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Conference Paper

DOWNSTREAMING AND REINDUSTRIALIZATION OF FOOD & ENERGY IN RESPONSE TO CHANGE CONTEMPORARY GEOPOLITICS

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Abstract.

Indonesia's target of being one of the top four world economies by 2045 is contingent on a strong industrialization plan to escape the middle-income trap. This heavy dependence on the export of raw commodities as well as the incursion of world-wide geo-political disturbances relating to the Russia–Ukraine war, the US–China trade war, and the Israel–Iran conflict accentuated the need for downstream processing and re-industrialization. This paper utilizes a qualitative content analysis of policy frameworks, governance model, and sectoral strategy in Indonesia's mineral, agromaritime, and renewable energy. The results suggest that downstreaming has a high potential to increase export value, generate jobs and improve economic resilience. The mineral industry needs choosing a mode of strategic governance that balances economic prosperity, sovereignty, environmental protection and access to markets. In the agromaritime sector, palm oil, cocoa, coconut, and seaweed offer chances to climb the global value ladder, with bioenergy particularly via biomass constituting a central pole of the renewable energy shift. Higher education institutions such as universities play an important role in the rapid transformation of industry by promoting innovation, technology transfer and talent cultivation. The research concludes that a comprehensive plan that combines economic and social restructuring, technology-based investment and inclusive governance is the key to achieve sustained industrial growth and able to bring about the vision of Golden Indonesia 2045.

Keywords: agromaritime industry; downstream processing; economic resilience; golden indonesia 2045; mineral governance

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Introduction

By 2045, it is estimated that Indonesia will be one of the four largest economies in the world (1,2). The vision of Golden Indonesia 2045, in turn, cannot be realized without a strong grounding in industrialization (3). The right industrialization path is key for middle-income countries to avoid falling into the middle-income trap, when economic growth stagnates due excessive dependence on the exports of primary products (1,2,4). Dependency on exports of raw commodities creates a worse situation, especially, while geopolitical tensions such as Russia–Ukraine conflict, US–China trade war and Iran–Israel conflict are exacerbating economic stability issues, energy security and food supply. These global disruptions also underscore the necessity of downstream processing and reindustrialization using Indonesia's abundant resources and competitive advantages.

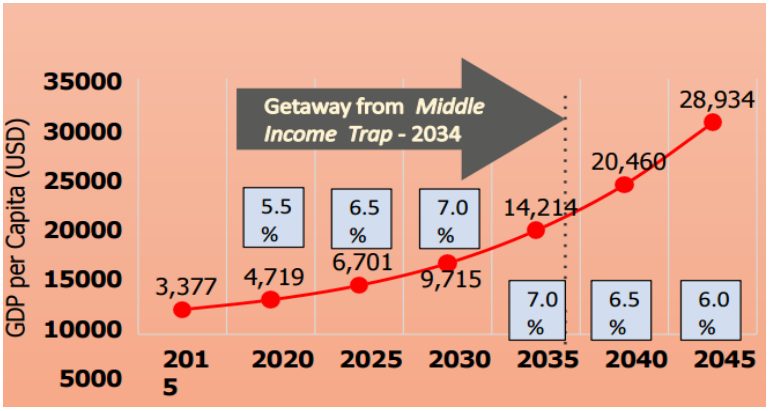

Figure 1. GDP Projections and Gateway from Middle Income Trap
Source: Satria (2025)

Literature Review

Theoretical Studies

Downstream processing is central in industrialization by transforming raw commodities into higher-value products, increasing export diversity, and strengthening economic resilience (5,6). Four governance models exist for managing critical minerals, that are free trade, protectionism, national mineral trust, and global mineral trust (1,2). Free trade agreement does prioritize market efficiency at the expense of sovereignty and environmental oversight. Protectionism supports national value reconciliation and control but may hamper global cooperation. A national mineral trust operates for deputies to enjoy collective benefits at the national scale through state-centred management, and a global mineral trust leads all parties to collaborate under global

standards, multilateral bindings, and technical cooperation on the path toward sustainability.

Table 1. Four Governance Models for Managing Critical Mineral
Source: Satria (2025)

Aspect	Free Trade	Protectionism	National Mineral Trust	Global Mineral Trust
Definition	Open cross-border trade with minimal restrictions	Policies to protect domestic mineral industry via tariffs, export bans, subsidies	A national framework managing mineral resources and revenues under government or designated body	An international cooperative system managing critical minerals as global commons
Control & Sovereignty	Low — market-driven, limited control over resources	High — strong national control over mining and exports	Very high — direct national control and management of mineral assets	Shared — sovereignty is partially ceded to international governance
Economic Focus	Maximize efficiency and comparative advantage	Promote domestic value addition and job creation	Ensure sustainable management and equitable distribution of benefits nationally	Sustainable global supply, equitable sharing, conflict reduction
Environmental Management	Depends on each country's regulations; varies widely	Stronger environmental regulations possible domestically	Direct national enforcement of sustainability and social safeguards	Global environmental standards and cooperative enforcement possible
Market Impact	Encourages global specialization and competition	Limits imports/exports to favor local industry	Centralized management aims for long-term resource stewardship	Coordinated global production and allocation to stabilize markets
Price Dynamics	Market-driven prices, volatile	Prices may be higher due to restrictions	Nationally managed pricing/revenue schemes	Potential price stabilization through global governance
Investment Climate	Attractive for foreign investors seeking open markets	May deter investors due to restrictions	Depends on trust's transparency and governance quality	Requires multinational trust, which may slow investment decisions
Benefits to Host Country	Can be limited if raw minerals are exported cheaply	Greater value retention via processing and taxes	Maximized control over revenues, sustainable benefits for citizens	Shared benefits; host country may gain technical support and fair trade
Challenges	Vulnerable to global shocks and resource depletion	Risk of trade retaliation, inefficiency	Needs strong governance, risk of mismanagement or corruption	Complex to establish, requires international trust and compliance
Example	Chile exporting copper freely in global markets	Indonesia's nickel export ban to boost domestic processing	Alaska Permanent Fund (USA) as a sovereign wealth fund managing mineral revenues	International Seabed Authority managing deep-sea mineral resources under UN framework

Industrialization can adhere two paradigms, either to establishing industry in Indonesia or advancing the industrialization of Indonesia (1,2,7). The first paradigm approach on establishing industrial capacity, neglecting social connections, which frequently leads to growth devoid of development. The second paradigm approach on integrates societal participation, aligning economic transformation with social transformation, and fostering inclusive development. In this context, agromaritime industries are a key sector for reindustrialization; since they have a cultural value, contribute to food and energy security, and leverage from their previous experiences during crises such as the 1997 economic crisis, financial crisis in 2009, and the COVID-19 crisis (8,9).

Empirical Studies

Indonesia's contribution of manufacturing to the GDP has been decreased from 21.5% years ago to 18.7% in 10 years, far behind other countries in Southeast Asia (1,2,10). Productivity levels are lower than in regional peers, with total factor productivity trending down. Despite low productivity, there are opportunities for reindustrialisation due to rich natural reserves, diverse bio-diversity, large population and trade agreements with 19 countries and 3 regions (1,2,11,12). Priority commodities for down streaming encompassing minerals that are nickel, copper, bauxite, and tin,

along with agromaritime products that are palm oil, coconut, cocoa, and seaweed.

Table 2. Priorities Commodities for Downstreaming
Source: Satria (2025)

	Commodity	PDB Potential	Labor Potential	Investment Potential(USD)	Export Potential(USD)
Minerals	Nickel	14,2 M	169 thousand	42,5 M	32,1 M
	Copper	58,57 M	240 thousand	6,68 M	152,09 M
	Bauxite	13,67 M	225 thousand	27,09 M	27,59 M
	Tin	13,0 M	29 thousand	17,34 M	41,01 M
Agromaritime	Palm	0,80 M	6 thousand	1,93 M	3,58 M
	Coconut	0,21 M	7 thousand	0,45 M	0,43 M
	Seaweed	9,3 M	10 thousand	0,7 M	N/A

Palm oil downstreaming offers opportunities to move up the global value chain in sectors like biofuels, oleochemicals, and biomaterials (13). The value of coconut processing could more than double through exports by 2029 to expanding employment. The plan for the coconut industry will maximize raw material use up to 75% and could create more than six million jobs by 2029. Seaweed production reached 9.7 million tons in 2023; production is anticipated to grow to over 14 million tons by 2029, with a four-fold increasing market value in the global market between 2023 and 2030 (1,2).

Bioenergy development also important in downstreaming, with targets increase the bioenergy share in the mix of the national energy to 23% by 2025 and 31% by 2050 were established (14,15). Biomass potential is over 32 billion oil equivalent units, consisting of palm residues, rice husks, and rubber wastes. This focus for decentralized biomass infrastructure, particularly in Sumatra and Java, can facilitate the energy transition to clean energy while building rural economies (1,2).

Table 3. Indonesia's Biomass Potential
Source: Satria (2025)

No	Source	Sumatra	Kalimantan	Jamali	Nusa Tenggara	Sulawesi	Moluccas	Papua	Total (Mwe)
1	Oil Palm	8,812	3,384	60	-	323	-	75	**12,654**
2	Sugarcane	399	-	854	-	42	-	-	**1,295**
3	Rubber	1,918	862	-	-	-	-	-	**2,781**
4	Coconut	53	10	37	7	38	19	14	**177**
5	Rice Husk	2,255	642	5,353	405	1,111	22	20	**9,808**
6	Corn	408	30	954	85	251	4	1	**1,733**
7	Cassava	110	7	120	18	12	2	1	**271**
8	Wood	1,212	44	14	19	21	4	21	**1,335**
9	Livestock Waste	96	16	296	53	65	5	4	**535**
10	Municipal Waste	326	66	1,527	48	74	11	14	**2,066**
Total (Mwe)		**15,588**	**5,062**	**9,215**	**636**	**1,937**	**67**	**151**	**32,654**

Methods

The study uses a qualitative content analysis approach, defined as a systematic method for deriving replicable and valid interpretations from textual data (16,17). The article studies policy narratives, governance mechanisms, and sectorial strategies in relation to Indonesia's reindustrialisation and downstreaming initiatives. Primary data set includes government legislations, trade agreements, organizational reports, industry white papers, and educational books for the last twenty years. The selection criteria emphasise industrial policy, resource management, global market trends and socio-economic transformation, mainly addressing minerals and agromaritime sectors and renewable energy integration. The unit of analysis centres on state-led strategies, institutional frameworks, and stakeholder responses to enhancing value-added processing while fostering inclusive growth. The credibility of the data is maintained by using official documents, expert analyses, and peer-reviewed literature to ensure robust and contextually grounded interpretations.

Results and Discussion

The industrialization in Indonesia is still at an early stage and bears the need for reindustrialization on domestic resources (18–20). Downstreaming in the mineral and the agromaritime sectors, as strategic options to increase export value, create employment and mitigate the risk of external shocks. In the mineral sector, the choice of governance model has to be made cautiously to weigh economic gains and sovereignty, environmental safeguards, and market access. Protectionism prevails, but shifting to a hybrid or a trust-led system may prove conducive to a more sustainable and equitable growth.

In the agromaritime dimension, palm oil represents a high-potential driver for economic as well as environmental objectives when diversified into bio-based industries (13,21). Cocoa, coconut, seaweed have high downstream potential but will need policies, technology and the human capital investment to address supply-chain and market access constraints. Bioenergy, particularly biomass should be a key in Indonesia's future plans for renewable energy, as well fits both overall industrial resilience and meet climate aimed outcomes.

The role of universities is instrumental in this process through research innovation and technopreneurship (22,23). By setting up the science and technology parks, fostering collaboration between the industry and the academia, and implementing teaching industry, publicity of innovation has been realised, and knowledge service innovation and innovation commerce are unlocked, and the

jobs and experts into the market. For example, there are beverage production lines, palm oil factories and animal feed teaching industries combining learning and the industry.

Conclusion

Strategic downstreaming for reindustrialization should be carried out for Indonesia to realize Golden Indonesia 2045 as well as to break free from the middle income trap. Geopolitical disturbances, reduction of the contribution of the manufacturing and problems of productivity suggest new dynamics around the valorisation via the transformation for the mineral as well as agromaritime products. The success of this approach will depend on synchronisation between industrial growth and social inclusion, and on creating the right governance framework for critical resources and investments in technology, human capital and innovation ecosystems. Indonesia can increase its resilience, broaden its export base, ensure its energy sovereignty and secure its long-term growth by incorporating social and economic transformation.

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