by focusing on downstream products and leveraging comparative advantages in upstream industries to enhance competitiveness. Conversely, Antoci et al. (2014) suggest that industrialization policies may negatively impact the well-being of those working in the agricultural sector and other general workers. This debate arises because the downstream of natural resources has significant implications for various aspects, including legal, social, environmental, international, policy design, and political considerations. This is an analysis of the pros and cons related to the downstream of natural resources, focusing on the aforementioned aspects.
1. Legal: Advocates of downstreaming argue that it facilitates more systematic and effective natural resource management within applicable legal frameworks. According to Adams, O’Connor, and Vanclay (2019), downstreaming can bolster the legal protection of natural resources, stimulate foreign investment, and enhance transparency in resource management. However, counter arguments suggest that downstreaming may exacerbate legal injustices and violate the rights of indigenous communities or groups dependent on natural resources.

2. Economic: Supporters of downstreaming contend that processing natural resources locally can increase the added value of products and contribute to the industrial sector’s role in economic growth. Job creation, income growth, and dependency reduction are cited as some of its benefits. Conversely, opponents express concerns about potential imbalances in the distribution of economic benefits, particularly for local communities and remote areas. Figure 2 shows downstreaming as a process of natural resource transformation.

3. Social: Proponents argue that downstreaming, by promoting downstream activities, can create new job opportunities and improve local economic well-being. Critics, however, contend that downstreaming often lacks fair community participation and may lead to social conflicts.

4. Environmental: Advocates of downstreaming assert that efficient processing of natural resources can reduce harmful environmental impacts and promote sustainable practices. Nevertheless, critics argue that downstreaming can cause significant environmental damage, such as deforestation, water pollution, and greenhouse gas emissions. According to Schandl et al. (2020), unwise downstreaming practices can threaten environmental sustainability and disrupt nature’s ability to support balance in ecosystems.
5. International sphere: Supporters argue that downstreaming enables a country to reduce its dependence on the export of raw materials and increase economic added value. However, critics contend that downstreaming can create power imbalances in global economic relations and result in the unfair exploitation of natural resources. This is exemplified by a complaint against Indonesia’s policy banning the export of nickel ore at the WTO.

6. Political: Supporters argue that downstreaming can enhance political stability and reduce dependence on economic sectors vulnerable to commodity price fluctuations. However, critics argue that downstreaming often occurs in the context of authoritarian or corrupt policies, benefiting political elites and harming the wider public’s interests. Acemoglu et al. (2019) suggest that downstreaming can create power imbalances and strengthen kleptocracy in authoritarian political contexts.

**Indonesia’s Nickel Downstreaming: New Developmental State in Practice**

Based on these findings, Indonesia’s nickel downstreaming strategy may be perceived as a manifestation of a new developmental state model. On one hand, the country sees tremendous opportunity from its abundant reserves of the increasingly strategic nickel. On the other hand, it taps into the paradigm of a new developmental state, which legitimizes proactive government intervention in the economy to add value to its nickel resources as long as the ultimate objective includes social inclusion and environmental sustainability. In other words, the downstreaming strategy is a practical example of how the old developmental state model has been refined into the new one. The researchers summarize the framework of analysis in Figure 3.

![Figure 3 Developmental State and Sustainable Future Model](image)

*Figure 3 Developmental State and Sustainable Future Model
Source: Author (2024)*
If Indonesia were to harness the old developmental state and industrial policy model, the government would probably focus its policy on supporting the development of new sectors that do not have a direct bearing on sustainability. With the old paradigm, the government would be content in developing the stainless-steel industry as it would already mark an industrial upgrading that is needed for the economy to grow. Nonetheless, as has been explained, the government’s ultimate objective for downstream has been the EV battery manufacturing industry, a sector that does not just engender higher added value but is also critical for the energy transition.

The government does not exclusively direct its efforts to help create the EV battery manufacturing industry but also strives to ensure that such industry grows in an environmentally sustainable manner. For instance, the government is adamant that the tailing from the HPAL nickel processing plant must not be disposed of under the sea (the so-called deep-sea tailing) but instead must be processed through the dry-stacking method, which may reduce its negative environmental impact. The government also encourages industry to reduce its carbon footprint by utilizing renewable energy, such as by promoting carbon capture storage for the nickel downstream industry.

Aside from environmental protection, the government is also keen to ensure that the nickel downstream industry also generates greater economic benefits for the local communities. This among others is done by strengthening the implementation of the MSMEs partnership program, in which large investors that receive fiscal incentives (such as tax holiday) are obliged to work with local MSMEs. Encouraging the inclusion of local MSMEs into large investors’ supply chains is one of the most potent ways to ensure that local communities can reap greater benefits from downstreaming. For investors, failure to work with MSMEs may entail the risk of their incentives being revoked.

The downstreaming of the nickel industry is also an important step in linking mining industrial policy with the SDGs. Through the downstream process, nickel extracted from mining is processed into value-added products, such as renewable energy batteries to electric vehicle components. The connection between the nickel downstream industry and the SDGs occurs in various aspects. Among others, the nickel downstream industry contributes to SDG 9 (industry, innovation, and infrastructure) by building sustainable infrastructure and promoting innovation in the production process.

In addition, through the production of renewable energy batteries, the industry supports SDG 7 (affordable and clean energy) in expanding access to affordable and clean energy. Furthermore, the nickel downstream industry also plays an important role in achieving SDG 8 (decent work and economic growth) by creating jobs and inclusive and sustainable economic growth. In the context of responsible consumption and production (SDG 12, responsible consumption and production), the nickel downstream industry can practice resource efficiency, waste reduction, and nickel reuse and recycling. In addition, its contribution to SDG 13 (climate action) is seen in the development of environmentally friendly solutions, such as renewable energy batteries, which help reduce greenhouse gas emissions and support action on climate change. In this regard, the downstreaming of the nickel
industry is one of the important efforts in integrating sustainable practices and SDGs into the implementation of mining sector industrialization policies in Indonesia.

Implementing the new developmental state model through a downstreaming strategy, Indonesia has achieved positive outcomes. At the macro level, the country has attracted investments in manufacturing sectors and diversified its export base towards higher value-added goods. Notably, regions hosting nickel downstream industries, such as Morowali in Central Sulawesi and Central Halmahera in North Maluku, have experienced substantial improvements in their standard of living. Over the past four years following the ban on raw mineral exports, real GDP per capita in these regions grew by 102.49% and 22.95%, respectively, far surpassing the national average of just 3.53% (see Figure 4). Moreover, Indonesia’s increased export share of critical minerals, as highlighted by the IEA, has elevated its role in the global shift towards a greener economy, bolstering its international diplomatic leverage. This structural transformation signifies Indonesia’s departure from its previous reliance on resource extraction, potentially averting premature deindustrialization and positioning the country on a sustainable economic trajectory.

![Figure 4 Real GDP per Capita of Downstream Nickel Industries Cities](source: BPS (2023))

In contrast with old developmental state models where social outcomes are usually neglected, Indonesia performs better in this regard. Jobs at the regional level for local people are growing, as indicated by a lower unemployment rate compared to the national level (Figure 5). The job growth is quite robust, with unemployment falling by 2.8% and 2.4% in Central Halmahera and Morowali during the downstream policy implementation period, beating the national record of a 1.8% drop. The number is not significant, but considering the long-run impact of COVID-19 on the labor market, these regions are recovering faster. Big industry players are required to have subcontracting agreements with local SMEs, which also help spur a wider opportunity to prevent higher inequality. However, the government has to
work more on the environmental aspects, as environmental damage to the local community continues to rise (Figure 6).

![Figure 5 Unemployment Rate in Downstream Nickel Industries Hosting Cities](source)

**Source:** BPS (2023)

![Figure 6 CO2 Emission in Downstream Nickel Industries Hosting Province](source)

**Source:** Global Energy Monitor (2023)
Conclusion

History demonstrates that Indonesia has much to learn from the industrial policy experience of East Asian developmental states. Among others, the Indonesian government should be more proactive in encouraging industrial upgrading of its companies through various policies such as ‘carrots’ and ‘sticks’ that must come with clear conditionalities. However, the window for the Indonesian government to replicate the policies of its more advanced peers in the past is closing today. The kind of active government intervention used by East Asian developmental states now falls out of favor amidst the pro-globalization discourse. Moreover, the increasingly ravaging climate change impacts make it very clear that industrial policy that only focuses on economic growth is no longer enough. Amidst this conundrum, Indonesia has a new window of opportunity to tap into, the growing nexus between developmental state, industrial policy, and ESG principles. With ESG imperative, the government’s proactive intervention is justified to correct market failures, which is important not just to achieve economic transformation but also for environmental sustainability and social empowerment.

Indonesia harnessed the window of opportunity with its ‘downstreaming’ strategy. Through the downstreaming, the Indonesian government attempts to seize the advantage that comes with having the world’s largest nickel reserve by following several hallmarks of East Asian industrial policy, including active government intervention in the market through a nickel ore export ban. However, even though the policy has the potential to significantly improve key economic indicators, the classical East Asian style of developmental state and industrial policy may engender negative environmental and social side effects. To that end, the Indonesian government also adjusts its foray into industrial policy amidst the new global context by targeting the electric vehicle battery sector, which is pivotal for the global energy transition, and ensuring that the downstream industry mitigates its possible negative environmental externality.

The Indonesian government’s endeavor to align industrial policy with ESG imperatives still leaves much room for improvement. For instance, despite some progress, the carbon footprint of the downstream industry remains high. Going forward, the government should formulate a downstreaming model through regulations that optimize its positive economic impacts while mitigating negative effects across social and environmental dimensions. The downstreaming agenda in Indonesia should continue to be refined to serve as a better model for the nexus between developmental state and industrial policy and ESG principles.

Acknowledgement

The authors would like to acknowledge the support of Universitas Indonesia. They would also like to thank the Journal of ASEAN Studies reviewers, who have provided meaningful feedback and opened up new perspectives.
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