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

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How to Cite: Lahadalia, B., Wijaya, C., Dartanto, T., & Subroto, A. (2024). Nickel downstreaming in Indonesia: Reinventing sustainable industrial policy and developmental state in building the EV industry in ASEAN. *Journal of ASEAN Studies*, *12*(1), 79−106. https:/doi.org/10.21512/jas.v12i1.11128

Abstract

The developmental state concept, which entails proactive government support for economic structural transformation, remains contentious today. Some scholars vigorously argue that government intervention in the economy was indispensable to the success of East Asian countries, whereas others are critical of the practice, arguing that it tends to neglect sustainability dimensions and contending that government intervention in the market is often unwarranted. In this study, the authors analyse how Indonesia's nickel 'downstreaming' strategy represents a new developmental state model that considers the aforementioned discourse on the merit of industrial policy. The new model aligns the classical developmental state concept with the need to address pressing environmental and social concerns, which are widely recognized as being of paramount importance. Through an integrative literature review and secondary data analysis, the study reveals that Indonesia's downstreaming strategy does exemplify a new developmental state model, as the government does not aim just to stimulate economic growth but also to contribute to the energy transition with EV battery manufacturing and to invigorate social inclusion by ameliorating inequality particularly in Eastern Indonesia. Nevertheless, the application of the new developmental state model through the downstreaming strategy uncovers some areas where improvement is necessary. The policy needs to be continuously refined so that its negative environmental and social externalities can be mitigated, and it can serve as a better example of a new developmental state model.

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

Journal of ASEAN Studies, Vol. 12, No. 1 (2024), pp.79−106
ISSN 2338-1361 print / ISSN 2338-1353 electronic
Received: 12th January 2024/ Revised: 25th June 2024/ Accepted: 8th July 2024

Introduction

Nations endowed with abundant natural resources often face the paradox of the 'resource curse', which is characterized by sluggish economic growth and social instability despite possessing a wealth of resources such as oil, gas, and critical minerals (Smith & Waldner, 2021). To address these challenges, industrial policy has become an essential instrument for fostering potential growth and development (Rodrik, 2004). However, the implementation of such policy is also increasingly shaped by considerations of sustainability, specifically environmental, social, and governance (ESG) criteria (Ferraz et al., 2021), which often impose a new constraint on resource-rich countries. Critiques have also highlighted that industrial policy might not work in the contemporary world based on global value chain (Werner et al., 2014).

Against the backdrop, Indonesia has resorted to a 'downstreaming' policy to add value to the commodities owned by the country by promoting resource-based industrialization. Once reliant on raw mineral exports to drive economic growth (Ferreira & Pinto, 2022), the strategic shift towards downstream processing marks a pivotal move for Indonesia. This policy aims to bolster industrialization, particularly in sectors such as electric vehicle (EV) battery production, which aligns with global sustainability goals (Meckling, 2021). The policy also differs from the East Asian model of industrialization, given its focus on utilizing domestic natural resources (Hayashi, 2010; Tai et al., 2013).

Aligning with sustainability goals is critical to Indonesia's downstreaming policy and essential for garnering international acceptance and investor confidence. Downstreaming enables Indonesia to better navigate the delicate balance between mitigating the threat of deindustrialization, escaping the middle-income trap, and adhering to ESG principles.

Based on a report on global critical minerals by the International Energy Agency (IEA), Indonesia stands poised to emerge as a significant player in the clean energy transition, given that it owns the world's largest nickel reserves (21% of global reserves) and largest nickel refining capacity (over 50% of global capacity; IEA, 2024). Nickel's pivotal role in energy-storage technology, a cornerstone of the energy transition sector, adds to Indonesia's significance in this sector. Many EV batteries require high nickel content—as high as 80% for the cathodes of nickel–manganese–cobalt (NMC) batteries, and Indonesia's nickel resources thus are poised to be critically important in this transformative global shift. Notwithstanding the potential, several studies have highlighted the challenges in the execution of the downstreaming policy in Indonesia, citing issues with the adequacy of infrastructure, technology access, skill gaps, and environmental considerations (Istiqomah et al., 2020).

The efficacy of Indonesia's downstreaming policy will be contingent upon the execution of an approach that harmonizes economic objectives with social and environmental sustainability. Fukuzawa (2012) highlighted the importance of adopting green industry principles in nickel processing, incorporating environmentally friendly technologies, effective waste management, and ethical labour standards to ensure sustainability and minimize

negative environmental and social impacts. Achieving this vision requires a policy framework that fosters economic growth while adhering to the Sustainable Development Goals or SDGs.

To date, a limited number of studies have examined resource-based industrial policies or downstreaming as part of the linkage between developmental state model and sustainability practices. This article aims to further enrich the discourse on the matter by analysing Indonesia's nickel-downstreaming agenda by integrating the developmental state framework and ESG practices. Importantly, Indonesia's circumstances significantly differentiate the country and its policies from resource-scarce East Asian countries and their developmental state policies. The primary contribution of this study is its development of a downstreaming policy model aimed at fostering high-quality and inclusive economic growth while simultaneously addressing sustainability concerns.

Research Method

The authors employed an integrative literature review to elucidate the relationship between developmental state theory and sustainability in the nickel downstreaming policy (Snyder, 2019). Heeding Knopf's (2006) assertion that relevant reports may come from a variety of sources beyond academia, this study incorporated books, academic journals, Indonesian regulations, and several development indicators on these topics. The review synthesized the findings by following Torraco's (2016) procedure, namely summarizing the primary conclusions, highlighting areas of consensus and disagreement, and identifying gaps in the literature. Moreover, the authors also utilized secondary data analysis and closely examined the data provided by international institutions (e.g. IEA) and national agencies (e.g. Indonesian Statistical Agency).

The analysis emphasized the strategic significance of nickel commodities for the global energy transition. By exploring the interconnections between developmental state theory and ESG practices, this study adopted an integrated approach that merges a theoretical framework with practical application. The focus on the nexus between these concepts is crucial for comprehending the strategic role of nickel downstreaming policy. This study contributes to the discourse by offering insights into the close associations between these pivotal concepts, elucidating the critical impact of strategic downstreaming on sustainable development.

Analytical Framework: Developmental State Theory and ESG Principles

Castle (1992) argued 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. Further, Knight (2014) defined a developmental state as a state in which 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, the developmental state model emerged during the post-World War II economic resurgence of East Asian countries, especially Japan. Later, following the devastating Korean

War, South Korea replicated several key Japanese policy instruments for its own economic transformation strategy. Subsequently, in the late 1970s, China's developmental state model began with the implementation of economic reforms under Deng Xiaoping.

Johnson (1982) identified the key elements of Japan's developmental state model: extensive government intervention in development, active industrial policies for economic growth, and the central role of the state bureaucracy. Wong (2004) argued that these elements have been evident across East Asia, where the states have attempted to maximize national productivity through strategic market interventions. States are equipped with robust institutional capabilities for formulating and enforcing targeted economic policies, especially in key industrial sectors. Wade's (2018) analysis went further, highlighting the importance of high investment rates, coordinated sectoral promotion, and strategies such as export promotion and import substitution. Institutionally, limited central bank and financial sector independence and close state–industry relations for disciplined economic management have been vital. The East Asian states have employed policies such as directed credit, fiscal incentives for investment, trade protection, and strategic negotiations with foreign investors.

Subtle differences have appeared in the implementation of different countries' development models. Chang (2022) noted how South Korea resorted to vigorous government trade protection to develop its nascent manufacturing base, including by banning all importation of cars until the late 1980s. Korea further provided hefty financing support through state-owned banks for national companies to diversify into strategic new sectors. However, South Korean government's support for its domestic industries imposed a high price on the national companies, which were obligated to meet various targets, primarily regarding exports. Only companies that managed to demonstrate their competitiveness by achieving a greater footprint in the international market would continue to benefit from the government's largesse, and the government did not have any qualms about cutting off companies that failed to meet their high standards. Studwell (2013) thus observed that South Korean industrial policy was less about 'picking winners' than it was about 'weeding out losers'.

The Chinese government, on the other hand, shifted from a centrally planned economy to a more market-oriented socialist market economy. Keping (2010) contended that China's developmental state model represented a new paradigm in the development of developing countries; some Chinese policies that can be considered by other developing countries include (1) prioritizing research and development and technological innovation, (2) providing funds and financial support through state-owned banks, and (3) investing in infrastructure development, including the development of transportation networks and energy, communications, and related sectors.

Notwithstanding each country's unique contexts, East Asian countries exhibit several commonalities in their development strategy. The authors summarize important similarities between the East Asian countries' national strategies, synthesized from the literature, in Table 1.

The East Asian developmental states also demonstrated some weaknesses. Wong (2004) noted how they are 'social welfare laggards' because they have implemented too few programmes concerned with socioeconomic redistribution. Kim (2007) also argued that even though Korea experienced an economic miracle, the country's social policy and outcomes are underdeveloped, as real wage growth lags far behind productivity growth. Another problem of the success of the developmental state model in promoting industry is the consequent environmental degradation (MacNeil & Paterson, 2012).

Table 1 Similarities in Developmental State Models of Japan, Korea, and China

Aspect	Similarities in Policy Implementation
Research and development (R&D) and innovation investment	The three countries recognized the importance of R&D and innovation in strengthening economic sectors. Governments encouraged investment in R&D, established research institutes, and encouraged public–private partnerships for technological innovation.
National industrial protection and promotion	Japan, China, and South Korea implemented national industrial protection and promotion policies to improve the competitiveness and sustainability of key sectors. Their governments provided financial support, implemented protectionist policies, and offered incentives to industries considered strategic for economic growth.
International trade and globalization	The three countries' governments were active in shaping markets, establishing trade partnerships, and participating in global supply chains to strengthen exports and develop economic relations with other countries.

Source: Authors' Analysis

In the economic literature, the term 'developmental state' is often used interchangeably with the term 'industrial policy'. The notion of industrial policy entails 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 that steer production towards sectors with higher growth potential, affecting both targeted industries and downstream sectors (Blonigen, 2016; Pack & Saggi, 2006). 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. A number of mainstream economists, such as Baldwin (1969), Krueger (1997), and Pack and Saggi (2006), typically oppose government intervention in industry, arguing it can harm market efficiency more than it can correct market failures. In contrast, scholars such as Wade (1990), Amsden (1992), Rodrik (1995), Stiglitz (1996), and Chang (2006) have highlighted the indispensable role of industrial policy in East Asia's rapid economic transformation.

Despite differing views in the scholarship, the use of industrial policy has risen, with a worldwide increase from 381 policies in 2009 to 1,140 in 2018 (Juhasz et al., 2023). Despite the criticism it often attracts in academia, both developed and developing countries widely implement structural interventions to foster industrialization (Di Maio, 2014). 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). Today, industrial policy is increasingly being embraced including by many developed countries who not so long ago publicly shunned the idea.

Within Indonesian policy circles, industrial policy has experienced periods of rise and decline. Industrialization has been viewed as central to the development process since the 1950s. However, in the early years of independence, from the 1950s until the mid-1960s, industrial development progress was slow due to political turmoil (Gunawan et al., 2020). After the mid-1960s, Indonesian industrial development became more successful. However, unlike the East Asian countries, Indonesia's success in manufacturing came with trade and investment liberalization, which encouraged foreign investment in the manufacturing sector. Moreover, Wie (2006) also highlighted that the government failed to foster an internationally competitive sector that was required to develop highly competitive industries in the 1980s. The financial crisis in the 1990s also proved to be fatal for the future of industrial policy in Indonesia, as Hill (1999) noted that the crisis drew more doubtful views for the efficacy of the industrial policy.

While the Indonesian government also pursued a pro-industrialization policy, according to Studwell (2013) and Chang (2022), the Indonesian government fell short in two areas, particularly compared to the more successful examples of the East Asian Tigers. The shortcomings are discussed in the following.

a. The East Asian Tigers compelled their domestic enterprises and conglomerates to enter higher-productivity manufacturing sectors, whereas Indonesia did not.

   The East Asian governments adopted various measures to encourage their domestic enterprises and conglomerates to enter new strategic manufacturing sectors. The measures comprised both 'carrots' and 'sticks'. For instance, the South Korean government offered various 'carrots', including government-backed concessional credit for companies diversifying into new strategic sectors. However, the government also wielded 'sticks', such as summoning the leaders of the large Korean conglomerates or *chaebols* to government detention centres to convey the importance of diversification as well as the government's ability to penalize those who defied its instruction. In light of these policies, South Korean conglomerates did not have much choice but to diversify. For instance, Hyundai, which started as a construction contractor, was nudged to diversify into shipbuilding and car manufacturing. The Indonesian government, however, did not carry out a similar policy. Indonesian conglomerates were allowed to continue to expand their business and become dominant in traditional sectors such as mining or agriculture. The carrots and sticks that were prevalent in the East Asian push for diversification were at best underused in the context of Indonesia.

b. The East Asian Tigers imposed stringent conditions for their support for national champions, whereas the Indonesian government did not.

The policy of the East Asian governments to support domestic industries could have easily backfired. The conglomerates could have misused the close relations they enjoyed with the government. Instead of diversifying as the governments hoped, the conglomerates could have persuaded, including through bribery, the government officials to continue giving them the handouts that they enjoyed. This did not occur, however, because the East Asian governments had very strong strings attached to the incentives and support they provided to domestic industries. For instance, the South Korean government's support for domestic industries (e.g. trade protection, favourable bank loans, and subsidies) came with robust export targets. Korean companies that failed to meet such targets were cut loose. In this regard, the South Korean government did not just pick the winners but also weeded out the losers. The Indonesian government did use several policies that may appear similar to those of its East Asian counterparts, but Jakarta did not insist on similar conditions. Without such conditions, Indonesian companies enjoyed the benefits of government support but did not face the kind of pressure their East Asian peers experienced to diversify.

A summary of comparison of industrial policy implementation between East Asian Countries and Indonesia, as synthesized by the authors, can be found in table 2 below.

In the past, the East Asian countries were primarily determined to achieve economic objectives, whereas today, ESG principles have become increasingly pertinent to their countries' policies. The ESG concept first came to prominence as a strategic response devised by the UN for corporations to achieve sustainable growth. In connection with the need to comply with the SDGs, companies need to highlight the nonfinancial aspects of their operations that might affect their investment valuation (Park et al., 2022). The nonfinancial aspects of ESG are an extension of the earlier idea of corporate social responsibility (Dahlsrud, 2006). Consideration of ESG compels stakeholders to consider the environmental, social, and governance aspects of an investment. Therefore, factors that were previously omitted in financial statements, such as carbon emissions, corporate governance, and community engagement, must now be managed and linked to the financial statements (Amal Zadeh & Serafem, 2018; Nelson, 2018). In addition, according to Pollman (2022), the UN *Who Cares Wins* report states that ESG standards are a way of highlighting the links between the three different areas that are increasingly important for various stakeholders. The report further elaborates that the ESG system entails sound governance and risk management, which are crucial for the implementation of policies and measures to address environmental and social challenges from the perspective of financial institutions. The shift from conventional corporate principles to ESG presents an opportunity for countries to align their concern for sustainability in their development with the support of the private sector, which is also moving in a more environmentally and socially responsible direction.

Table 2 Comparison of Industrial Policy Implementation: East Asian Countries and Indonesia

Policy	Japan	South Korea	China	Indonesia
Protection of domestic industries	Very strong; high import tariffs	Very strong; high import tariff	Very strong; trade protection and subsidies	Haphazard application of import tariffs and domestic component levels
Selecting strategic sectors and encouraging domestic companies to enter them	Very strong	Very strong	Strong	Weak
Financing support	Vigorous, including through government banks	Vigorous, including through government banks	Vigorous, including through government banks and investment funds	Weak
Conditions	Robust, with demanding export targets	Robust, with demanding export targets	Adequate	Weak
Role of foreign direct investment (FDI) to support industrialization	Hostile; FDI was very limited to provide room for the diversification of domestic enterprises	Hostile; FDI was very limited to provide room for the diversification of domestic enterprises	Very open to FDI, with many onerous conditions, including forming joint ventures and undertaking technology transfers	Very open to FDI, with inadequate requirements for technology transfers
Involvement of state-owned enterprises in manufacturing	Not involved	Involved for some critical industries	Involved particularly for upstream industries	Limited involvement of SOEs in the manufacturin g industry
Export promotion	Very strong	Very strong	Very strong	Weak

Source: Authors' Analysis

ESG has become a crucial element in the development of many countries, as investors increasingly prioritize sustainable and responsible companies. Baker et al. (2022) found through a revealed preference approach that investors are willing to pay 20 basis points more annually for a fund with an ESG mandate compared to an identical mutual fund without one. In addition, international trade is shaping investor behaviour as countries impose additional costs on carbon-intensive goods. For instance, the European Union has initiated the implementation of a carbon border adjustment mechanism (CBAM), raising the prices of carbon-intensive goods (European Commission, 2023). Moreover, consumers are becoming more environmentally conscious. A study by Frey et al. (2023) revealed that products with

ESG-related claims experienced 28% cumulative growth over the past five years, compared to 20% for products without such claims.

Several countries have undertaken initiatives to align with ESG principles. The United States enacted the Inflation Reduction Act, which aims to promote green industries, including by providing subsidies of up to $7,500 for domestically produced EVs (Internal Revenue Service, 2023; Vazquez & Judd, 2022). China is also advancing its green industrial policies by offering subsidies and providing funding support (DiPippo et al., 2022; Hao et al., 2014; Jin, 2023; Wei et al., 2023). Currently, China is the world's largest producer of solar modules and EVs (IEA, 2024). Similarly, Japan, through its Ministry of Economy, Trade, and Industry, has targeted 14 sectors related to carbon neutrality and implemented various policy initiatives, including establishing a green investment fund worth two trillion yen and a performance-based interest subsidy system for energy transition initiatives.

Green Economic Transformation: Towards a New Developmental State Model

In the past, the notion of a developmental state and that of ESG were considered as two separate subjects. Now, however, there are growing linkages between developmental states and the sustainability imperative (Yülek, 2018). The developmental state model, which primarily rests on economic growth alone, is ill-equipped to confront today's global predicaments (Aiginger, 2014), as the repercussions of climate change and social inequality are too evident to ignore. Rapid industrialization in the present context would not only be inadequate but might even be counterproductive if it were to come at the expense of sustainability. Moreover, there has been protracted criticism of state intervention, with some economists fervently arguing it to be inefficient at best and disastrous at worst. Government interference is alleged to carry substantial risk of government failure, which would undermine economic development with rent-seeking side effects.

On the other side of the equation, compliance with ESG standards is increasingly popular, as there is a growing understanding that a business-as-usual government approach to address sustainability conundrums is not enough (Peshawaria, 2024). With the rampant market failures that have enabled the marginalization of environmental or social factors in economic development, even a number of neoclassical economists have contended that government intervention in this regard is warranted (Stern, 2022). Moreover, some have argued that ESG compliance will remain limited if it exclusively focuses on environmental sustainability while ignoring the short-term but more pressing needs of the impoverished populations in many parts of the world. In other words, as important as the future environmental sustainability agenda is, present basic economic needs also need to be addressed.

In this context, there is increasing recognition of the need to augment the nexus between the developmental state and ESG principles (Kastelli et al., 2023). A modern developmental state needs to take into account environmental concerns because doing so helps to legitimize government interventions. ESG practices also need to take into consideration short-term economic needs as well as proactive government interventions to break the business-as-usual

cycle. Table 3 summarizes these concerns by comparing the classical and new model of developmental state.

Table 3 Matrix of Comparison Between the Conventional and the New Model of the Developmental State

		Scope of objectives		
		Economic	**Environmental and social**	**Economic, social, & environmental**
Legitimacy for government intervention	**Contentious legitimacy**	Conventional Developmental State Model		
	Widespread legitimacy		Conventional ESG	New Developmental State Model: Green Economic Transformation

Source: Authors' Analysis

The rise of new developmental state models presents opportunities for developing countries that are striving to promote structural transformation in a manner that entails more legitimacy because their development goals are intertwined with social and environmental sustainability.

Nickel's Strategic Position in the Energy Transition

Advances in clean energy technologies are key to encouraging sustainable production and consumption behaviours worldwide (Nassani et al., 2019). Nickel is required for numerous new energy technologies. With unique properties that make it essential in a wide range of applications, nickel is used in many clean energy technologies, such as batteries for EVs and energy storage systems (ESSs). Material engineering of nickel can produce high-performance energy storage devices, and according to Sameti and Haghighat (2018), ESSs are set to play a significant role in achieving the target of net zero emissions.

Nickel's strategic importance is highlighted by its critical role in EVs and ESSs, which are experiencing rapid demand growth (Rajaeifar et al., 2022). Lithium-ion-based batteries (LIBs) with high nickel content are often the technology of choice for EVs because they offer the highest energy density on the market. Energy density is a priority for original equipment manufacturers because it determines the distance a vehicle can travel per battery charge. Further, nickel-containing cathodes in LIBs help to make the batteries smaller and lighter, leading to more efficient EVs capable of longer driving distances. According to data from Wood Mackenzie (2020), the share of nickel-based batteries—lithium–NMC oxides and lithium–nickel–cobalt–aluminum oxides—will be around 50% in 2030. This means that the potential demand for battery-powered EVs relying on nickel could reach 84.5 million units worldwide in 2030 (IEA, 2024b). The rapid growth of the EV industry directly affects the

demand for batteries that use nickel as a key component. According to the IEA (2022), in a climate-driven scenario such as the net zero emission scenario, nickel demand in 2030 is projected to more than double from that of 2021, driven by the rapid deployment of renewable energy technology.

Historically, nickel was primarily used for alloys, including stainless steel, but from 2020 to 2023, the clean energy sector became the main driver of a 30% increase in overall nickel demand (IEA, 2024b). By 2023, the share of clean energy applications as a proportion of total nickel demand crossed 15%, with EV batteries being the major source of demand (IEA, 2024b). Looking to the future, the demand for high-quality nickel raw materials is predicted to continue to increase, driven by the widespread adoption of EVs in various countries and the substantial expansion of battery ESSs.

As nickel's strategic importance in energy transition is rising so is the crucial role that Indonesia plays. This is evident from the export of nickel-derivative products from Indonesia. In 2021, less than 5% of Indonesia's nickel-derivative exports were nickel for EV batteries, but in 2023, the number jumped to more than 20% (Trademap, 2024). In recognition of this, Indonesia aims to attract investments to boost production capacity along the EV supply chain, leveraging its comparative advantage in nickel.

Currently, Indonesia holds the world's largest nickel reserves, constituting approximately 21% of the global total, estimated at 21 million metric tonnes. In 2022, Indonesia produced 1.6 million metric tonnes of nickel, significantly outpacing other countries. These reserves are primarily located in Eastern Indonesia, particularly in Sulawesi, Maluku, and Papua (US Geological Survey, 2023).

Nickel in Indonesia is processed into battery-grade material primarily through high-pressure acid leach (HPAL). The share of HPAL production, which is less carbon-intensive than alternative processing methods, is set to increase from 2% in 2023 to 15% by 2030, whereas the share of rotary kiln electric furnace production is projected to decline from 90% to 80% (IEA, 2024a). This shift could reduce the carbon intensity of nickel production from 80 tonnes CO_2 per tonne to 75 tonnes CO_2 per tonne by 2030. However, the reliance on coal for energy could keep total emissions high, despite cleaner processing methods (IEA, 2023). Therefore, Indonesia's efforts to scale up the use of renewable energy and improve waste management are crucial for reducing the environmental footprint of nickel downstream projects and aligning them with global sustainability goals.

Indonesia is determined to ensure that nickel downstreaming reaches the most strategic products with highest added value, namely EV batteries. As the private sector was still reticent to enter the sector, Indonesian government established a state-owned enterprise namely the Indonesia Battery Corporation in 2021 to advance its position as a major producer of EV batteries, with a target to manufacture 140 gigawatt-hour (GWh) battery capacity by 2030 (IBC, 2021). 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 this critical mineral, thereby contributing significantly to global efforts in the clean energy transition.

The EV Market in ASEAN and Indonesia

As the global economy continues to exhibit signs of volatility in recent years, the economic landscape of Association of Southeast Asian Nations (ASEAN) has notably diverged from this trend by demonstrating remarkable vibrancy and resilience. For instance, while the global economic output experienced a moderate increase of 3.2% in 2023, the five principal member countries of ASEAN (Indonesia, Malaysia, Thailand, Philippines, and Singapore) or the so-called ASEAN-5 recorded a commendable 4.1% growth (IMF, 2024).

The positive economic outlook of the region is also reflected in the robust expansion of the electric vehicle market. The compound annual growth rate of EV in the ASEAN EV market is projected to reach between 16% and 39% between 2021 and 2035. Such rapid growth is set to propel, the annual sales of EV in ASEAN from US$ 2 billion in 2021 to approximately US$ 100 billion in 2035, reflecting a staggering increase of 50-fold (Utama et al, 2024).

The projected growth of EV market in ASEAN is enabled by several key factors. In the supply side, the region, particularly Indonesia and the Philippines are endowed with abundant reserves of nickel that is increasingly critical for EV battery manufacturing. Thailand, Indonesia, and Malaysia also possess adequate Internal Combustion Engines (ICE) vehicle manufacturing capacity that may support the transition to EV manufacturing. On the demand side, while the EV cost remains more expensive, governments in ASEAN including in Thailand, Singapore, and Indonesia have offered generous tax incentive to encourage EV adoption by consumers. Finally, countries in the region are also improving their EV infrastructure readiness, for instance Singapore already has 3,600 charging stations and Thailand has 2,600 charging stations (Utama et al, 2024).

The increasingly lucrative EV market in ASEAN, the region's natural resource endowment and the supportive government policies also help draw immense EV investment into the region. As can be observed in figure 1, In 2022, the EV related investment into the region jumped 6-fold which was not just spurred by FDI into EV manufacturing in the downstream but also EV battery material processing in the midstream, particularly in Indonesia. This influx of investment into the region has led the world's 10 largest EV manufacturers to establish their presence in ASEAN.

While the overall growth of EV in the ASEAN market is vibrant, the growth trajectories vary among the member countries. For instance, by 2035, the projected EV adoption rates are estimated to reach 25% in the Philippines and 15% in Malaysia, whereas Indonesia and Thailand are expected to achieve adoption rate of 50% and 45% respectively. The projection of EV annual sales in ASEAN countries can be seen in figure 2 below. Given Indonesia's vast market, 50% adoption rate of EV would translate into 4.5 million units of EV sales, making Indonesia the regional leader of EV market in terms of volume.

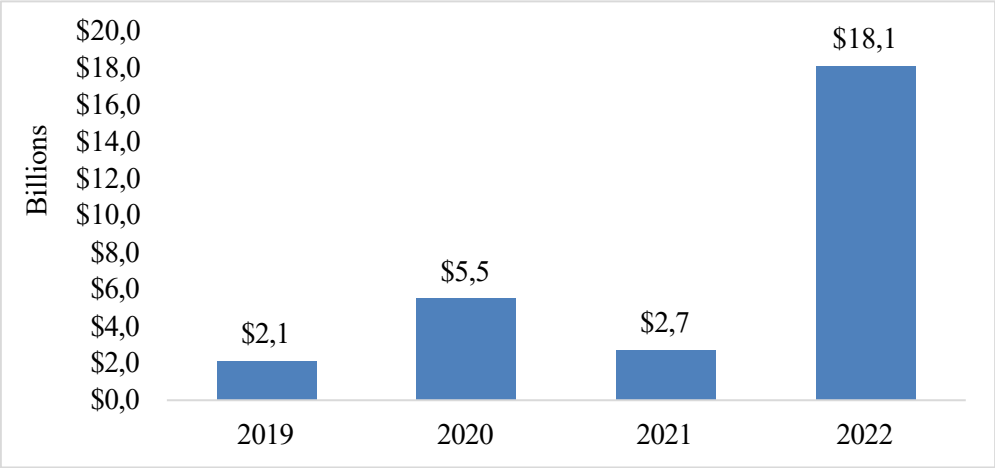

Figure 1 EV – Related Investment into ASEAN

Source: ASEAN Special Investment Report (ASEAN & UNCTAD, 2023)

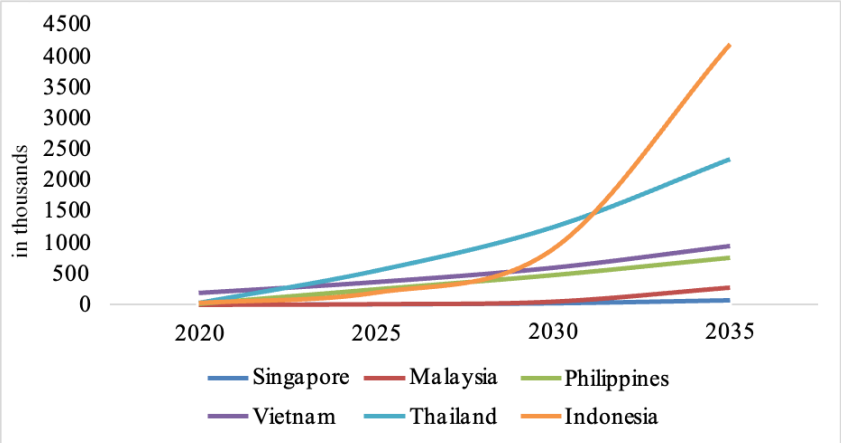

Figure 2 Projection of Annual EV Sales in 6 ASEAN Member Countries (in thousands)

Source: EY Analysis (Utama et al, 2024)

Given its leading role in the future of ASEAN EV market and its strategic natural resource endowment, Indonesia is poised to be an important epicenter of the regional EV value chain development. Taking Indonesia's importance into account, the following sections would focus on nickel downstreaming in Indonesia which is critical for the development of EV manufacturing in the country.

Indonesia's Policy to Promote Nickel Downstreaming

Indonesia's downstreaming strategy is anchored in the 1945 Constitution, specifically 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 major natural resources, must thus be controlled by the state and

utilized for the greatest prosperity of the Indonesian people. In encouraging nickel downstreaming in Indonesia, the government has taken various policy steps and established regulations supporting industrial downstreaming; these are described in the following:

1. Law No. 4/2009 as amended by Law No. 3/2020 on Mineral and Coal Mining

   This law explicitly stipulates the obligation of every business entity operating in the mining sector to increase the added value of minerals they own. The government is mandated to come up with minimum threshold for the mineral processing, taking into account market demand and the need to generate higher value for the people's welfare.

2. Law No. 3/2014 on Industry

   This regulation emphasizes the need for domestic industry to increase the added value of natural resources through the development of domestic processing industries. The government has the authority to impose restrictions or even prohibitions on the export of natural resources in this context.

3. Minister of Energy and Mineral Resources Regulation No. 11 of 2019 on Mineral and Coal Mining

   This regulation explicitly set the deadline for nickel ore export permit to December 31st 2019, after which nickel ore export would be banned. The regulation marked a turning point for Indonesia's nickel downstreaming journey. Previously, the implementation of the downstreaming strategy was not optimal with policy inconsistency. After the decree was issued, the government strictly enforced the ban which laid the groundwork for the policy's success in attracting nickel processing investment.

The Indonesian government's downstreaming strategy also entails a carrot and stick approach. Indonesia is applying this carrot and stick approach to develop an end-to-end supply chain for EV battery manufacturers and exporters. In the upstream context, Indonesia is utilizing its nickel reserves and applying restrictive measures in the form of export bans as the 'stick', and further down the value chain, namely in EV battery production and EV adoption, Indonesia is offering incentives in the form of tax breaks for producers and consumers as 'carrots'.

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 (REM) downstreaming. Shen et al. (2020) asserted that China's pro-industrial policies have successfully promoted downstream processing industries for REM. China's rare earth export restriction was found to significantly increase the domestic processing of the minerals.

During the first decade of export restrictions, 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. The export restriction led 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 REM prices in China.

Similar with China's mineral export restriction, the most radical 'stick' strategy implemented by Indonesia was the raw nickel ore export ban imposed in 2014, which was relaxed in 2017 and eventually reimposed in early 2020. Amid fears of a global nickel shortage, the ban convinced foreign companies to set up processing plants in Indonesia. There are currently several nickel processing projects under development in Indonesia, and these projects will be key to ensuring the future global nickel supply for batteries.

In the downstream segment of the supply chain, Indonesia uses a 'carrot' strategy to offer incentives for EV consumers through Presidential Regulation No. 79/2023. Under the presidential regulation, both two- and four-wheel EV consumers can receive a sizable incentive, such as a waiver of the luxury goods tax for four-wheel EV. Furthermore, under the new presidential regulation, the incentive applies not only 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, the South Korean automaker Hyundai and battery giant LG Energy Solution (LGES) are finishing the construction of Indonesia's first EV battery cell factory, with a planned annual production capacity of 10 GWh (Reuters, 2021), thus creating the opportunity for Indonesia to capitalize on the investment and improve its own EV production capacity. The plant is expected to start production in 2024. These battery cells will be used by Hyundai and its affiliate Kia. LGES' US$1.1 billion investment in this plant is part of a US$9.8 billion overall EV battery cell investment deal (Reuters, 2020). Chinese battery giant CATL (which supplies batteries to companies such as Tesla, BMW, and Volkswagen) has also announced plans to invest roughly US$6 billion in Indonesia (CATL, 2022). CATL's recycling arm, Brunp, has invested in a nickel processing project led by Chinese battery material producer GEM.

Transforming raw natural resources into higher-value-added products has become a heated topic of debate. Some argue that the Indonesian government should consider intensifying current economic policies by focusing on downstream products and leveraging comparative advantages in upstream industries to enhance competitiveness (Kim, 2023; Kim, 2024; Muhamad & Djong, 2024). For example, Kim (2024) argued that the export ban imposed by the government of Indonesia has significantly increased investment in downstream nickel sectors, including MHP, nickel matte, stainless steel, and EV batteries. Moreover, Kim (2024) highlighted the importance of strengthening the industrialization process by developing technologies, expanding financing, and improving ESG standards. On the other end of the spectrum, others have argued that the downstreaming policy has some inadequacies. Tai (2016) contended that state capacity in Indonesia is flawed as evident in the failed national car program in the 1990s with collusion between the government and the private sector. Patunru (2023) noted how the past downstreaming policy in Indonesia involving trade protection of timber and rattan did not end well, as it led to more deforestation and failed to deliver a substantial economic gain. Patunru also emphasized a concern that the overall added value of the nickel downstreaming policy would only be marginal because the value would require

extra capital and labour from other sectors, which would reduce the added value of those sectors. Finally, Patunru also asserted that the capital-intensive nature of nickel processing would mean that the added value would likely be captured as a return to foreign capital owners instead of for Indonesians.

This debate has arisen because downstreaming of natural resources has significant economic, social, and environmental aspects. The following is a summary of the potential upsides and downsides of downstreaming which have been actively discussed upon.

1. Economic: Advocates of downstreaming contend that processing natural resources locally can increase the added value of resources and contribute to the industrial sector's role in economic growth. Job creation, income growth, and reduced import dependency are cited as some of its benefits (Kim, 2023; Kim, 2024; Muhamad & Djong, 2024). Conversely, detractors express concerns about potential risks of downstreaming, including risks associated with the capital-intensive nature of nickel downstreaming (Patunru, 2023), trade retaliation (Aswicahyono & Rafitrandi, 2018), and previous cases of downstreaming failures such as the case of rattan. (Patunru, 2023).

2. Social: Proponents argue that downstreaming can create new job opportunities and improve local economic well-being. Critics, however, contend that the burden of the downstreaming policy is oftentimes asymmetrical to the detriment of vulnerable communities. The CREA/CELIOS (2024), for example, reported that there is an increasing trend of air-pollution-related health costs linked to nickel-smelting sites including the growing number of respiratory diseases.

3. Environmental: Advocates of downstreaming assert that efficient processing of natural resources can reduce harmful environmental impacts and promote sustainable practices. Moreover, if directed at EV battery production, nickel downstreaming can play a critical role in supporting clean energy transition in Indonesia and in the world. However, critics argue that downstreaming can cause significant environmental damage, such as deforestation, water pollution, and greenhouse gas emissions. According to Schandl et al. (2020), irresponsible material processing, which may be part of downstreaming practices, can undermine environmental sustainability.

Indonesia's Nickel Downstreaming: New Developmental State Model in Practice

Based on the preceding discussion, Indonesia's nickel downstreaming strategy may be perceived as a manifestation of a new developmental state model. On the one hand, the country sees a tremendous opportunity in harnessing the increasingly strategic nickel reserve it has at its disposal. On the other hand, the country is looking into the paradigm of a new developmental state model that 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 one suited to the current era. Figure 3 illustrates the analytical framework.

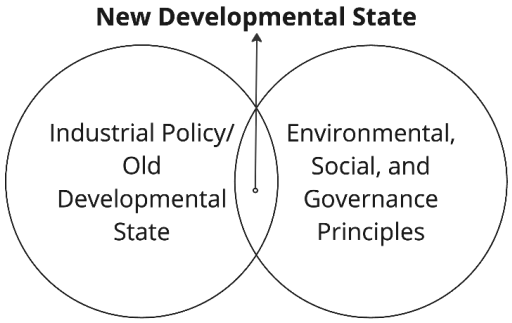

Figure 3 New Developmental State Model Source: Authors

If Indonesia were to adopt the old developmental state model, the government would probably focus its policy on supporting the development of new sectors that do not have a direct bearing on sustainability. In the old paradigm, the government would be content to develop the stainless-steel industry because doing so would already mark an industrial upgrade that is needed for the economy to grow. However, the government's ultimate target for downstreaming is the EV battery manufacturing industry, a sector which does not just involve higher added value but is also critical for energy transition.

The government is not exclusively directing its efforts to help create the EV battery manufacturing industry but is also striving to ensure that this industry grows in an environmentally sustainable manner. For instance, the government is adamant that the tailings from HPAL nickel-processing plants must not be disposed at sea (so-called deep-sea tailings) but instead must be processed through the dry-stacking method, which may reduce the negative environmental impact (Nangoy & Ungku, 2021; Silva, 2023). The government is also encouraging the industry to reduce its carbon footprint by utilizing renewable energy and by promoting carbon capture storage (CCS) for the nickel downstream industry. Currently, the government already has a number of specific regulations to promote CCS, including Presidential Regulation No. 14 of 2024 on the Implementation of Carbon Capture and Storage.

Besides environmental protection, the government is also keen to ensure that the nickel downstream industry also generates greater economic benefits for local communities. This is done by, among other initiatives, strengthening the implementation of the micro, small, and medium enterprises (MSMEs) partnership program under the regulation of the Minister of Investment/Chairman of Coordinating Board of Investment No. 1 of 2022. The ministerial regulation obliges large investors that receive fiscal incentives (such as tax holidays) to work with local MSMEs. Encouraging the inclusion of local MSMEs in large investors' supply chains is one of the most potent ways to ensure that local communities can reap greater benefits from downstreaming.

The downstreaming of the nickel industry may also mark an important step in supporting the alignment of Indonesia's economic development with the SDGs. For instance, the nickel downstream industry may contribute to SDG 8 (decent work and economic growth) by creating jobs and promoting inclusive economic growth, to SDG 7 (affordable and clean energy) by expanding access to affordable and clean energy through the increased production of EV battery materials, to SDG 13 (climate action) insofar as downstreaming may help to facilitate the energy transition that is critical for climate change mitigation, and to SDG 10 (reduced inequalities) insofar as downstreaming may help many local communities in Eastern Indonesia that have been marginalized to secure a better livelihood. In short, downstreaming opens up more opportunities for Indonesia to meet the SDG targets, particularly if the country's strategy is refined to better address social and environmental side effects.

By implementing the new developmental state model through the downstreaming strategy, Indonesia has achieved several positive outcomes. At the macro level, the country has attracted investments in manufacturing sectors and diversified its export base, increasing the share of high-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 standards 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 Fig. 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. This structural transformation signifies Indonesia's departure from its previous reliance on resource extraction. If sustained, the transformation may also potentially reverse Indonesia's premature deindustrialization and help to position the country on a sustainable economic trajectory.

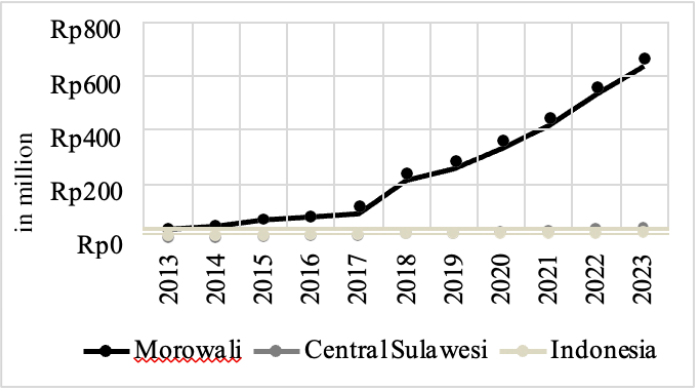

Figure 4 Real GDP per Capita of Morowali, Central Sulawesi, and Indonesia

Source: Indonesian Statistics Agency

Unlike in old developmental state models that often overlooked social outcomes, Indonesia has paid more attention to this aspect. According to Kim (2007), wealth distribution in South Korea during its rapid growth era was relatively unequal, with the national Gini coefficient rising from 0.332 in 1970 to 0.392 in 1978. Recently, Raeskyesa (2020) also posited that manufacturing growth has statistically insignificant correlation with inequality. In contrast, there have been significant improvement in the wealth distribution of downstreaming regional epicenters. The Gini coefficient in Morowali decreased from 0.377 in 2015 to 0.281 in 2023, and in Central Sulawesi, it declined from 0.374 to 0.304 over the same period. The decline in Gini coefficient can be observed in Figure 5.

Despite the improvement in Gini ratio, downstreaming has brough to fore a number of social issues that require attention, including the increasingly limited access to education and healthcare. The extraordinary expansion of the nickel downstream industry has attracted a significant influx of migrant workers along with their school – age children from various regions of Indonesia to key downstreaming hubs including Morowali and Central Halmahera. This surge in population has exacerbated the demand for social services including education and healthcare, which the existing infrastructure is unable to adequately support. As the result, some schools are forced to operate in three shifts per day, with some teachers managing more classes than is pedagogically feasible.

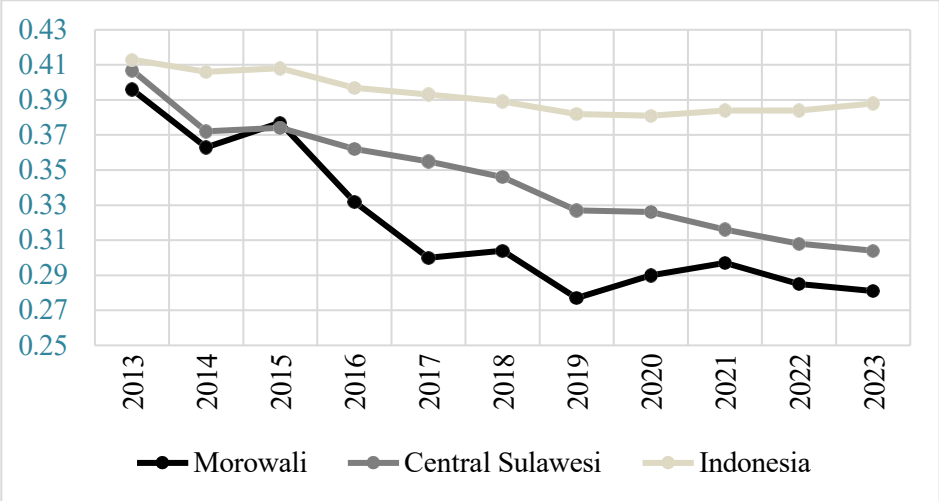

Figure 5 Gini Ratio From 2013 to 2023 in Morowali, Central Sulawesi, and Indonesia

Source: Indonesian Statistics Agency, 2024

In addition to the social issues, the Indonesian government must address environmental concerns, as local communities face increasing environmental damage. Figure 6 highlights the significant rise in CO2 emission estimates following the increased operations of downstream industries. Emissions in North Maluku increased from 2.4 million tonnes CO2 equivalent in 2020 to 15.7 million tonnes CO2 equivalent in 2023, while in Central Sulawesi, emissions rose from 9.6 million tonnes CO2 equivalent in 2019 to 20.8 million tonnes CO2 equivalent in 2023.

The increase in CO2 emission is a serious concern that the government needs to address in order to ensure the future sustainability of nickel downstreaming. There have been efforts by the government to encourage the use of renewable energy including through Presidential Regulation No. 112 in 2022 on accelerating the electricity generation from renewable energy. Nevertheless, much still needs to be done given Indonesia's persistent high reliance of fossil fuel in its energy mix.

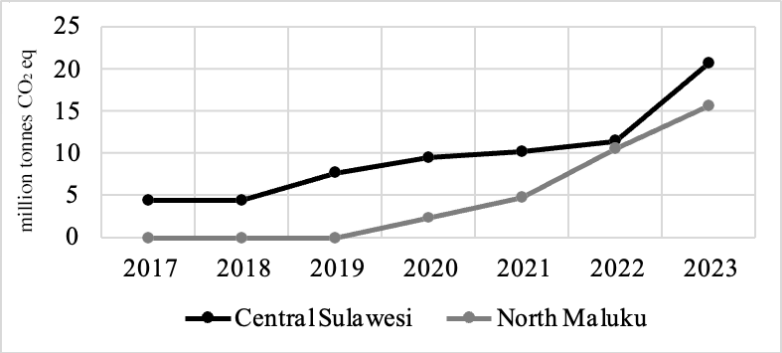

Figure 6 Estimates of CO2 Emissions in Major Regional Hubs for Nickel Downstream Industries

Source: Global Energy Monitor Tracker, 2024

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 to encourage industrial upgrading of its companies through various policy 'carrots' and 'sticks' that must come with clear conditions. 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 interventions that were used by East Asian developmental states have now fallen out of favour amidst the pro-globalization discourse. Moreover, the increasingly dire climate change impacts make it clear that an industrial policy that only focuses on economic growth is no longer adequate. In this context, there is an opportunity for Indonesia to create a strategic nexus between developmental state concept and ESG principles. In line with the ESG imperative, the government's proactive intervention can be justified if it is aimed at achieving economic transformation as well as environmental sustainability and social empowerment.

Through its downstreaming policy, the Indonesian government is attempting 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 the nickel ore export ban. However, even though the policy has the potential to significantly improve key economic indicators, a classical East-Asian-style developmental

state model would likely generate negative environmental and social side effects. Thus, the Indonesian government is also adjusting its foray to industrial policy to the new global context by targeting the EV battery sector, which is pivotal for the global energy transition as well as ensuring that downstream industries mitigate their possible negative environmental externalities. Furthermore, the government is also striving to improve social inclusion by encouraging large investors to partner with local MSMEs.

The Indonesian government's endeavour to align industrial policy with ESG imperatives still leaves much room for improvement. For instance, despite some progress, the carbon footprint of downstream industries remains high. Going forward, the government should formulate a downstreaming model that optimizes the positive economic impacts and mitigates the negative effects across social and environmental dimensions. We acknowledge that the environmental and social impacts require further in-depth and comprehensive exploration to provide a clearer understanding of the nickel downstreaming industry in Indonesia.

Through this writing, the authors presented a novel perspective that integrates the developmental state model with ESG principles. This approach addresses the ongoing dialectics surrounding globalization and liberalization in relation to Indonesia's nickel downstreaming within the context of emerging economies. The findings of this study may provide valuable insights for policymakers in developing countries and contribute to the broader intellectual discourse concerning the new developmental state.

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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