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# Insights of Strategic Pathways for the Indonesian Mining Industry in the Green Energy Transition

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**Abstract** - *Indonesia plays a pivotal role in the global energy transition due to its vast reserves of critical minerals, especially nickel, which are essential for electric vehicles and renewable technologies. This study examines Indonesia's mining sector by grounding the analysis in two complementary theories: the Natural Resource-Based View (NRBV) and Institutional Theory. The NRBV highlights how environmental capabilities—such as pollution prevention, stewardship, and clean technology—generate competitive advantage through improved efficiency, reduced risk, and access to green markets. Institutional Theory explains how coercive policy shifts, normative ESG expectations, and mimetic industry dynamics influence mining practices in emerging markets. Using secondary data from Statista, BPS, and national reports (2014–2023), we analyze export-to-GDP elasticity, foreign direct investment, greenhouse gas emissions, and ESG benchmarking. A thematic coding of stakeholder discourse from the Indonesia Mining Summit 2024 further contextualizes institutional pressures. Findings reveal that post-2020 policy interventions (nickel ore export ban) significantly boosted exports and FDI, yet rising emissions and governance gaps constrain sustainable transformation. Theoretical integration shows that while NRBV-based capabilities create opportunities for ESG-driven competitiveness, institutional pressures shape the pace and direction of adoption. This study contributes to strategic management and sustainability literature by offering evidence-based insights for policymakers, investors, and mining firms navigating Indonesia's pathway toward green industrialization.*

**Keywords** - *Mining, Energy Transition, ESG, Circular Economy, Indonesia, NRBV, Institutional Theory, Emerging Markets*

## I. INTRODUCTION

The transition to green energy is one of the defining global challenges of the 21st century, particularly for resource-dependent emerging economies. Indonesia, as one of the world's top producers of nickel, occupies a central position in the global supply chain for technologies such as electric vehicles (EVs), batteries, and renewable energy infrastructure [1]. Environmental and governance challenges are well documented in the literature. For instance, an empirical impact evaluation shows that nickel mining has led to substantial loss of forest cover in Indonesia, significantly affecting ecosystem integrity [2]. Another study highlights broader environmental and health risks across Indonesia's extractive sectors, particularly noting contamination, habitat degradation, and community exposure [3]. Additionally, research from the Sustainable Minerals Institute underscores how the reliance on coal-fired smelting has surged—up 32% in 2022—and contributed to both environmental and social disruptions, including population displacement and ecosystem stress.

In response, global stakeholders increasingly emphasize Environmental, Social, and Governance (ESG) principles and circular economy practices as criteria for sustainable competitiveness in mining [4]. For Indonesia, alignment with these principles is essential to attract sustainable investment, access green markets, and mitigate risks under mechanisms such as the EU's Carbon Border Adjustment Mechanism (CBAM). Yet, the sector continues to struggle with rising emissions, regulatory inconsistencies, and enforcement gaps.

To situate these dynamics within a conceptual frame, this study employs two complementary theories: the Natural Resource-Based View (NRBV) and Institutional Theory. The NRBV argues that firm and sectoral advantage increasingly derives from environmental capabilities such as pollution prevention, product stewardship, and clean technology [5], [6]. In Indonesia's mining context, these capabilities translate into ESG outcomes and circular practices that reduce risks while unlocking strategic opportunities. Institutional Theory, by contrast, emphasizes how organizational behaviour is shaped by coercive pressures (e.g., regulations such as the 2020 nickel export ban), normative pressures (investor and ESG disclosure requirements), and mimetic pressures (peer adoption of low-carbon technologies) [7]. Together, these frameworks explain not only why cleaner practices generate long-term

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value but also how institutional conditions accelerate or constrain their adoption in emerging markets [8].

Accordingly, this paper analyzes Indonesia's mining industry through both economic and institutional lenses. Using secondary quantitative data (2014–2023) from Statista, BPS, and government sources, we assess mining GDP, foreign direct investment, export performance, and greenhouse gas emissions. Export-to-GDP elasticity is modelled to evaluate economic dependency on mineral exports, while ESG benchmarking highlights environmental and governance gaps. Complementing this, thematic coding of the Indonesia Mining Summit 2024 is used to capture stakeholder discourse across governance reform, ESG compliance, innovation, and social inclusion. By integrating NRBV and Institutional Theory, the study identifies strategic opportunities, constraints, and pathways for Indonesia's mining sector in the green energy transition.

## II. LITERATURE REVIEW

The NRBV posits that long-term competitiveness increasingly depends on environmental capabilities such as pollution prevention, product stewardship, and clean technology (Hart, 1995; Hart & Dowell, 2011). Firms and sectors that invest in these capabilities can achieve cost reductions, improved resource efficiency, and privileged access to green markets. In the context of Indonesia's mining industry, NRBV explains why ESG alignment and circular economy practices—such as waste valorization, carbon reduction, and recycling—are not only ethical imperatives but also sources of strategic advantage.

Institutional Theory complements this view by emphasizing that organizational behaviours are shaped by coercive, normative, and mimetic pressures (DiMaggio & Powell, 1983; Scott, 2014). In emerging markets, these pressures are magnified by institutional voids and regulatory volatility (Khanna & Palepu, 2010). For Indonesian mining, coercive pressures include the 2020 nickel ore export ban and downstreaming regulations; normative pressures stem from ESG disclosure standards and investor expectations; and mimetic pressures arise when firms emulate early adopters of low-carbon technologies. Institutional Theory thus explains when and how external forces accelerate—or stall—the adoption of NRBV-related capabilities.

Together, NRBV and Institutional Theory structure the empirical approach of this study. NRBV informs the selection of performance indicators (exports, GDP elasticity, ESG benchmarking) that reflect a capability-based advantage. Institutional Theory guides the analysis of regulatory shifts and stakeholder narratives, situating Indonesia's mining transformation within broader institutional dynamics.

### *A. Mining and the Energy Transition in Emerging Markets*

The transition from fossil fuels to renewable energy has intensified global demand for critical minerals such as nickel, cobalt, lithium, and rare earth elements [9]. These materials are indispensable for low-carbon technologies, including solar panels, wind turbines, and electric vehicles. For emerging markets like Indonesia, resource endowment creates opportunities for rapid economic growth but also risks of environmental degradation and social inequality [10], [11], [12].

From an NRBV perspective, this creates incentives for firms and governments to develop clean technologies and stewardship practices to ensure that resource-based advantages translate into long-term competitiveness. From an Institutional perspective, global regulatory mechanisms—such as the EU's Carbon Border Adjustment Mechanism (CBAM)—and domestic policies like export bans exert coercive pressure on Indonesian mining firms to internalize sustainability practices.

### *B. ESG in the Mining Sector*

Environmental, Social, and Governance (ESG) frameworks have become central to evaluating corporate sustainability performance, particularly in resource-intensive industries [4]. Studies show that firms with stronger ESG practices often enjoy improved financial and operational performance through lower risk, reduced financing costs, and enhanced reputation [13].

For Indonesia, alignment with ESG norms is crucial to attract foreign direct investment and sustain export competitiveness. NRBV underscores how ESG practices strengthen firm capabilities, while Institutional Theory explains the growing normative pressures from investors, regulators, and international markets that demand ESG compliance.

### *C. Circular Economy and Resource Efficiency*

The circular economy promotes closed-loop systems that minimize waste and maximize resource utilization across product life cycles [14], [15]. In mining, this translates into recycling, reusing tailings, and integrating cleaner technologies. While developed economies have advanced such practices, adoption in emerging markets remains limited due to technological and institutional barriers [16].

Here, NRBV suggests that circular practices enhance strategic advantage by improving efficiency and lowering environmental costs. Institutional Theory adds that normative pressures from global buyers and coercive pressures from domestic regulators may gradually push Indonesian mining firms toward circular adoption.

### *D. Strategic Management in Resource-Intensive Emerging Markets*

Resource-based sectors in emerging markets face unique challenges: institutional volatility, weak enforcement, and infrastructural deficits [8]. Strategic management scholarship highlights that firms operating in such contexts must align business strategies not only with economic goals but also with institutional expectations and stakeholder demands [11], [17], [18].

For Indonesia, this means balancing export-driven growth with ESG and circular economy practices. NRBV frames this as a challenge of capability development, while Institutional Theory frames it as a response to institutional pressures—both domestic and international—that shape the mining sector's trajectory.

### *E. Theoretical Integration and Operationalization*

Table 1 synthesizes how NRBV and Institutional Theory are operationalized in this study. This dual framework enables a multi-method approach that combines quantitative elasticity modelling and ESG benchmarking with qualitative stakeholder discourse analysis.

Table I Theoretical Constructs and Operationalization In The Study

| Theoretical Construct | What It Predicts | Operationalization in Indonesian Mining Context |
|---|---|---|
| **NRBV: Pollution prevention, stewardship, clean technology capabilities** | Firms/sectors with cleaner capabilities gain competitive advantage via efficiency, reduced risk, and premium market access | Export-to-GDP elasticity modeling; ESG benchmarking; GHG time-series analysis |
| **Institutional: Coercive pressures** | Policy shocks drive industrial reconfiguration and capital inflows | Pre-/post-2020 nickel export ban comparison; shifts in FDI and exports |
| **Institutional: Normative pressures** | Investor and regulatory ESG expectations change firm practices | ESG risk benchmarking; discussion of CBAM exposure and disclosure gaps |
| **Institutional: Mimetic pressures** | Firms emulate peers and respond to stakeholder discourse | Thematic analysis of Indonesia Mining Summit 2024 |

## III. METHODOLOGY

This study employs a secondary multi-method research design that combines quantitative analysis of macroeconomic indicators with qualitative thematic interpretation of stakeholder discourse. The research design is explicitly informed by the Natural Resource-Based View (NRBV) and Institutional Theory, which serve as complementary lenses for analyzing both firm-level capabilities and system-level institutional pressures. By integrating statistical modeling with discourse analysis, the study aims to provide a comprehensive and theoretically grounded account of Indonesia's mining sector in the context of the green energy transition.

The quantitative strand of this research relies on open-source data, primarily obtained from Statista, and cross-validated with official publications of the Badan Pusat Statistik (BPS), reports from the Ministry of Energy and Mineral Resources (MEMR), and the World Bank Commodity Data Portal. The selected indicators include mining sector GDP, foreign direct investment (FDI) in mining, nickel export values, and greenhouse gas (GHG) emissions. These datasets cover the period 2014–2023 for economic indicators and 2018–2022 for emissions, reflecting the availability of reliable public data. To ensure comparability, all monetary values were converted into constant 2023 U.S. dollars using IMF inflation-adjusted exchange rates. Mining GDP reported in Indonesian rupiah was standardized to U.S. dollars, and discrepancies between Statista and BPS data were reconciled through cross-checking. Missing values, such as the absence of emissions data for 2023, were retained as explicit limitations rather than estimated, to maintain transparency.

The quantitative analysis proceeds in three stages. First, a descriptive time-series analysis illustrates the trends in mining GDP, exports, FDI inflows, and GHG emissions. Second, the relationship between mining exports and GDP growth is evaluated through an export-to-GDP elasticity model, which measures the sensitivity of mining GDP to changes in export performance. Elasticity is calculated using the following formula:

$$Elasticity = \frac{\%\Delta\ Mining\ GDP}{\%\Delta\ Mining\ Export} \quad (1)$$

Where %ΔMining GDP represents the annual growth rate of mining sector GDP, and %Δ Mining Exports represents the annual growth rate of mining export values. Sensitivity checks were conducted by recalculating elasticity while excluding the year 2020, which was heavily affected by the COVID-19 pandemic, in order to assess the

robustness of results. Third, a comparative pre- and post-policy analysis examines the effects of the 2020 nickel ore export ban, contrasting average values of exports, GDP, and FDI during the pre-policy period (2014–2019) and post-policy period (2020–2023)

The qualitative strand of the study complements the quantitative findings by examining institutional pressures and stakeholder narratives. The source material is drawn from a nationally significant event, the Indonesia Mining Summit 2024 – Session 1: The Innovation, a publicly available recording hosted on YouTube. This session featured perspectives from government agencies (notably the Ministry of Energy and Mineral Resources), parliament (Commission XII of the DPR RI), industry associations (the Indonesian Mining Association), media representatives, academia, and civil society organizations. Speaker contributions were transcribed manually and systematically organized into Microsoft Excel for analysis. Each transcript segment was recorded with its timecode, speaker identity, summary, and assigned code.

Thematic analysis followed an iterative codebook construction process. Five thematic clusters were identified as central to the discourse: governance reform, ESG compliance, technological innovation, stakeholder inclusion, and political commitment. For example, statements concerning licensing reform, enforcement, and transparency were grouped under governance reform, while those related to emissions, disclosure, or carbon border adjustments were classified under ESG compliance. To enhance coding consistency, transcripts were revisited multiple times, and ambiguous cases were reclassified through iterative refinement.

By aligning these methods with the theoretical framework, the study ensures conceptual coherence. The NRBV is operationalized through the analysis of environmental and economic performance indicators, such as export-to-GDP elasticity, emissions intensity, and ESG benchmarking, which together capture capability-driven sources of competitive advantage. Institutional Theory is operationalized through the pre-/post-policy analysis of the nickel export ban and the thematic interpretation of summit discourse, which highlight the coercive, normative, and mimetic forces shaping Indonesia's mining transformation. Taken together, the mixed-methods design provides both statistical rigor and interpretive depth, enabling a more holistic understanding of how Indonesia's mining sector navigates the opportunities and constraints of the green energy transition.

## IV. FINDINGS AND DISCUSSION

### *A. Descriptive Time-Series Analysis*

Table 2 presents trends in Indonesia's mining GDP, exports, foreign direct investment (FDI), and greenhouse gas (GHG) emissions between 2014 and 2023. The data reveal three important dynamics. First, nickel export values surged sharply after 2020, increasing nearly fivefold from USD 6.3 billion in 2019 to USD 30.2 billion in 2023. This coincided with the implementation of the nickel ore export ban, suggesting a strong policy effect on downstreaming and value creation. Second, FDI inflows to the mining sector grew from USD 2.6 billion in 2014 to USD 7.0 billion in 2023, reflecting rising investor confidence in Indonesia's role as a global hub for electric vehicle (EV) supply chains. Third, GHG emissions increased from 19.6 Mt $CO_2$e in 2018 to 22.4 Mt $CO_2$e in 2022, underscoring a persistent decarbonization gap despite economic gains.

Table II Indonesia's Mining Sector Performance (2014–2023): GDP, Exports, FDI, And Emissions

| Year | Mining GDP (IDR Trillion) | Mining Exports (USD Billion) | FDI in Mining (USD Billion) | GHG Emissions (Mt $CO_2$e) |
|---|---|---|---|---|
| 2014 | 1,178 | – | 2.6 | – |
| 2019 | 1,400 | 6.3 | 4.5 | 19.6 |
| 2020 | 1,500 | 10.1 | 2.0 | 20.6 |
| 2021 | 1,600 | 15.4 | 3.3 | 21.3 |
| 2022 | 2,393 | 64.9 | 5.1 | 22.4 |
| 2023 | 2,198 | 51.5 | 4.7 | – |

These trends align with the NRBV, which emphasizes the role of capabilities such as downstream processing and technological innovation in securing long-term competitive advantage. However, the rising emissions suggest that capability development has been uneven, with economic gains outpacing environmental stewardship.

### *B. Export-to GDP Elasticity Modeling*

$$\text{Growth rate} = \left(\frac{Current\ year - previous\ year}{previous\ year}\right) \times 100 \quad (2)$$

Export-to-GDP elasticity was calculated to assess the relationship between export performance and sectoral GDP growth. Between 2020 and 2022, elasticity remained high, averaging around 6.9, indicating that every 1% increase in mining exports contributed nearly 7% to mining GDP growth. However, in 2023, elasticity dropped to around 2.4, suggesting that mining GDP began to decouple from export volatility,

possibly due to stabilization or internal consumption growth.

Table III Export-To-GDP Elasticity In Indonesia's Mining Sector (2020–2023)

| Year | Export Growth (%) | GDP Growth (%) | Elasticity |
|---|---|---|---|
| 2020 | +60.63% | +7.14% | **8.49** |
| 2021 | +51.98% | +6.67% | **7.80** |
| 2022 | +52.15% | +7.50% | **6.95** |
| 2023 | +29.06% | +12.21% | **2.38** |

The high elasticity values in the early years reflect strong dependency on exports as the primary driver of sectoral growth. The decline in elasticity after 2022 suggests that mining GDP has begun to decouple from export volatility, possibly due to domestic consumption, industrial diversification, or stabilization of downstream processing. From the NRBV perspective, this indicates a gradual shift from simple resource exports to capability-driven value creation. From an Institutional Theory perspective, this shift was enabled by coercive regulatory interventions, particularly the export ban.

### *C. Pre-post Policy Impact Comparison*

To further evaluate the effect of the 2020 nickel ore export ban, average indicators were compared for the pre-policy period (2014–2019) and post-policy period (2020–2023)

Table IV Comparison Of Key Indicators Before And After Nickel Export Ban (Pre-2020 Vs Post-2020)

| Indicator | Pre-Policy Avg (2014–2019) | Post-Policy Avg (2020–2023) | Change |
|---|---|---|---|
| Nickel Export Value (USD bn) | ~3.2 | ~19.8 | +519% |
| Mining GDP (IDR tn) | ~1,350 | ~1,750 | +30% |
| FDI in Mining (USD bn) | ~3.5 | ~6.5 | +86% |

The results confirm that the export ban had a transformative effect on the sector. Export values increased more than fivefold, FDI nearly doubled, and mining GDP rose significantly. These findings support the argument that coercive institutional pressures (as described by Institutional Theory) can reconfigure industrial structures and attract investment. However, the continued reliance on coal-based smelting and the rise in GHG emissions highlight the limits of policy-driven industrialization in delivering environmental sustainability.

### *D. ESG Benchmarking and Thematic Analysis*

Despite economic successes, Indonesia lags behind peer countries such as Australia and Canada in terms of ESG transparency and compliance. Benchmarking reveals that while Indonesia has expanded its nickel exports and downstream industries, its carbon intensity remains high due to fossil-based energy inputs. Illegal mining, which caused estimated financial losses of IDR 5.82 trillion in 2022, further undermines governance credibility.

The qualitative analysis of the Indonesia Mining Summit 2024 – Session 1: The Innovation provides insight into these institutional challenges. Five thematic clusters emerged: governance reform, ESG compliance, innovation, stakeholder inclusion, and political commitment. For example, the Ministry of Energy and Mineral Resources emphasized licensing reform and downstream strategy, reflecting coercive pressures; investors and industry representatives stressed ESG disclosure, reflecting normative pressures; while NGOs and academia highlighted illegal mining and community displacement, underscoring gaps in governance and social accountability.

From the lens of Institutional Theory, these findings illustrate how multiple pressures interact. Coercive regulations drive structural change, normative expectations demand compliance, and mimetic pressures encourage firms to emulate early movers in green innovation. However, without strong enforcement and consistent ESG reporting, the sector risks reputational damage and potential trade restrictions under mechanisms like the EU's Carbon Border Adjustment Mechanism (CBAM).

### *E. Strategic Synthesis*

Taken together, these findings illustrate a paradox. On the one hand, Indonesia has leveraged its natural resource endowment and regulatory power to stimulate rapid export growth and investment inflows, consistent with the NRBV's emphasis on capability-driven advantage. On the other hand, the sector faces structural weaknesses in ESG compliance and environmental performance, which are shaped by institutional voids and weak enforcement capacity. This duality underscores that while Indonesia has achieved economic resilience, long-term competitiveness will require embedding ESG and circular economy practices into the core of its mining governance framework.

A comparative ESG benchmarking was conducted to position Indonesia's mining sector relative to peer countries. Indicators include greenhouse gas (GHG)

emissions intensity, ESG disclosure scores, governance indicators, and exposure to carbon border measures. The results are summarized in Table 5.

Table V Comparative ESG Benchmarking Of Mining Sectors (2022–2023)

| Indicator | Indonesia | Australia | Canada |
|---|---|---|---|
| GHG Emissions from Mining (Mt $CO_2e$, 2022) | 22.4 | 17.1 | 15.5 |
| Energy Source for Smelting | Coal-dominated (~60%) | Mixed (coal, gas, renewables) | Hydro and renewables (>70%) |
| ESG Disclosure Score (Refinitiv, 2023)* | 43/100 | 71/100 | 76/100 |
| Governance Effectiveness (World Bank Index, 2022)** | -0.15 | +1.19 | +1.42 |
| Illegal Mining / Governance Gap | High (losses: IDR 5.82 tn in 2022) | Low | Low |
| Exposure to EU Carbon Border Adjustment Mechanism (CBAM) | High (nickel, coal smelting exports) | Moderate (aluminum, steel) | Low (clean energy dominance) |

**ESG Disclosure Score based on Refinitiv ranking (0 = lowest transparency, 100 = highest).*
***Governance Effectiveness Index ranges from -2.5 (weak) to +2.5 (strong).*

The comparison highlights three critical gaps. First, Indonesia's mining operations remain highly carbon-intensive due to reliance on coal-based smelting, while Canada benefits from renewable energy integration and Australia from a more balanced energy mix. Second, ESG disclosure in Indonesia is significantly weaker (43/100) compared to Australia (71/100) and Canada (76/100), limiting access to global green financing. Third, governance weaknesses—including illegal mining and inconsistent enforcement—continue to undermine institutional credibility.

From an NRBV perspective, this benchmarking underscores Indonesia's limited capability development in clean technology and ESG reporting. From an Institutional Theory perspective, it illustrates how coercive pressures such as CBAM and normative expectations from investors may compel Indonesia to close these gaps if it wishes to sustain competitiveness in global mineral supply chains.

Table VI Thematic Content Analysis: Indonesia Mining Summit 2024 – Innovation Session

| Timecode | Speaker | Quote (summary) | Code | Theme |
|---|---|---|---|---|
| 29:03 – 34:29 | Editor in Chief, Harian Kompas | Media must push the mining industry to be accountable in ESG and innovation. | Role of journalism | Public Accountability |
| 35:13 – 41:25 | Chairman of IMA | Investors are pushing for ESG-aligned operations; Indonesia must catch up. | ESG investment pressure | Market Forces & Sustainability |
| 43:45 – 1:09:30 | Ministry of Energy and Mineral Resources (MEMR) | Presented national roadmap: downstream strategy, critical mineral policy, and licensing reform. | Regulatory transformation | Strategic Governance |
| 1:22:10– 1:36:55 | Chairperson of Commission XII, DPR RI | Parliament supports fiscal and legal incentiv | Political support for ESG | Political Commitment |

| Timecode | Speaker | Quote (summary) | Code | Theme |
|---|---|---|---|---|
| | | es for sustainable mining. | | |
| 1:44:00–2:43:00 | Panel Discussion (academia, industry, NGOs) | Issues raised: illegal mining, land conflicts, carbon taxes, green smelting, AI monitoring, local labor inclusion. | Environmental-social conflict, Innovation practices | Stakeholder Complexity & Innovation |

*F. SWOT and PESTEL Strategic Synthesis*

Strategically, Indonesia's mining sector presents a complex profile. It enjoys substantial strengths such as large-scale mineral reserves, strong global demand for nickel, and successful downstreaming policies. However, these are counterbalanced by weaknesses in ESG performance, enforcement of environmental regulations, and continued dependence on fossil energy sources. Opportunities for growth lie in expanding electric vehicle (EV) battery supply chains and integrating circular economy practices, while threats include ESG-related trade restrictions and reputational risks in global markets. A PESTEL analysis confirms these dynamics: politically, Indonesia benefits from regulatory stability and state-led industrial planning; economically, the sector remains robust; socially, mining regions face inequality and informal labor issues; technologically, clean innovation remains limited; environmentally, emissions are rising; and legally, enforcement of sustainable mining standards is inconsistent.

Table VII SWOT Analysis of Indonesia's Mining Sector Amid Energy Transition

| Strengths | Weaknesses |
|---|---|
| Largest global nickel reserves | High carbon emissions (22.4 Mt $CO_2$e) |
| Strong FDI growth post-2020 | Weak enforcement of mining governance |
| Successful downstream policy | Fossil-dependent smelting industry |
| **Opportunities** | **Threats** |
| EV battery supply chain growth | ESG-based export restrictions (EU) |
| Global shift to clean energy | Reputational damage from illegal mining |

Table VIII Pestel Analysis Of Indonesia's Mining Industry (2024 Outlook)

| Factor | Insight |
|---|---|
| **Political** | Stable policy direction under mineral governance |
| **Economic** | Significant growth in exports and FDI post-policy |
| **Social** | Community impact from illegal and informal mining |
| **Technological** | Lack of clean energy integration in mining operations |
| **Environmental** | GHG emissions rising without mitigation |
| **Legal** | Weak enforcement on illegal mining and ESG reporting standards |

In summary, Indonesia's mining sector has proven resilient and globally significant, particularly in driving strategic energy transitions through nickel and coal exports. The post-2020 reforms have stimulated export growth and domestic value creation. However, the data also confirms serious structural gaps in ESG compliance, enforcement, and decarbonization efforts. Future policies must prioritize cleaner technologies, stronger governance, and alignment with international ESG frameworks to ensure sustainable, long-term competitiveness in global markets.

## V. CONCLUSION

This study has examined Indonesia's mining sector in the context of the green energy transition by combining quantitative analysis of macroeconomic performance with qualitative assessment of stakeholder discourse. Anchored in the Natural Resource-Based View (NRBV) and Institutional Theory, the study demonstrates that Indonesia has successfully leveraged its mineral endowment and regulatory instruments to stimulate export growth, attract foreign direct investment, and strengthen domestic value creation. The sharp increase in nickel exports and FDI following the 2020 export ban reflects the role of coercive institutional pressures in driving industrial restructuring, while the observed decline in export-to-GDP elasticity suggests the gradual emergence of new capabilities and a more diversified growth trajectory.

At the same time, the findings reveal persistent weaknesses in environmental performance and

governance. Rising GHG emissions, the continued reliance on coal-based smelting, and the prevalence of illegal mining highlight the limits of capability development when ESG considerations are not systematically embedded. Comparative benchmarking further indicates that Indonesia lags behind peer countries such as Australia and Canada in ESG disclosure, governance effectiveness, and carbon intensity. From the NRBV perspective, this gap reflects an incomplete translation of natural resource advantages into sustainable competitive capabilities. From the standpoint of Institutional Theory, it underscores the fragmented and inconsistent nature of normative and mimetic pressures in Indonesia's institutional environment.

Theoretically, this study contributes by demonstrating how NRBV and Institutional Theory can be jointly applied to explain the interplay of capabilities and institutional pressures in a resource-dependent emerging economy. Empirically, it provides evidence of how policy shocks such as the nickel export ban can alter industrial dynamics, while simultaneously revealing structural risks in ESG compliance. Practically, the results suggest that policymakers must go beyond economic optimization and explicitly integrate ESG and circular economy practices into governance frameworks. This includes incentivizing cleaner technologies, strengthening enforcement mechanisms, and enhancing transparency in ESG reporting to meet global sustainability standards such as the EU Carbon Border Adjustment Mechanism.

In conclusion, Indonesia stands at a strategic crossroads. Its resource endowment and policy-driven downstreaming efforts have secured short-term economic gains, but long-term competitiveness will depend on its ability to align mining governance with global sustainability imperatives. Future progress requires a deliberate shift from resource exploitation to capability building and institutional strengthening. Only by embedding ESG principles and circular practices at the core of its mining strategy can Indonesia ensure that its role in the global energy transition is both economically rewarding and environmentally sustainable

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