



## ANALYSIS OF OWNERSHIP, LOCATION, INTERNALIZATION (OLI) MODEL IN INDONESIA-CHINA BAUXITE DOWNSTREAM COOPERATION

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### Abstract:

The cooperation between Indonesia and China in the downstream bauxite industry reflects the dynamic interaction between national policy and foreign direct investment (FDI) in the extractive sector. This article uses the Eclectic Paradigm Model (Ownership, Location, Internalisation) to analyse cooperation and understand the motives and mechanisms behind Chinese companies' investments in Indonesia's bauxite processing industry. The research takes a qualitative, descriptive-analytical approach, applying thematic coding techniques to secondary data from policy documents, corporate reports and academic literature. The findings reveal that Chinese companies possess ownership-specific advantages, such as capital and technology. Indonesia, meanwhile, offers a strategic location with abundant bauxite reserves and downstream policy incentives and internationalisation incentives that enable cost efficiency and the protection of intangible assets. While this cooperation has accelerated Indonesia's bauxite industrialisation and increased its national economic value added, it also raises challenges related to foreign technological dominance and long-term investment dependence.

**Keywords:** Downstreaming, bauxite, FDI, OLI Model, Indonesia-China.

**Titulo en Español:** *Análisis del modelo de propiedad, ubicación e internacionalización (OLI) en la cooperación entre Indonesia y China en el sector de transformación de la bauxita*

### Resumen:

*La cooperación entre Indonesia y China en la industria de transformación de la bauxita refleja la interacción dinámica entre la política nacional y la inversión extranjera directa en el sector extractivo. Este artículo utiliza el Modelo del Paradigma Ecléctico (Propiedad, Ubicación, Internacionalización) para analizar dicha cooperación y comprender los motivos y mecanismos que subyacen a las inversiones de las empresas chinas en la industria de procesamiento de la bauxita de Indonesia. La investigación adopta un enfoque cualitativo y descriptivo-analítico, aplicando técnicas de codificación temática a datos secundarios procedentes de documentos de política, informes corporativos y literatura académica. Los resultados revelan que las empresas chinas poseen ventajas específicas, como el capital y la tecnología. Indonesia, por su parte, ofrece una ubicación estratégica, abundantes reservas de bauxita e incentivos políticos en las fases posteriores de la cadena de valor, así como incentivos a la internacionalización que permiten la eficiencia en los costes y la protección de los activos intangibles. Esta cooperación plantea retos relacionados con el dominio tecnológico extranjero y la dependencia de la inversión a largo plazo.*

**Palabras Clave:** Transformación industrial, bauxita, IED, modelo OLI, Indonesia-China.

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## 1. Introduction<sup>3</sup>

The bauxite downstream cooperation between Indonesia and China is a significant case study in understanding the dynamics of interaction between national policy and foreign direct investment (FDI) in the extractive sector. Indonesia, which is geologically endowed with bauxite reserves of approximately 1.2 billion tons, making it one of the countries with the largest reserves globally, has for many years tended to export the commodity in its raw form<sup>4</sup>. This practice has resulted in low added value and minimal contribution to national industrial development. To answer these challenges, the Indonesian government issued a strategic policy through Law Number 4 of 2009 concerning Mineral and Coal (Minerba Law), which was later revised into Law Number 3 of 2020<sup>5</sup>. One important aspect of this policy is the prohibition of raw mineral exports, including bauxite, as an effort to encourage domestic processing and refining and accelerate natural resource-based industrialization.

On the other hand, China, as an industrialized country experiencing high economic growth, has a huge need for mineral raw materials, including bauxite as a major component in the aluminum industry. To ensure long-term security of supply, China is actively expanding investment in strategic partner countries, including Indonesia, through foreign economic policies such as the Belt and Road Initiative (BRI). China, as the center of the world's largest aluminum industry, requires a very large supply of bauxite. According to industry analysis, producing 1 million tons of aluminum requires around 2 million tons of alumina and around 4 million tons of bauxite (with 45% aluminum content). This high demand has prompted China to seek and secure access to bauxite resources in various countries, including Indonesia, which has abundant bauxite reserves<sup>6</sup>.

To ensure long-term security of supply, China is actively investing in the smelter and mineral processing sectors in various countries, including through foreign economic policies such as the Belt and Road Initiative (BRI). In Indonesia, Chinese investors' interest in bauxite smelter development is very high, as seen from the many projects and cooperation between Chinese companies and local industry players. A concrete example is the cooperation between PT Inalum, PT Aneka Tambang Tbk (ANTM), Nanshan Aluminum, PT Well Harvest Winning Alumina Refinery, PT Borneo Alumindo Prima, Aluminum Corporation of China Ltd (CHALCO), PT Smelter Nikel Indonesia, PT Kapuas Prima Citra, PT Kobar Lamandau Mineral, PT Well Harvest Winning AR, PT Alchemist Metal Industry, and PT Sebuku Iron Lateritic Ores in building a bauxite smelter<sup>7</sup>.

Indonesia's downstream mineral policies, such as the ban on raw bauxite exports, also encourage Chinese investors to invest in the downstream bauxite industry in the country, so that they can still access raw materials while supporting local industrial development. In this

<sup>3</sup> We are grateful to the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia for the funding provided (Contract No.7/KP-DRP Riset/VI/2025). Our thanks also go to Universitas Muhammadiyah Yogyakarta for the essential institutional support and conducive environment that enabled this research.

<sup>4</sup> "Pemilik Cadangan Nikel Dan Bauksit Terbesar Di Dunia, Ini Yang Dilakukan Indonesia", *ESDM*, 2024, <https://esdm.go.id/id/media-center/arsip-berita/pemilik-cadangan-nikel-dan-bauksit-terbesar-di-dunia-ini-yang-dilakukan-indonesia>.

<sup>5</sup> "Law of the Republic of Indonesia Number 3 of 2020 Concerning Amendments to Law Number 4 of 2009 Concerning Mineral and Coal Mining", Presiden Republik Indonesia, 2020, at <https://jdih.esdm.go.id/storage/document/UU No. 3 Thn 2020.pdf>.

<sup>6</sup> Syahrir Ika: "Kebijakan Hilirisasi Mineral : Policy Reform Untuk Meningkatkan Penerimaan Negara", *Kajian Ekonomi Dan Keuangan*, Vol. 1, n° 1 (2017), pp. 42–67, <https://doi.org/10.31685/kek.v1i1.259>.

<sup>7</sup> Pratama Guitarra: "Jangat Kaget! China Jadi Penikmat Terbesar Bauksit Republik Indonesia", *CNBC*, Indonesia, 2022, at <https://www.cnbcindonesia.com/news/20220215135810-4-315540/jangat-kaget-china-jadi-penikmat-terbesar-bauksit-ri>.



context, Chinese companies' investment in Indonesia's bauxite processing sector is driven not only by economic considerations but also by geopolitical and geoeconomic interests. The presence of these investments has helped shape the landscape of Indonesia's mineral processing industry, particularly through the development of industrial estates and smelters in resource-rich areas such as West Kalimantan<sup>8</sup>.

This study analyses the Indonesia-China bauxite downstream cooperation through the theoretical approach of Eclectic Paradigm Model, or known as Ownership, Location, and Internalization (OLI) Model, developed by John Dunning. The OLI model was chosen as it offers a comprehensive conceptual framework to explain the motives and mechanisms of FDI through three main dimensions. First, ownership advantages refer to strategic assets owned by foreign firms, such as financial, technological, and managerial capital that support global competitiveness. Second, location advantages highlight the factors that make a country, in this case Indonesia, an attractive investment destination, such as the availability of natural resources, fiscal incentives, and infrastructure. Third, internalization advantages relate to the motivation of foreign firms to run their operations directly rather than through market mechanisms, in order to reduce transaction costs and protect intangible assets.

The field of mineral downstreaming can be enriched by integrating various international investment theories that offer valuable insights into the motivations behind foreign direct investment (FDI) in the sector<sup>9</sup>. One such theory is the Eclectic Paradigm (OLI), proposed by Dunning, which examines the three core components of Ownership, Location, and Internalization. These components provide a robust framework for understanding how mining companies engage in downstreaming activities, particularly in countries rich in natural resources<sup>10</sup>. Ownership highlights the firm's unique competitive advantages, such as proprietary technologies or access to mineral reserves, which allow them to establish a strong presence in global markets<sup>11</sup>. Location focuses on the strategic advantages offered by certain regions, including trade policies like export bans, which can incentivize domestic processing of minerals<sup>12</sup>. Internalization, on the other hand, addresses the firm's preference for controlling the entire value chain to minimize external risks and transaction costs, a concept particularly relevant in mineral processing industries where supply chain security is critical<sup>13</sup>.

Additionally, several international investment theories further elaborate on FDI motivations in the context of mineral downstreaming.<sup>14</sup> The Monopolistic Advantage Theory suggests that firms engage in FDI to exploit unique assets such as technology, market access, or strategic knowledge<sup>15</sup>. In the mineral sector, firms with advanced processing technologies or

<sup>8</sup> Emanuel Edi Saputra: "Hilirisasi Bauksit Diharapkan Sesuai Aturan Harga Patokan Mineral", *Kompas.com*, 2025, <https://www.kompas.id/artikel/hilirisasi-bauksit-diharapkan-sesuai-aturan-harga-patokan-mineral>.

<sup>9</sup> Bam Wouter and De Bruyne Karolinen: "Location Policy and Downstream Mineral Processing: A Research Agenda", *The Extractive Industries and Society*, Vol. 4, n° 3 (2017), pp. 443–47, at <https://doi.org/10.1016/j.exis.2017.06.009>.

<sup>10</sup> Cantwell John (2015): *The Eclectic Paradigm: A Framework for Synthesizing and Comparing Theories of International Business from Different Disciplines or Perspectives*, Basingstoke, Palgrave Macmillan.

<sup>11</sup> Dunning John H.: "The Eclectic Paradigm as an Envelope for Economic and Business Theories of MNE Activity", *International Business Strategy: Theory and Practice*, Vol. 9, n° 1 (2000) pp. 163–190, at <https://doi.org/10.4324/9780203186039-10>.

<sup>12</sup> Guberman, David; Shreiber, Samantha and Perry Anna: "Export Restrictions on Minerals and Metals: Indonesia's Export Ban of Nickel", Working Paper ICA-104, 2024, at [https://www.usitc.gov/publications/332/working\\_papers/ermm\\_indonesia\\_export\\_ban\\_of\\_nickel.pdf](https://www.usitc.gov/publications/332/working_papers/ermm_indonesia_export_ban_of_nickel.pdf).

<sup>13</sup> Dunning John H., *op. cit.*

<sup>14</sup> Nayak Dinkar and Choudhury Rahul N.: "A Selective Review of Foreign Direct Investment Theories", ESCAP, Working Paper, n°143, March 2014.

<sup>15</sup> Hymer Stephen (1976): "The International Operations of National Firms, A Study of Foreign Direct Investment (FDI)", Cambridge, MIT Press.



exclusive access to raw materials can leverage these advantages to dominate both domestic and international markets.<sup>16</sup> The Product and Factor Market Imperfection Theory highlights the role of market inefficiencies, such as the uneven distribution of processing technologies or skilled labor, which multinational corporations can exploit by investing in downstream operations to optimize their production processes<sup>17</sup>.

Further expanding the analysis, the Uppsala Model of internationalization (Johanson & Vahlne, 1977) offers a process-based approach, suggesting that firms gradually increase their international commitment through experiential learning. This theory implies that mineral processing firms may initially focus on geographically proximate markets before expanding their operations globally. On the contrary, the Born Global / International New Ventures (INV) theory challenges the incremental approach, explaining how some firms internationalize rapidly from inception by leveraging niche technologies and global networks<sup>18</sup>. These models provide a nuanced understanding of the different internationalization paths that firms involved in mineral downstreaming might pursue, depending on their resources and strategies<sup>19</sup>.

Moreover, theories like the Resource-Based View (RBV) and Dynamic Capabilities emphasize the importance of a firm's internal resources, both tangible and intangible, in sustaining a competitive advantage<sup>20</sup>. For firms involved in mineral downstreaming, proprietary technologies and the ability to adapt to market changes are crucial for maintaining leadership in the sector. Institutional Theory also adds depth to the discussion, stressing that the behavior of firms is often shaped by the institutional environment, including legal, cultural, and regulatory factors. Export bans, trade protectionism, and national policies on natural resource management all fall within this institutional framework, influencing firms' decisions to invest in domestic processing capabilities<sup>21</sup>.

Lastly, Network Theory explores how a firm's position within a network of relationships, such as those with suppliers, customers, and strategic partners, drives its internationalization process<sup>22</sup>. This is particularly relevant for mineral downstreaming, where collaborations across borders are often essential for success<sup>23</sup>. By integrating these diverse theoretical perspectives, a more comprehensive understanding of mineral downstreaming can be achieved, extending beyond the simplistic view of policy-driven motivations and into a broader analysis of firm-level strategies, market imperfections, and the dynamic capabilities required for success in global markets<sup>24</sup>.

In this context, this study introduces novelty through the Ownership, Location, Internalization (OLI) theoretical approach in explaining the dynamics of bauxite downstreaming cooperation between Indonesia and China. The OLI approach, which originates

<sup>16</sup> Guberman, David; Shreiber, Samantha and Perry Anna, *op.cit.*

<sup>17</sup> Ethier, Wilfred J.: "The Multinational Firm", *The Quarterly Journal of Economics* 101, n° 4 (1986), pp. 805-834.

<sup>18</sup> Oviatt Benjamin M. and Phillips McDougall, Patricia: "Toward a Theory of International New Ventures," *Journal of International Business Studies*, Vol. 25, n° 1 (1994), pp. 45–64.

<sup>19</sup> Johanson Jan and Vahlne Jan-Erik: "The Internationalization Process of a Firm", *Journal of International Business Studies*, Vol. 8, n° 1 (Spring - Summer, 1977), pp. 23-32, at <https://www.jstor.org/stable/254397>

<sup>20</sup> Barney, Jay: "Firm Resources and Sustained Competitive Advantage", *Journal of Management* Vol.7, n° 1 (1991), pp. 99–120, at <https://doi.org/10.1177/0149206391017001>.

<sup>21</sup> North, Douglass C: "Institutions", *Journal of Economic Perspectives* Vol. 5, n° 1 (Winter 1991), pp.97–112.

<sup>22</sup> Johanson Jan and Lars-Gunnar Mattsson: "Internationalisation in Industrial Systems — A Network Approach," in Forsgren, Mats, Holm, Ulf., Johanson, Jan (eds) (2015): *Knowledge, Networks and Power*, London, Palgrave Macmillan, pp. 111–32.

<sup>23</sup> Tikkanen, Henrikki : "The Network Approach in Analyzing International Marketing and Purchasing Operations: A Case Study of a European SME's Focal Net 1992-95", *Journal of Business & Industrial Marketing*, Vol. 13, n° 2 (1998), pp. 109–31.

<sup>24</sup> Nayak and Choudhury, *op.cit.*

from foreign direct investment (FDI) theory, provides a more comprehensive framework for assessing the motivations and strategic benefits of this bilateral cooperation. Unlike previous studies that tend to use theories of protectionism, economic development, or value addition, this research offers a new perspective linking asset ownership, location advantages, and business process internalization as the primary determinants of the effectiveness of international cooperation-based bauxite downstreaming.

By utilizing the Ownership, Location, and Internalization (OLI) theoretical framework developed by John Dunning, this research is directed to examine in depth the dynamics of bauxite downstream cooperation between Indonesia and China. The analysis focuses on two main questions, first, how the three elements in the OLI model, ownership advantage, location advantage and internalization advantage, are concretely implemented in the pattern of investment and collaboration between the two countries; and second, to what extent the cooperation has strategic implications for Indonesia's national industrial development, especially in strengthening the structure of the mineral processing industry and promoting sustainable economic independence. With this approach, the study is expected to make a theoretical contribution to the development of studies on foreign direct investment (FDI), as well as offer evidence-based policy recommendations for the Indonesian government in an effort to strengthen natural resource governance, create domestic added value, and improve the competitiveness of national industries in an increasingly integrated global economy.

## 2. Theoretical Framework

The Eclectic Paradigm (OLI) framework, developed by John H. Dunning, provides an integrative explanation of why multinational enterprises (MNEs) engage in international production and foreign direct investment (FDI)<sup>25</sup>. The framework posits that FDI is most likely when three sets of advantages jointly apply Ownership (O) advantages at the firm level, Location (L) advantages in the host economy, and Internalization (I) advantages that make internal governance more efficient than market-based arrangements. By combining insights from industrial organization, location, and internalization theories, OLI is considered eclectic because it explains international expansion as the outcome of the interaction among these interdependent advantages rather than a single-factor logic. Figure 1 summarizes the three-pillar structure of the OLI framework used to guide the analysis in this study<sup>26</sup>.

**Figure 1. Eclectic Paradigm or OLI Framework**



The OLI framework argues that international production outcomes are best understood by examining how firm-specific strengths, host-country conditions, and governance considerations

<sup>25</sup> Dunning John H., *op. cit.*

<sup>26</sup> Rahman Azmeri et al.: "Multinational Contracting and the Eclectic Paradigm of Internationalization," *Engineering, Construction and Architectural Management*, Vol 25, n° 11 (3 October 2018), pp 1418-1435



interact. Accordingly, the core concepts are organized into three advantages (Ownership, Location, and Internalization).

- a. Ownership (O) advantages refer to firm-specific assets and capabilities, tangible and intangible, that enable firms to compete abroad despite the liability of foreignness. These include proprietary technology, patents, trademarks, brand reputation, managerial know-how, organizational routines, and other distinctive competencies.
- b. Location (L) advantages capture host-country attributes that make foreign production attractive relative to producing at home and exporting. Such attributes include natural resource endowments, infrastructure quality, political and economic stability, market size and growth potential, and policy incentives offered by host governments.
- c. Internalization (I) advantages explain why firms prefer hierarchical governance (e.g., wholly owned subsidiaries) over market-based arrangements such as licensing or arm's-length contracting. Internalization is motivated by the desire to reduce transaction costs and market failure risks, protect proprietary knowledge from opportunism, and ensure coordination and quality control across borders<sup>27</sup>.

### **2.1. Explanatory Advantages of the OLI Framework**

The OLI framework explains foreign direct investment (FDI) more effectively than many earlier international investment theories because it offers a whole picture perspective that integrates multiple determinants into one coherent logic. Rather than treating international expansion as an either outcome driven by a single factor, OLI argues that foreign production is most likely when three advantages operate simultaneously, firms must possess Ownership (O) advantages that offset the additional costs and risks of operating abroad; host economies must provide Location (L) advantages that make producing overseas more attractive than producing at home and exporting; and firms must perceive Internalization (I) advantages such that controlling activities internally is more efficient than relying on external market arrangements. This conjunctural logic clarifies that FDI is not merely a consequence of firm strength or host-country attractiveness alone, but of the interaction among firm-level capabilities, place-specific conditions, and governance efficiency<sup>28</sup>.

Beyond offering a comprehensive explanation, OLI also provides a clear analytical roadmap for distinguishing different modes of internationalization. When firms have ownership advantages but lack strong location and/or internalization drivers, they are more likely to pursue licensing, because the firm's knowledge or assets can be exploited abroad without establishing foreign production. When firms possess ownership and internalization advantages but location conditions do not strongly favor production abroad, exporting becomes a more plausible strategy, since the firm still benefits from internal control (such as protecting know-how) while serving foreign markets from the home base. In contrast, FDI becomes the preferred mode when ownership, location, and internalization advantages coalesce, making overseas production and internal governance jointly superior to arm's-length market transactions<sup>29</sup>.

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<sup>27</sup> Dunning John H. and Lundan, Sarianna M.: "Institutions and the OLI Paradigm of the Multinational Enterprise," *Asia Pacific Journal of Management*, Vol. 25, n° 4 (2008), 573–93, at <https://doi.org/10.1007/s10490-007-9074-z>.

<sup>28</sup> Ashiru Folajimi and Oni, Oluwasola: "In Support of Dunning's Eclectic Paradigm A Look at Emerging Market SME Internationalisation to Nigeria", in Jafari-Sadeghi, Vahid; Dana Léo Paul (eds.) (2023): *International Entrepreneurship in Emerging Markets*, Abingdon, Routledge.

<sup>29</sup> Buckley Peter J. and Casson, Mark C.: "The Internalisation Theory of the Multinational Enterprise: A Review of the Progress of a Research Agenda after 30 Years", *Journal of International Business Studies* Vol. 40, n° 9 (2009), pp. 1563–80, <https://doi.org/10.1057/jibs.2009.49>.



Another key strength of the OLI framework lies in its contextual flexibility. The relative importance of O, L, and I can vary across industries (for example, between resource-based and knowledge-intensive sectors), across host-country institutional environments, and across different historical eras shaped by globalization dynamics, regulatory change, and digital transformation. This context-specific character allows OLI to remain analytically useful beyond static trade models, because it can accommodate structural shifts in the global economy and heterogeneity across locations. Importantly, contemporary applications also recognize that location advantages are not uniformly distributed within national borders; sub-national differences in institutional quality, policy environments, and infrastructure can substantially affect investment outcomes, an issue particularly salient for resource-based industries and downstream processing where local governance and regional conditions often determine project feasibility and performance<sup>30</sup>.

## **2.2. Analytical Limitations of the OLI Framework**

Despite its broad applicability and strong integrative logic, the Eclectic Paradigm (OLI) has attracted substantial criticism across several dimensions. Acknowledging these shortcomings is important to ensure rigorous and reflexive use of the framework, particularly when applying it to complex empirical contexts. One of the most frequently cited limitations concerns OLI's relatively static orientation. The framework tends to offer a snapshot of ownership, location, and internalization advantages at a given point in time, but it provides less explanatory depth regarding how these advantages are built, accumulated, and transformed through organizational learning, sequencing, and the gradual evolution of firms' international paths. Relatedly, OLI is often criticized for downplaying managerial agency by prioritizing structural and economic determinants, it pays limited attention to managers' cognition, strategic discretion, and decision-making processes that can decisively shape internationalization trajectories<sup>31</sup>.

A second major challenge emerges from the rise of the digital and platform economy, which strains several foundational assumptions embedded in classic OLI reasoning. In digitally mediated business models, competitive advantage may depend less on the ownership of physical assets and more on access-based resources such as network effects, data analytics capabilities, and ecosystem orchestration. These dynamics are not always adequately captured by conventional notions of ownership advantages<sup>32</sup>. At the same time, digitalization can weaken the traditional relevance of location advantages, because virtual delivery and digitally scalable operations reduce the constraints of geographic distance and physical presence. Digital business models can also reshape internationalization logic, since firms may internationalize through platforms, partnerships, and global user networks without establishing wholly owned subsidiaries<sup>33</sup>. Such developments have encouraged scholars to propose platform-oriented extensions of OLI that more explicitly incorporate information and knowledge-related advantages.

OLI's explanatory boundaries are also highlighted by the growing prominence of multinational enterprises from emerging markets. Traditional interpretations of OLI often assume firms expand abroad primarily to exploit pre-existing ownership advantages. In contrast, emerging market multinationals frequently pursue outward FDI to acquire strategic

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<sup>30</sup> Buckley and Casson, *op.cit.*

<sup>31</sup> Dunning, John H. "The Eclectic Paradigm as an Envelope for Economic and Business Theories of MNE Activity", *Journal of International Business Studies*, Vol. 19, n° 1 (Spring 1988), pp. 1-31

<sup>32</sup> Ankit Surana et al., "Understanding the Internationalization of Digital Platform Firms: Developing the Platform-OLI (P-OLI) Framework," *SSRN Electronic Journal*, 2024, 1–44, <https://doi.org/10.2139/ssrn.5039293>.

<sup>33</sup> Bhandari Krishna Raj et al.: "Digitalization, Internationalization, and Firm Performance: A Resource-Orchestration Perspective on New OLI Advantages", *International Business Review*, Vol. 32, n° 7 (2023), pp.102-135, at <https://doi.org/10.1016/j.ibusrev.2023.102135>.



assets technology, brands, and distribution channels to compensate for competitive gaps at home. This asset-seeking or springboard behavior exposes limitations in an exploitation-centered reading of OLI. Moreover, OLI does not always sufficiently foreground the enabling role of home-country institutional support and political advantages, including state backing, preferential financing, and diplomatic-economic leverage, which can be critical drivers of outward investment from emerging economies<sup>34</sup>.

Another important critique concerns governance forms that extend beyond OLI's internalization emphasis. While the internalization pillar privileges hierarchy as an efficient response to market imperfections, contemporary international business increasingly relies on hybrid governance arrangements such as joint ventures, strategic alliances, equity partnerships, and multi-firm networks<sup>35</sup>. In many knowledge-intensive and technology-driven sectors, relational governance and network embeddedness can provide superior coordination for combining complementary capabilities without full integration. As a result, scholars argue that OLI offers limited analytical leverage for alliance-heavy and network-based strategies, prompting proposals to incorporate networking advantage as an additional pillar (e.g., OLIN) to better reflect collaborative global strategies<sup>36</sup>.

Concerns have also been raised regarding the paradigm's long-term theoretical evolution. As OLI has expanded to accommodate a wide range of empirical phenomena, critics warn of conceptual stretching and declining analytical precision. If ownership and internalization advantages are defined too broadly, they risk being inferred after the fact from observed multinational behavior, which can turn the framework into a tautology and weaken its predictive capacity. A common response is to retain a basic OLI core while drawing on complementary theories, such as the resource-based view, institutional theory, political economy, and network perspectives, to supply mechanisms that OLI does not explicitly specify<sup>37</sup>.

Finally, although institutional considerations have been incorporated in later refinements, critics maintain that OLI still does not fully capture political economy dynamics, particularly in extractive industries and strategic sectors. In such contexts, investment outcomes are shaped not only by formal policies and incentives but also by political risk, state-firm bargaining, informal norms, and shifting regulatory coalitions. These factors are often decisive in natural resource governance and downstream processing, where investment decisions are embedded in contested arenas involving multiple stakeholders, asymmetric power relations, and evolving national development agendas<sup>38</sup>.

For analyzing Indonesia-China bauxite downstream cooperation, the OLI framework offers a strong integrative lens to examine: (i) Chinese investors' firm-specific capabilities (O), (ii) Indonesia's resource endowments and downstream policy incentives (L), and (iii) governance choices in organizing cross-border production and technology transfer (I). At the same time, a reflexive application must account for OLI's limitations. The emerging-market

<sup>34</sup> Vlado Vivoda, "Resource Nationalism, Bargaining and International Oil Companies: Challenges and Change in the New Millennium", *New Political Economy*, Vol. 14, n° 4 (2009), pp. 517-34, at <https://doi.org/10.1080/13563460903287322>.

<sup>35</sup> Johanson Jan and Vahlne, Jan Erik: "The Uppsala Internationalization Process Model Revisited: From Liability of Foreignness to Liability of Outsidership", *Journal of International Business Studies*, Vol. 40, n° 9 (2009), pp. 1411-31, at <https://doi.org/10.1057/jibs.2009.24>.

<sup>36</sup> Deyi Xu et al., "Resource Nationalism: The Intersection of Politics and Economics", *Humanities and Social Sciences Communications*, Vol. 11, n° 1 (2024), pp. 1-15, <https://doi.org/10.1057/s41599-024-03949-8>.

<sup>37</sup> Yadong Luo and Rosalie L. Tung, "International Expansion of Emerging Market Enterprises: A Springboard Perspective", *Journal of International Business Studies*, Vol. 38, n° 4 (2007), pp. 481-98, at <https://doi.org/10.1057/palgrave.jibs.8400275>.

<sup>38</sup> Xu et al., *op.cit.*



features of Chinese firms, the political sensitivity of natural resource investments, sub-national institutional variation across Indonesian regions, and the prominence of hybrid arrangements (e.g., joint ventures and inter-firm networks) suggest the need to complement core OLI logic with additional theoretical resources, particularly institutional/political economy and network perspectives, so that the analysis captures both economic efficiency considerations and the broader governance realities shaping downstream investment outcomes.

### **3. Research Method**

This research uses a qualitative approach with a descriptive-analytical design using secondary data. The main objective of this approach is to understand the dynamics of the application of the Ownership, Location, and Internalization (OLI) model in the context of bauxite downstream cooperation between Indonesia and China. Secondary data was collected from various credible and relevant sources, including national policy documents such as Law No. 4/2009 on Mineral and Coal (Minerba), its revision through Law No. 3/2020, as well as derivative regulations such as the Minister of Energy and Mineral Resources Regulation No. 11/2020. In addition, corporate sustainability reports from relevant companies such as CHALCO, PT Inalum, and PT Aneka Tambang (ANTAM), as well as publications of civil society organizations such as Wahana Lingkungan Hidup Indonesia (WALHI). To deepen the analysis, this research also draws on academic literature and media investigation reports. All data was analyzed using thematic coding, identifying recurring thematic patterns related to ownership, location, and internalization advantages, as well as strategic aspects of collaboration between state and non-state actors in the mineral downstream sector. The coding process was conducted inductively based on empirical findings and deductively referring to the OLI Model conceptual framework.

### **4. Results and Discussion**

#### **4.1 Strategic Potential of Bauxite in Indonesia**

Indonesia ranks sixth in the world in bauxite reserves, with total resources reaching 7.4 billion tons and proven reserves of 2.7 billion tons. These abundant natural resources provide a strategic position for Indonesia in the global aluminum industry map, especially considering aluminum as a key commodity for various strategic industries such as automotive, construction, packaging, to green technology<sup>39</sup>. The strategic value of bauxite is increasing along with the projected growth of world aluminum demand, which reaches 3-4% per year, driven by energy transition and industrial development in developing countries<sup>40</sup>.

The Indonesian government has taken a strategic step through a downstream policy by banning the export of raw bauxite ore since June 2023, in accordance with the mandate of the Minerba Law No. 3/2020<sup>41</sup>. This policy aims to change the paradigm from raw material exports to domestic processing, with the potential to increase added value from IDR 21 trillion to IDR 62 trillion per year<sup>42</sup>. The implementation of this policy has encouraged the development of several strategic projects, such as the Smelter Grade Alumina Refinery (SGAR) in Mempawah

<sup>39</sup> “Pemilik Cadangan Nikel Dan Bauksit Terbesar Di Dunia, Ini Yang Dilakukan Indonesia”, *op.cit.*

<sup>40</sup> Umah Nisatul: “Daftar ‘Harta Karun’ RI, Bikin Kaya, Ada Yang Nomor 1 Dunia!”, *CNBC Indonesia*, 11 October 2021, at <https://www.cnbcindonesia.com/market/20211010215821-17-282835/daftar-harta-karun-ri-bikin-kaya-ada-yang-nomor-1-dunia/3>.

<sup>41</sup> Muliawati Firda Dwi: “Tangan Sakti Jokowi Di Awal Juni: Setop Ekspor Bauksit!”, *CNBC Indonesia*, 25 December 2023, at <https://www.cnbcindonesia.com/news/20231225093415-4-500159/tangan-sakti-jokowi-di-awal-juni-setop-ekspor-bauksit>.

<sup>42</sup> “Ekspor Bauksit Disetop, Pendapatan Negara Melejit Rp62 T”, *CNBC Indonesia*, 21 December 2022, at <https://www.cnbcindonesia.com/news/20221221144634-4-398884/ekspor-bauksit-disetop-pendapatan-negara-melejit-rp62-t>.



with a capacity of 1 million tons per year and the PT Well Harvest Winning (WHW) plant in Ketapang with a capacity of 2 million tons per year<sup>43</sup>.

The potential for developing an integrated aluminum supply chain in Indonesia is huge, starting from bauxite mining, alumina refining, to aluminum production<sup>44</sup>. PT Inalum, as the only national aluminum producer, currently has a production capacity of 900,000 tons of alumina per year, which is processed into aluminum ingots supported by the construction of the Smelter Grade Alumina Refinery (SGAR) in Mempawah, West Kalimantan.<sup>45</sup> The existence of new projects such as PT Borneo Alumina Indonesia (BAI) further strengthens domestic alumina supply and reduces import dependency previously supplied from Australia. This supply chain integration not only increases economic added value but also opens up opportunities for the development of downstream industries such as automotive components and electric vehicle batteries<sup>46</sup>.

From an investment perspective, Indonesia's bauxite potential has attracted global investors, especially from China, which accounts for 55% of the world's aluminum production. Major companies such as Nanshan Aluminum and China Hongqiao Group have invested heavily in alumina projects in Indonesia. However, key challenges include high smelter investment costs of USD 1-2 billion per project, limited energy infrastructure, and dependence on imported chemicals such as caustic soda (NaOH). To optimize the strategic potential of bauxite, a comprehensive policy is required, including the provision of fiscal incentives and accelerated development of supporting infrastructure<sup>47</sup>.

#### **4.2. Cooperation Partner for the Development of the Bauxite Downstream Industry in Indonesia**

Bauxite downstreaming in Indonesia involves various actors, both domestic and foreign, who play a role in the development of the bauxite processing industry into alumina and aluminum. On the domestic side, PT Indonesia Asahan Aluminium (Inalum), as the state-owned mining holding company, acts as the parent of MIND ID, encouraging downstream projects through affiliates such as PT Aneka Tambang Tbk (ANTM). ANTM itself is one of the main players with a bauxite mine in Kalimantan and a processing project with a Chinese partner. In addition, local companies such as PT Borneo Alumindo Prima, PT Kobar Lamandau Mineral, and PT Alchemist Metal Industry also contribute to the development of smelters and refining facilities<sup>48</sup>.

Meanwhile, Chinese investment plays a crucial role in supporting technology and capital for the bauxite downstream in Indonesia. Several large companies, such as Nanshan Aluminum Co., Ltd. and Aluminum Corporation of China Ltd. (CHALCO), are involved as

<sup>43</sup> Anam, Khoirul: "Sah! RI Punya Proyek Hilirisasi Bauksit-Aluminium Terintegrasi Pertama", *CNBC Indonesia*, 26 September 2024, at <https://www.cnbcindonesia.com/news/20240924114314-4-574152/sah-ri-punya-proyek-hilirisasi-bauksit-aluminium-terintegrasi-pertama>.

<sup>44</sup> Wicaksono Pebrianto Eko: "Well Harvest Dongkrak Kapasitas Smelter Jadi 2 Juta Ton per Tahun", *Liputan6.com*, 15 June 2017, at <https://www.liputan6.com/bisnis/read/2991643/well-harvest-dongkrak-kapasitas-smelter-jadi-2-juta-ton-per-tahun>.

<sup>45</sup> Mahendro Aryo: "Inalum Rancang Produksi 900 Ribu Ton Aluminium per Tahun", *detik.com*, 20 October 2023, at <https://www.detik.com/bali/bisnis/d-6993002/inalum-rancang-produksi-900-ribu-ton-aluminium-per-tahun>.

<sup>46</sup> Evandio Akbar: "SGAR Fase I Targetkan Produksi 3.000 Ton Alumina per Hari", *Bisnis.com*, 24 September 2024, at <https://ekonomi.bisnis.com/read/20240924/44/1802009/sgar-fase-i-targetkan-produksi-3000-ton-alumina-per-hari>.

<sup>47</sup> Nurmutia Elga: "Di Forum Ini, INALUM Dorong Transformasi Industri Aluminium Nasional", *CNBC Indonesia*, 7 April 2025, <https://www.cnbcindonesia.com/news/20250407190107-4-624027/di-forum-ini-inalum-dorong-transformasi-industri-aluminium-nasional>.

<sup>48</sup> Anam: "Sah! RI Punya Proyek Hilirisasi Bauksit-Aluminium Terintegrasi Pertama", *op.cit.*



investors as well as processing technology providers. In addition, there are joint ventures such as PT Well Harvest Winning Alumina Refinery (WHW AR), which is a collaboration between Harita Group (Indonesia) and Winning Investment Group (China), illustrating the strategic synergy between the two countries<sup>49</sup>. Winning Investment Group is part of a large Chinese consortium that brings capital and technical expertise to alumina projects in Indonesia<sup>50</sup>.

This diversity of actors suggests that bauxite downstream in Indonesia is not only driven by domestic investment, but also involves international cooperation, particularly with China, which has high capabilities in the global aluminium industry. This collaboration accelerates the construction of processing facilities while transferring technology, although it also raises questions regarding ownership structure and reliance on foreign investment. Table 1 below provides further details on the companies involved in the development of the bauxite processing industry.

**Table 1. Companies Involved in the Development of the Bauxite Processing Industry in Indonesia**

No.	Company Name	Country of Origin	Types of Engagement	Description
1	PT Indonesia Asahan Aluminum (Inalum)	Indonesia	SOE Mining Holding	The parent of MIND ID, is involved in the development of a bauxite downstream project through an affiliate of ANTM.
2	PT Aneka Tambang Tbk (ANTM)	Indonesia	Bauxite Mining and Processing	A subsidiary of MIND ID, it has a bauxite mine in Kalimantan and a downstream project with a Chinese partner.
3	Nanshan Aluminum Co., Ltd.	China	Investors and Processing Technology	One of China's largest aluminum producers is investing in a bauxite processing facility in Indonesia.
4	PT Well Harvest Winning Alumina Refinery (WHW AR)	Indonesia-China (Joint Venture)	Alumina Operations and Processing	Cooperation between Harita Group (Indonesia) and Winning Investment (China); project in Ketapang, West Kalimantan.
5	PT Borneo Alumindo Prima	Indonesia	Smelter Project Developer	Engaged in bauxite processing and refining project in West Kalimantan.

<sup>49</sup> Guitarra: “Jangat Kaget! China Jadi Penikmat Terbesar Bauksit Republik Indonesia”, *op.cit.*

<sup>50</sup> Muliawati Firda Dwi: “Proyek Rp 13,96 T Ini Bakal Hasilkan 1 Juta Ton Alumina Mulai 2025”, *CNBC Indonesia*, 17 October 2024, <https://www.cnbcindonesia.com/news/20241017193759-4-580654/proyek-rp-1396-t-ini-bakal-hasilkan-1-juta-ton-alumina-mulai-2025>.



No.	Company Name	Country of Origin	Types of Engagement	Description
6	Aluminum Corporation of China Ltd. (CHALCO)	China	Multinational Aluminum Company	China's state-owned enterprise and the world's largest aluminum producer; actively investing in smelters in Southeast Asia, including Indonesia.
7	PT Smelter Nikel Indonesia	Indonesia	Diversifying into Bauxite Downstream	Initially focused on nickel, it began to enter the bauxite processing sector.
8	PT Kapuas Prima Citra	Indonesia	Mining and Smelter Subsidiaries	Part of a national mining group expanding into bauxite processing.
9	PT Kobar Lamandau Mineral	Indonesia	Bauxite Mine and Smelter Developer	Based in Central Kalimantan, it manages bauxite areas and downstream local industries.
10	PT Alchemist Metal Industry	Indonesia	Metals and Refining Industry	Engaged in base metal processing including bauxite downstream projects.
11	PT Sebuku Iron Lateritic Ores (SILO)	Indonesia	Mining and Smelter Companies	Initially focused on iron ore and nickel, it is now participating in bauxite downstream.
12	Winning Investment Group (part of WHW AR)	China	Lead Investor and Consortium	Affiliates of Shandong Weiqiao and China Hongqiao, bring capital and technology to Indonesia's alumina projects.

Source: Processed by the author from Anam (2024); Guitara (2022); and Muliawati (2024).

#### **4.3. Analysis of Ownership, Location, Internalization (OLI) Model in Bauxite Downstream Cooperation**

In the context of bauxite downstream cooperation between Indonesia and China, the application of the OLI model can provide a deeper understanding of the strategic determinants behind the involvement of Chinese companies in the development of bauxite processing and refining industries in the Indonesian region. Ownership advantages of Chinese companies may include access to advanced bauxite refining technology and experience on a large industrial scale. Location advantages, meanwhile, are reflected in Indonesia's potential bauxite reserves, competitive production costs, as well as national policies related to the ban on raw material



exports that encourage the development of downstream facilities in the country. Internalization advantages are evident in the tendency of Chinese companies to build smelters or refineries directly through joint ventures or subsidiaries in Indonesia, in order to control the production process and reduce the risk of dependence on local parties or policy fluctuations. An analysis of these three factors will reveal why foreign companies choose to invest in Indonesia, how the cooperation is structured, and the strategic implications for the development of the national bauxite industry. An explanation of the OLI analysis of the Indonesia-China Bauxite Downstream Cooperation follows:

#### **4.3.1. Ownership-Specific Advantages (O): China's Firm-Specific Advantages**

Chinese companies have strong ownership-specific advantages through financial excellence and large economies of scale, enabling them to reduce production costs, expand markets, and compete aggressively at the global level. Strong capital support from the government and domestic financial institutions gives them access to cheap financing for international expansion. Additionally, technological advantages and downstream capabilities, including control over distribution, marketing, and after-sales services, further strengthen their competitive position, making Chinese companies well-positioned to face global competition. An explanation related to Ownership-Specific Advantages (O) China's Firm-Specific Advantages will be fully detailed below.

- *Financial Advantage and Economies of Scale*

Ownership-Specific Advantages (O) is one of the main determinants in the Eclectic Paradigm theory that explains the motivation and competitiveness of multinational companies in global expansion<sup>51</sup>. In this context, Chinese companies show a very prominent advantage, especially in the mining and mineral processing investment sector in developing countries such as Indonesia<sup>52</sup>. One of the main advantages is their financial capacity and large economies of scale, which are largely facilitated by state policy support. Through major programs such as the Belt and Road Initiative (BRI) and the “Go Global” strategy, Chinese companies gain extensive access to long-term financing sources subsidized by state-owned financial institutions, such as the China Development Bank and the Export-Import Bank of China<sup>53</sup>. This allows them to aggressively expand and fund high-risk projects overseas, including in the bauxite and aluminum sectors.

A concrete example of this advantage can be seen in Tsingshan Holding Group, a large Chinese private company that has invested significantly in Indonesia's mineral sector. Through its Indonesian subsidiary, Tsingshan is building ferronickel and alumina smelter facilities with an investment value of USD 3.7 billion, making it one of the largest capital-intensive investments in the Southeast Asian region<sup>54</sup>. This financial advantage is also reinforced by economies of scale, as Chinese companies are often vertically and horizontally integrated in industrial supply chains, from upstream to downstream. China's dominance in the global mineral processing industry provides great opportunities for technology transfer and

<sup>51</sup> Dunning, John H. : “The Eclectic (OLI) Paradigm of International Production: Past, Present and Future”, *International Journal of the Economics of Business*, Vol. 8, n° 2 (2001), pp. 173–90, at <https://doi.org/10.1080/13571510110051441>.

<sup>52</sup> Fauziyyah Putri Zahra and Kusuma Paksi Arie: “Dampak Kerja Sama Indonesia-China Dalam Proyek Investasi Nikel Terhadap Pertumbuhan Ekonomi Kedua Negara”, *Jurnal Ilmiah Dinamika Sosial* 7, n° 1 (2023): 86–105, <https://doi.org/10.38043/jids.v7i1.4279>.

<sup>53</sup> Boreyko Anton V. ; Vernigora Alinas A.; Kislitsyn Vyacheslav A.: “The Infrastructure Competition Between the United States and China in Developing Countries”, *Herald of the Russian Academy of Sciences* 92, n° 7 (2022): 627–35, <https://doi.org/10.1134/S1019331622130159>.

<sup>54</sup> “Tsingshan to Ramp up Aluminum Production in Indonesia in 2023 – CRU”, *Mining.com*, 2021, at <https://www.mining.com/web/tsingshan-to-ramp-up-aluminum-production-in-indonesia-in-2023-cru/>.



operational excellence to partner countries such as Indonesia. The presence of Chinese companies brings not only capital and infrastructure, but also alumina refining technology, rare earth metal processing, and large-scale project management systems<sup>55</sup>. Therefore, the ownership-specific advantages of Chinese companies stem not only from financial capacity but also from technological integration, operational efficiency, and systemic support from their home countries, making them strategic actors in the dynamics of economic globalization and cross-border investment, especially in capital-intensive natural resource sectors such as bauxite and alumina.

- *Technology Excellence and Downstream Capability*

China has been a pioneer in the development of bauxite processing technology, particularly in addressing the challenges arising from the dominance of low-grade bauxite resources. Through recent innovations, China has not only improved resource utilization efficiency but also reduced production costs, increased recovery rates and minimized environmental impacts. Here are the technological advantages and downstream capabilities of China's bauxite processing:

- 1) Optimization of Resource Utilization

China developed a carbonization calcification method that enables the utilization of low-quality diasporic bauxite that is abundant in the country<sup>56</sup>. The technology was able to reduce the mass fraction of Na<sub>2</sub>O in the bauxite residue to 0.95% with alumina dissolution rates reaching 81.32%, thereby increasing the economic value of ores previously considered marginal<sup>57</sup>. In addition, the homogenization technique allows the use of low-cost bauxite to produce higher purity materials, which are then applied in alumina-silica refractories and ceramics<sup>58</sup>.

- 2) Cost Efficiency through Process Innovation

The application of direct flotation technology to diasporic bauxite at the Zhongzhou flotation plant, Henan, has proven significant cost savings in metallurgical processing over seven years of operation. In addition, cyclone flotation successfully reduced over-grinding and improved coarse particle recovery, thereby optimizing process efficiency and reducing production costs<sup>59</sup>.

- 3) Improved Efficiency and Recovery Rate

The combination of selective grinding, particle sorting, and direct flotation resulted in improved aluminum-silicon (A/S) ratios and higher recovery rates. Closed-circuit trials showed that the A/S ratio reached 8.23 with a recovery rate of 91.42%. In addition, the flotation cell-column integration provided higher efficiency than conventional methods, making it an optimal solution for the processing of medium to low-grade bauxite ore<sup>60</sup>.

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<sup>55</sup> Ajeng Dinar Ulfiana: "Kementerian Investasi Sebutkan Penyebab Investor Cina Dominasi Smelter Nikel Di Indonesia", *Tempo.co*, 2023, at <https://www.tempo.co/ekonomi/kementerian-investasi-sebutkan-penyebab-investor-cina-dominasi-smelter-nikel-di-indonesia-117776>.

<sup>56</sup> Chang he Gao et al.: "One Step Sintering of Homogenized Bauxite Raw Material and Kinetic Study," *International Journal of Minerals, Metallurgy and Materials*, Vol. 23, n° 10 (2016), pp. 1231–38, at <https://doi.org/10.1007/s12613-016-1343-8>.

<sup>57</sup> Yang Chen et al.: "Exploration of Large-Scale Application of Efficient and Clean Utilization of Low-Grade Bauxite," *Separations*, Vol. 10, n° 6 (2023), pp. 1–11, <https://doi.org/10.3390/separations10060336>.

<sup>58</sup> Jiancheng An et al.: "Research and Application Progress of Bauxite Based Homogenized Groggs in China," *China's Refractories*, Vol. 30, n° 4 (2021), pp. 19–24, at <https://doi.org/10.19691/j.cnki.1004-4493.2021.04.004>.

<sup>59</sup> Golam Taki et al.: "Potential of Blended Byproduct Caps for Management of Bauxite Residues: How Do Texture and Weathering Impact Geochemistry?", *Resources, Conservation and Recycling* Vol. 215, n° 7 (2025), pp. 1–13, <https://doi.org/10.1016/j.resconrec.2024.108077>.

<sup>60</sup> Tânia Gameiro et al.: "Novel Red Mud Waste-Derived Magnetic Geopolymer Spheres, Made without the Addition of Any Extra Iron Compounds, for the Removal of Wastewater Contaminants", *Journal of Environmental Management*, Vol. 377, n° 1 (2025), pp. 1–13, at <https://doi.org/10.1016/j.jenvman.2025.124615>.



4) Lower Environmental Impact

The innovation of the chemical pre-desilication method effectively separated silicon from bauxite, improved the A/S ratio, and made low-grade bauxite more viable for alumina production. In addition, the utilization of bauxite tailings as raw materials for construction materials, zeolite 4A, and corundum-mullite composites promotes a circular economy while reducing industrial waste<sup>61</sup>.

5) Contribution to Sustainable Development

The latest technology focuses on energy saving, high alumina recovery, and residual waste minimization, which is in line with the principle of green industry. China is not only improving the productivity of its bauxite industry but also ensuring environmental sustainability in the long term<sup>62</sup>.

**Table 2. China's Bauxite Processing Technology and Downstream Capability Advantages**

Technology	Excellence	Benefits
Calcification-Carbonization, Homogenization	Better Resource Utilization	Increases alumina dissolution rate, allowing utilization of low-grade bauxite
Flotation, Cyclone Flotation	Cost Reduction	Lowering processing costs, optimizing the flotation process
Selective Scouring, Cell and Column Integration	Improved Efficiency and Recovery	Increased A/S (Alumina/Silica) ratio, resulting in higher recovery rates
Desilication Method, Bauxite Waste Utilization	Environmental Benefits	Silica separation efficiency, reutilization of bauxite waste
Energy Saving, Waste Reduction	Sustainable Development	Increase productivity, minimize negative impact on the environment

Source: Processed by the author from Reuters (2021), Ulfiana (2023), Chang he Gao et al., (2016); Yang Chen et al. (2023); Golam Taki et al. (2025)

Through various technological breakthroughs, China has proven its capability in bauxite downstream, from improving processing efficiency to sustainable waste management. These innovations not only strengthen the resilience of the domestic alumina industry but also make significant contributions to the development of mineral processing technologies globally.

**4.3.2. Location-Specific Advantages (L)**

Indonesia offers strong location-specific advantages, thanks to its strategic position along major international trade routes, which enhances connectivity with global markets. Abundant natural resources, a large and competitive labor force, and a growing domestic market further strengthen its appeal to investors. The government continues to improve infrastructure such as ports, toll roads, and industrial zones to support efficient logistics and business operations. Additionally, the presence of industry clusters like Special Economic Zones (SEZs) helps create

<sup>61</sup> Hua Zeng et al.: “Progress on the Industrial Applications of Red Mud with a Focus on China”, *Minerals* Vol.10, n° 9 (2020), pp. 1–28, at <https://doi.org/10.3390/min10090773>.

<sup>62</sup> Gu Songqing: “The Evolution of Alumina Production Technology in China, New Challenges and Trends”, in *Travaux 46, Proceedings of 35th International ICSOBA Conference*, 2017, pp. 135–43.

an integrated and investment-friendly business environment. A more detailed explanation of the Location-Specific Advantages (L) is provided below.

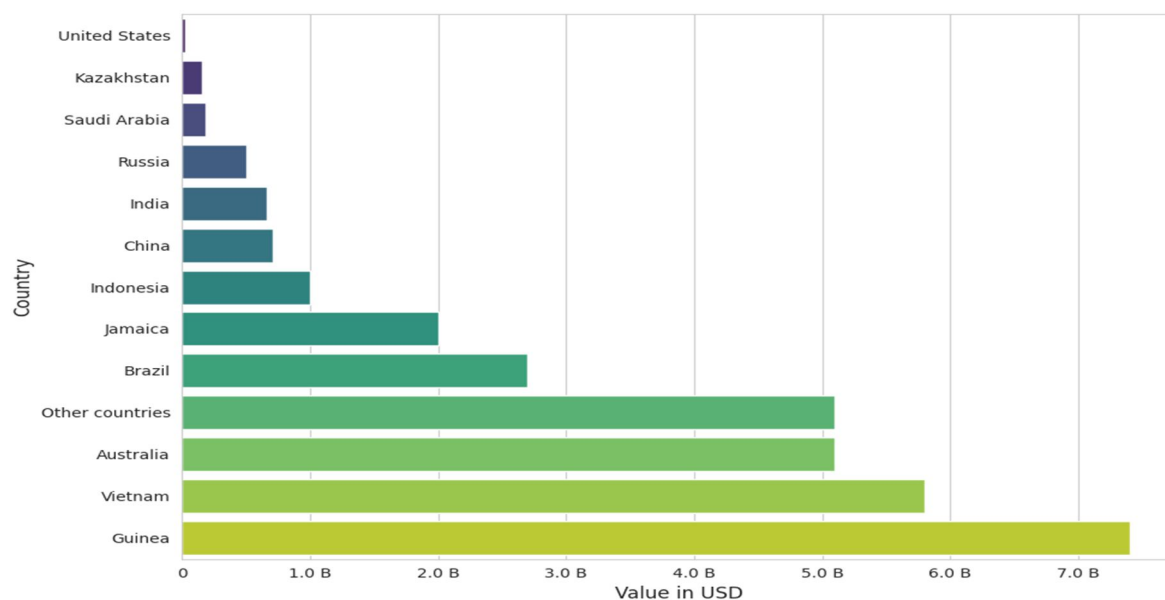
- *Factors Supporting Indonesia's Location Advantage*

Indonesia has a strategic position in the global bauxite industry landscape. Supported by abundant natural resources, favourable geological and climatological characteristics, as well as a national policy framework that encourages the increase of mineral added value, Indonesia has a great opportunity to become the world's bauxite downstream centre. Proper management of this advantage can drive inclusive and sustainable economic growth, while strengthening the competitiveness of the national industry in the global aluminum-based supply chain<sup>63</sup>. Some of the advantages of bauxite mining locations in Indonesia include:

- 1) National Reserve Potential as a Foundation for Industrialization

According to data from the Ministry of Energy and Mineral Resources (2024), Indonesia has bauxite reserves of 1 billion tons, making it the sixth largest reserve owner in the world after Guinea, Vietnam, Australia, Brazil, and Jamaica, as shown in the following Figure 2.

**Figure 2. World Bauxite Reserve Data**



Source: Ahdiat, 2023

This is an important foundation for the long-term development of the bauxite mining and processing industry. Large reserves not only ensure the sustainability of mining operations but also create investment certainty for the development of downstream industries such as alumina processing, aluminum smelting, and high-value-added derivative manufacturing products<sup>64</sup>.

- 2) Geoclimatic Advantage with Quality Resources from Natural Processes

<sup>63</sup> “Pemilik Cadangan Nikel Dan Bauksit Terbesar Di Dunia, Ini Yang Dilakukan Indonesia”, *ESDM*, 3 November 2024.

<sup>64</sup> Ahdiat Adi: “Indonesia, Negara Dengan Cadangan Bauksit Terbesar Ke-6 Global Pada 2022”, *databoks.katadata.co.id*, 2023, at <https://databoks.katadata.co.id/pertambangan/statistik/73dc90ec2b51e58/indonesia-negara-dengan-cadangan-bauksit-terbesar-ke-6-global-pada-2022>.



The tropical climate, characterized by high rainfall and constant temperatures throughout the year favors intensive weathering of aluminum-rich host rocks.<sup>65</sup> This creates ideal conditions for the formation of bauxite laterites with high alumina and low silica content, which are highly desirable in the alumina production process. In addition, the geological structure in areas such as West Kalimantan and the Riau Islands favors the accumulation of bauxite deposits on a large and economic scale.<sup>66</sup> These morphological conditions facilitate exploration activities and reduce mining operational costs.<sup>67</sup>

### 3) Downstreaming Policy as a Step to Industrial Independence

The Indonesian government has implemented a progressive policy approach by banning the export of raw mineral ores, including bauxite, as stipulated in Law No. 3 of 2020 on Mineral and Coal Mining.<sup>68</sup> This policy is designed to increase domestic processing and refining, while creating domestic added value and expanding the national industrial base. This downstream program encourages the construction of smelters and alumina refining plants, especially in bauxite-producing areas such as West Kalimantan, which has direct implications for job creation, increasing regional income, and strengthening local economic structures<sup>69</sup>.

- *Infrastructure and Industry Clusters*

Indonesia has developed a bauxite downstream strategy as an effort to increase the added value of natural resources domestically. This strategy is realized through the development of an integrated industrial cluster that includes mining, refining, and smelting activities in one area, as well as the utilization of national competitive advantages, such as the availability of coal energy at relatively low prices. Since the implementation of the policy to ban the export of raw bauxite ore in 2023, investment in the domestic processing sector has increased significantly, especially in the production of alumina and aluminum, which ultimately strengthens the structure of the national mineral industry<sup>70</sup>.

The development of an integrated industrial park has been a key approach in the development of the national bauxite industry. A prominent example is the Indonesia Morowali Industrial Park (IMIP) in Central Sulawesi, which, although originally developed for the nickel industry, is now also an important center for bauxite processing. Within the park, PT Well Harvest Winning Alumina Refinery, a partnership with Chinese investors, operates a large capacity alumina refinery. In addition, the development of other industrial estates such as Ketapang in West Kalimantan by PT Borneo Alumina Indonesia and the Bintan Industrial Estate in the Riau Islands is strengthening the national supply chain for alumina, while creating logistical efficiencies and more competitive economies of scale<sup>71</sup>.

<sup>65</sup> Nugraheni, Rosmalia Dita et alia: "Regional Tectonic and Geochemical Approach to Distinguish Bauxite Characteristics in Pahang, Malaysia and West Kalimantan, Indonesia", in *IOP Conference Series: Earth and Environmental Science*, Vol. 212 (2018), pp. 1–11, at <https://doi.org/10.1088/1755-1315/212/1/012026>.

<sup>66</sup> Hendri Sutrisno et al.: "Characteristics and Potential Use of Residual Aaste from Bauxite Ore Processing Industry in West Kalimantan, Indonesia", *Journal of Ecological Engineering*, Vol 26, n° 1 (2025), pp. 355–72, at <https://doi.org/10.12911/22998993/196062>.

<sup>67</sup> Tri Winarno et al.: "Characteristics and Genesis of Laterite Bauxite in Sompak District and Surrounding Areas, Landak Regency, West Kalimantan," *Indonesian Journal on Geoscience*, Vol.10, n° 1 (2023), pp. 37–49, at <https://doi.org/10.17014/ijog.10.1.37-49>.

<sup>68</sup> Presiden Republik Indonesia, Law of the Republic of Indonesia Number 3 of 2020 concerning Amendments to Law Number 4 of 2009 concerning Mineral and Coal Mining.

<sup>69</sup> N. Jafar et al.: "Mineralogical Study of Bauxite of Kenco Area, Landak District, West Kalimantan Province, Indonesia", in *IOP Conference Series: Earth and Environmental Science*, Vol. 1134 (2023), pp. 1–8, at <https://doi.org/10.1088/1755-1315/1134/1/012025>.

<sup>70</sup> "Pemilik Cadangan Nikel Dan Bauksit Terbesar Di Dunia, Ini Yang Dilakukan Indonesia", *op.cit.*

<sup>71</sup> Guitarra, Pratama: "Jangat Kaget! China Jadi Penikmat Terbesar Bauksit Republik Indonesia", *CNBC Indonesia*,



Another advantage supporting the competitiveness of Indonesia's bauxite industry is the availability of cheap coal energy. Unlike competitor countries such as Australia, which rely on natural gas and renewable energy with higher production costs, Indonesia relies on domestic coal-fired power plants, most of which are subsidized, resulting in lower energy tariffs. The International Energy Agency (IEA) notes that energy tariffs for the industrial sector in Indonesia are among the lowest in the Southeast Asian region. Some industrial estates, such as IMIP, even operate captive power plants, which not only ensure a stable energy supply but also increase the attractiveness for foreign investment, especially from China, which dominates the development of alumina smelter projects in Indonesia.<sup>72</sup>

Currently, four alumina smelter facilities have been completed and are operational. On the other hand, there are still eight smelter projects under construction, some of which are PT Borneo Alumina Indonesia in Mempawah, West Kalimantan (23.67% progress), PT Laman Mining in Ketapang, West Kalimantan (32.39%), PT Kalbar Bumi Perkasa in Sanggau, West Kalimantan (37.25%), and PT Sumber Bumi Marau in Ketapang (50.05%). Other projects, such as PT Persada Pratama Cemerlang, PT Parenggean Makmur Sejahtera, PT Dinamika Sejahtera Mandiri, and PT Quality Sukses Sejahtera, show construction progress between 52% and 65%<sup>73</sup>.

#### 4.3.3. Internalization Incentives (I)

Internalization advantages are one of the pillars in the OLI (Ownership, Location, Internalization) Model, which explains why multinationals choose to undertake foreign direct investment (FDI) operations instead of through market mechanisms such as licensing or exports. In the context of Indonesia-China bauxite downstream, some of the internationalization advantages that are crucial factors that encourage Chinese companies to invest directly in the construction of smelters and integrated industrial estates in Indonesia include:

- *Reduced Transaction Costs*

Internalization of business operations allows companies to avoid high transaction costs due to market uncertainty, information asymmetry, and contractual risks. Data from the World Trade Organization (2023) shows that the mining and mineral processing industry has an average transaction cost of 15-20% higher if done through market mechanisms compared to direct investment<sup>74</sup>. For example, PT Well Harvest Winning Alumina Refinery, a joint venture between Hongqiao Group (China) and PT Cita Mineral Investindo, chose to build an alumina plant in Ketapang, West Kalimantan, rather than importing raw bauxite to China. This approach reduces dependence on the volatile bauxite spot market and minimizes supply risk<sup>75</sup>.

- *Protection of Intangible Assets*

Chinese companies in bauxite downstream projects in Indonesia rely on alumina refining technology and smelter management, which are high-value intangible assets. If they choose

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2022, at <https://www.cnbcindonesia.com/news/20220215135810-4-315540/jangat-kaget-china-jadi-penikmat-terbesar-bauksit-ri>.

<sup>72</sup> "Southeast Asia Energy Outlook 2022", *Southeast Asia Energy Outlook 2022*, IEA, 2022, at <https://doi.org/10.1787/10bc5730-en>.

<sup>73</sup> "Melacak Perkembangan Smelter Bauksit Di Indonesia", Sucofindo, 2024, at <https://www.sucofindo.co.id/artikel-1/smelter-bauksit/>.

<sup>74</sup> "Global Value Chain Development Report (Resilient and Sustainable GVCS in Turbulent Times)", WTO, 2023, at [https://www.wto.org/english/res\\_e/booksp\\_e/gvc\\_dev\\_rep23\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/gvc_dev_rep23_e.pdf)

<sup>75</sup> Wicaksono, *op. cit.*



license-based cooperation, there is a risk of technology misuse or knowledge leakage<sup>76</sup>. Data from the Indonesian Ministry of Industry (2023) shows that 72% of Chinese companies in the minerals sector prefer FDI to protect their Intellectual Property Rights (IPR). For example, Tsingshan Holding Group's investment in IMIP included the development of Rotary Kiln Electric Furnace (RKEF) technology for nickel processing, which was later adapted for bauxite processing. By fully controlling operations, the company can keep the technology confidential and prevent knowledge transfer to local competitors<sup>77</sup>.

- *Operational Efficiency and Economies of Scale*

Internalization enables companies to achieve vertical efficiencies by integrating the entire supply chain, from bauxite mining to alumina production. A study by McKinsey (2023) on the mineral industry in Southeast Asia found that companies that internalize their operations experience production cost savings of 12-18% compared to the traditional contracting model<sup>78</sup>. A concrete example is the construction of an integrated industrial park in Morowali by PT Indonesia Tsingshan Stainless Steel (ITSS), which combines a smelter, power plant, and export port in one location. This integration reduces logistics costs by 30% while speeding up production time<sup>79</sup>.

#### **4.4. Strategic Implications of Indonesia's Bauxite Industry Development in Strengthening the Structure of the Mineral Processing Industry and Encouraging Economic Independence**

Bauxite downstream cooperation between Indonesia and China has a significant strategic impact on national industrial development, particularly in strengthening the structure of the mineral processing industry and advancing sustainable economic independence. When analyzed through the Eclectic Paradigm Ownership (O), Location (L), and Internalization (I) (OLI) the pattern of advantage distribution becomes visible, Chinese investors predominantly control technology, capital, and operational know-how (O), while Indonesia offers strong location advantages (L) through large bauxite reserves and relatively competitive energy costs, positioning the country as a major destination for mineral industrialization. In addition, internalization (I) through partnerships and majority ownership arrangements can generate coordination efficiencies and facilitate rapid project execution; however, this governance structure also raises concerns about path dependency and long-term reliance on external technology and industrial ecosystems<sup>80</sup>.

According to the Ministry of Industry (2023), the downstreaming policy increased the contribution of the mineral processing sector to manufacturing GDP from 8.2% in 2015 to 12.7% in 2022. This growth coincided with the realization of 14 bauxite–alumina smelters with total investment of US\$9.8 billion, of which approximately 78% was foreign direct investment from China. The resulting structural transformation has shifted Indonesia's role from a raw material exporter toward an intermediate-goods producer, reflected in the increase of national

<sup>76</sup> Muhammad Harianto: "Analisis Energi: Antam Mengadopsi Teknologi RKEF Tsingshan Bila Akuisisi," *antaranews.com*, 2024, at <https://www.antaranews.com/berita/4540014/analisis-energi-antam-mengadopsi-teknologi-rkef-tsingshan-bila-akuisisi>.

<sup>77</sup> Riedho, M Roehman Zainur: "Strategi Tiongkok Dalam Memanfaatkan Momentum Kebijakan Larangan Ekspor Bijih Nikel Oleh Pemerintah Indonesia", *Jurnal Ilmiah Hubungan Internasional*, Vol. 20, n° 1 (2024), pp. 74–95, at <https://doi.org/10.26593/jihi.v20i1.7156.74-95>.

<sup>78</sup> "Renewable Energy Manufacturing Opportunities for Southeast Asia", McKinsey, 2023, at <http://dspace.mit.edu/handle/1721.1/59804>.

<sup>79</sup> "Laporan Kinerja Kementerian Investasi/Badan Koordinasi Penanaman Modal", BKPM, 2023.

<sup>80</sup> Riyandanu Muhamad Fajar: "Senasib Nikel, Hilirisasi Bauksit Berpotensi Didominasi Investor Cina" *Katadata.co.id*, 30 December 2022, at <https://katadata.co.id/berita/energi/63aeae3a93362/senasib-nikel-hilirisasi-bauksit-berpotensi-didominasi-investor-cina>.



alumina production capacity from 1.2 million tons in 2019 to 4.3 million tons in 2023, contributing to an estimated 60% reduction in alumina import dependence<sup>81</sup>.

Nevertheless, the strategic implications extend beyond output expansion and import substitution. The dominance of foreign technology remains a major constraint around 85% of alumina processing technology is reportedly controlled by Chinese companies, limiting knowledge transfer and weakening the consolidation of domestic R&D capabilities<sup>82</sup>. From an economic perspective, downstreaming has increased export value added, with bauxite-derived product exports reaching US\$3.2 billion in 2022, a five-fold increase compared to 2014<sup>83</sup>. However, a WTO report indicates that around 65% of the export value chain is still integrated into China's industrial ecosystem, suggesting that Indonesia's value capture remains uneven and that locally anchored industrial linkages need strengthening to distribute benefits more equitably<sup>84</sup>.

At this stage, the OLI lens is useful for identifying how firm-specific capabilities, host-location conditions, and governance choices interact to shape investment outcomes. However, the Indonesia–China bauxite downstream cooperation also reveals several dimensions that the Eclectic Paradigm (OLI) does not sufficiently explain, and these limitations have direct implications for policy and economic independence strategies. First, the observed Location advantage is not purely an economic outcome of comparative resource endowments; it is also shaped by political pull. In particular, Indonesia's export ban creates a forced location advantage, a policy-induced investment logic where firms invest in domestic processing not only because it is inherently the most efficient location, but because the alternative mode (exporting raw bauxite) is legally constrained<sup>85</sup>. In this setting, OLI's conventional framing of L advantages as largely market-based economic attractiveness is insufficient to explain why firms accept operational risks and regulatory exposure as a condition of accessing the resource and market.

Second, OLI often treats institutional conditions as relatively stable background parameters, whereas Indonesia's downstreaming landscape is characterized by institutional friction and institutional shocks. Sudden policy shifts, such as changes in permitting and compliance regimes (e.g., the RKAB system) and evolving divestment or local ownership requirements, can rapidly alter the costs and feasibility of internalization strategies<sup>86</sup>. These institutional shocks may invalidate internal governance efficiencies overnight, meaning that the I advantage is not only a function of transaction cost logic but also of shifting regulatory constraints. This complexity is further amplified when state-owned enterprises operate in dual roles as both commercial partners and actors with regulatory influence, creating governance arrangements that do not fit neatly into standard market-versus-hierarchy reasoning.

Third, the cooperation faces sustainability pressures that expose another blind spot of the classic OLI framing. According to the Institute for Essential Services Reform (IESR), each ton of alumina production generates around 1.8 tons of red mud (bauxite residue), posing

<sup>81</sup> “Laporan Kinerja Kementerian Investasi/Badan Koordinasi Penanaman Modal”, *op.cit.*

<sup>82</sup> Wittbecker, Greg: “The Third Coming of Indonesia in Aluminum”, 2025, at <https://www.aluminummarketupdate.crugroup.com/global-trade/indonesia-aluminum-china-exports-imports-smelters/#main>.

<sup>83</sup> “Produksi Barang Tambang Mineral, 2021-2023”, BPS, 2025, at <https://www.bps.go.id/id/statistics-table/2/NTA4IzI=/produksi-barang-tambang-mineral.html>.

<sup>84</sup> “Global Value Chain Development Report (Resilient and Sustainable GVCS in Turbulent Times)”, WTO, 2023, at [https://www.wto.org/english/res\\_e/booksp\\_e/gvc\\_dev\\_rep23\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/gvc_dev_rep23_e.pdf)

<sup>85</sup> Suparman Nanang et al.: “Regulatory Hierarchy Conflicts and the Regional Autonomy Regime In”, *Journal of Mining and Environment (JME)*, Vol.17, n° 1 (2025), pp. 89–104, at <https://doi.org/10.22044/jme.2025.16033.3090>.

<sup>86</sup> *Ibid.*



environmental risks if not properly managed. In addition, around 90% of alumina production reportedly still relies on coal-based energy, increasing the sector's carbon footprint<sup>87</sup>. In this context, what appears as an Ownership advantage in the short run, such as access to low-cost, coal-based captive power or weaker environmental standards, may constitute a dirty advantage that becomes a global liability under tightening climate policy and potential carbon-related trade measures<sup>88</sup>. Moreover, socio-environmental conflicts (land disputes, waste management controversies, and local resistance) can delay or halt projects regardless of how strong O, L, and I advantages appear on paper, indicating that OLI underplays legitimacy constraints and non-market project risks.

Finally, while OLI helps explain why multinational enterprises integrate to capture value, it is less equipped to explain market distortions and distributional outcomes in the host economy. In Indonesia's downstreaming context, the export ban can contribute to oligopsony conditions, creating a buyer's market in which a limited number of Chinese-led smelters may exert price-setting power over numerous domestic miners and upstream suppliers<sup>89</sup>. This market structure can result in suboptimal value capture for Indonesia and may lock the downstream trajectory into lower-value processing stages (e.g., alumina) rather than accelerating upgrading into higher-value manufacturing (e.g., advanced materials and EV-related components). Therefore, beyond OLI, complementary perspectives from political economy, institutional analysis, and global value chain upgrading are needed to explain power asymmetries, policy-induced market structures, and the quality of industrial upgrading outcomes.

From a policy standpoint, these findings imply that strategic independence requires not only expanding smelter capacity but also strengthening domestic capability formation and governance safeguards. Fiscal incentives should prioritize domestic R&D and technology development in mineral processing, while technology transfer regulations need clearer enforcement mechanisms within foreign investment frameworks to prevent persistent dependence. Environmental governance must be tightened through circular-economy-based industrial clusters, stricter standards for red mud management, and accelerated energy transition in smelter operations to reduce long-term liabilities<sup>90</sup>. Finally, to mitigate oligopsony risks and improve value capture, Indonesia needs stronger locally embedded industrial linkages, supplier development programs, and diversification of export markets to reduce dependence on a single dominant partner country.

#### **4.5. Ameliorating the Eclectic Paradigm (OLI) for a Better Explanation of Indonesia–China Bauxite Downstream Cooperation**

To better explain Indonesia–China bauxite downstream cooperation, the Eclectic Paradigm (OLI) needs to be ameliorated by integrating insights from institutional theory, strategic asset-

<sup>87</sup> Myllyvirta Lauri et al.: “Membantah Mito Nilai Tambah, Menilik Ulang Industri Hilirisasi Nikel – Dampak Ekonomi Dan Kesehatan Dari Industri Nikel Di Sulawesi Tengah, Sulawesi Tenggara, Dan Maluku Utara”, 2024.

<sup>88</sup> Jobit Parapat and Katherine Hasan, “Berkembangnya Captive Coal Power: Awan Gelap Di Cakrawala Energi Bersih Indonesia”, 2023, at [https://globalenergymonitor.org/wp-content/uploads/2023/09/CREA\\_GEM\\_Indonesia-Captive\\_ID\\_2023.pdf](https://globalenergymonitor.org/wp-content/uploads/2023/09/CREA_GEM_Indonesia-Captive_ID_2023.pdf).

<sup>89</sup> Aditya Hadi, “Miners Slam Chinese Smelters for Buying Bauxite below Benchmark Price”, *The Jakarta Post*, 2025, at <https://www.thejakartapost.com/business/2025/05/06/miners-slam-chinese-smelters-for-buying-bauxite-below-benchmark-price.html>.

<sup>90</sup> Abdul F. et al., “Possible Strategies for Red Mud Neutralization and Dealkalization from the Alumina Production Industry: A Review for Indonesia”, *International Journal of Environmental Science and Technology* 22, n° 6 (2025), pp. 5159–78, at <https://doi.org/10.1007/s13762-024-06122-5>.



seeking (asset-augmenting) perspectives, network dynamics, and a dynamic capabilities lens<sup>91</sup>. While the original OLI framework remains valuable for mapping the structural determinants of foreign direct investment (FDI), it often conceptualizes multinational enterprises (MNEs) as predominantly rational economic actors exploiting pre-existing ownership advantages in locations characterized by relatively stable factor endowments. In the Indonesia–China bauxite case, however, investment behavior is better understood as a co-evolutionary process in which Indonesian state agencies, Chinese firms’ strategic motives, institutional conditions, and interorganizational networks jointly reshape the parameters of ownership, location, and internalization<sup>92</sup>. This study proposes four modifications to the OLI framework to better capture the distinctive governance and investment patterns observed in Indonesia–China bauxite downstream cooperation<sup>93</sup>.

#### 4.5.1. From Asset-Exploiting to Asset-Augmenting Ownership Advantages (O)

In its traditional formulation, OLI conceptualizes ownership (O) advantages as firm-specific assets, such as proprietary technology, managerial capabilities, brand equity, and financial strength, that firms exploit abroad to overcome the liability of foreignness<sup>94</sup>. This view implicitly assumes that firms possess these advantages prior to internationalization and then deploy them overseas to generate returns. In the Indonesia–China bauxite downstream sector, however, Chinese firms’ outward investment is frequently better interpreted through the lens of strategic asset-seeking/asset-augmenting FDI, where foreign investment is used to *augment* capabilities and secure strategic positions rather than merely exploit pre-existing advantages<sup>95</sup>.

In this context, a key ownership-related motive is the pursuit of long-term resource stability, where guaranteed access to bauxite inputs can itself function as a strategic advantage generated through the investment process<sup>96</sup>. Such advantages are not simply brought in by investors; they are often co-produced through engagement with host-country institutions, state-owned enterprises, and policy frameworks<sup>97</sup>. Consequently, the ownership pillar is more explanatory when it recognizes that advantages can be augmented and reconfigured through investment–state interactions rather than assumed as fixed endowments<sup>98</sup>. The ownership dimension can be further extended to include political capital as a core component of O for state-linked firms. Political capital derived from home-government policy support, inter-state diplomatic ties, and state-connected enterprise networks helps explain why Chinese investment is concentrated in strategic mineral downstreaming and why firms may accept lower margins or higher uncertainty in exchange for long-term strategic security. This political pull is difficult

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<sup>91</sup> Eka Putra Ramdhani et al.: “Characterisation of Bauxite Cleaning Waste in Tanjungpinang Indonesia,” *IOP Conference Series: Earth and Environmental Science*, Vol. 1148 (2023), pp. 1–8, at <https://doi.org/10.1088/1755-1315/1148/1/012001>.

<sup>92</sup> “Indonesia’s 900,000 t Aluminum Goal’s Reality Check: 7 Stalled Refineries, 24 Mln t of Lost Bauxite Demand”, AL Circle, 2025, at <https://www.mysteel.net/news/5104978-indonesias-900-000-t-aluminum-goals-reality-check-7-stalled-refineries-24-mln-t-of-lost-bauxite-demand>.

<sup>93</sup> Sutrisno et al., *op. cit.*

<sup>94</sup> Ramdhani et al.: “Characterisation of Bauxite Cleaning Waste in Tanjungpinang Indonesia”, *op. cit.*

<sup>95</sup> *Ibid*

<sup>96</sup> Liao Shumin: “China’s Tianshan Aluminum Sinks on Plan to Buy Three Bauxite Mines in Indonesia for USD30.3 Million”, *yicaiglobal.com*, 2023, at <https://www.yicaiglobal.com/news/china-tianshan-aluminum-sinks-on-plan-to-buy-three-bauxite-mines-in-indonesia-for-usd303-million>.

<sup>97</sup> “RI 78th Anniversary, MIND ID Track Record Provides Added Value for Indonesia in the Mining Industry Downstream Sector”, *Mind.id*, 2023, at <https://www.mind.id/en/news/hut-78-ri-rekam-jejak-mind-id-memberi-nilai-tambah-untuk-indonesia-di-sektor-hilirisasi-industri-pertambangan>.

<sup>98</sup> Ramdhani et al.: “Characterisation of Bauxite Cleaning Waste in Tanjungpinang Indonesia”, *op. cit.*



to capture under purely economic interpretations of ownership advantage but is essential in the Indonesia–China bauxite case<sup>99</sup>.

#### **4.5.2. From Passive to State-Contrived Location Advantages (L)**

Conventional OLI reasoning treats location (L) advantages as relatively stable, economically grounded attributes of host countries' natural resources, factor costs, infrastructure quality, and market characteristics<sup>100</sup>. Indonesia's bauxite downstream trajectory, however, illustrates state-contrived (or forced) location advantages, in which the investment attractiveness of a location is substantially constructed through regulatory intervention rather than arising solely from market efficiency. In particular, downstreaming policies, most notably the raw mineral export ban, can create an investment imperative by restricting alternative modes of resource access<sup>101</sup>. Under such conditions, location advantage is not simply given by endowments; it is actively shaped by institutional design. This is reinforced by additional governance mechanisms that structure operational feasibility and investor behavior, such as work-plan and licensing compliance requirements (e.g., RKAB-related controls) and evolving local participation expectations<sup>102</sup>. Importantly, these institutional arrangements should not be treated as minor modifiers of L; rather, they are constitutive of the location advantage itself. Integrating institutional theory thus allows OLI to represent the Indonesian state as an active agent that constructs and enforces the investment environment, producing locational attractiveness through policy instruments and their implementation<sup>103</sup>.

#### **4.5.3. From Internalization to Network Internalization (I → OLIN / Networking)**

The internalization (I) pillar, grounded in transaction cost economics, posits that multinational enterprises (MNEs) will internalize cross-border transactions within hierarchical governance structures when market contracting becomes inefficient due to opportunism, information asymmetries, and asset specificity<sup>104</sup>. However, the governance architecture of Indonesia–China bauxite downstreaming is frequently characterized not by full hierarchical integration, but by complex interorganizational arrangements. A substantial share of projects is structured through joint ventures and multi-partner collaborations involving Chinese providers of technology and capital, Indonesian conglomerates or license holders, and, in certain configurations, state-owned enterprises and other locally embedded actors<sup>105</sup>.

These empirical patterns are more plausibly conceptualized through network internalization, whereby coordination, risk absorption, and degrees of control are achieved through relational governance and repeated interactions rather than unitary ownership. From a network-theoretic standpoint, firms' positionality within inter-firm ties conditions their access to critical resources, regulatory intelligence, and dispute-resolution mechanisms functional equivalents that can partly substitute for hierarchical internalization<sup>106</sup>. This observation

<sup>99</sup> Mysteel, "Guangxi Investment Group to Extend Aluminum Value Chain to Indonesia and Malaysia," [mysteel.net](https://www.mysteel.net/news/5038247-guangxi-investment-group-to-extend-aluminum-value-chain-to-indonesia-and-malaysia), 2023, at <https://www.mysteel.net/news/5038247-guangxi-investment-group-to-extend-aluminum-value-chain-to-indonesia-and-malaysia>.

<sup>100</sup> Ramdhani et al., "Characterisation of Bauxite Cleaning Waste in Tanjungpinang Indonesia",

<sup>101</sup> "Indonesia Seeks Investors to Speed up Bauxite Downstreaming", *Xinhua Net*, 2024, <https://english.news.cn/20241129/a5f02bf8eab241cf892d834b2dd8283b/c.html>.

<sup>102</sup> "Indonesia's 900,000 t Aluminum Goal's Reality Check: 7 Stalled Refineries, 24 Mln t of Lost Bauxite Demand", *op. cit.*

<sup>103</sup> Muhammad Farhan, "Indonesia Justifies Bauxite Export Ban to Boost Domestic Smelter Industry," [jakartaglobe.id](https://jakartaglobe.id/business/indonesia-justifies-bauxite-export-ban-to-boost-domestic-smelter-industry#google_vignette), 2025, [https://jakartaglobe.id/business/indonesia-justifies-bauxite-export-ban-to-boost-domestic-smelter-industry#google\\_vignette](https://jakartaglobe.id/business/indonesia-justifies-bauxite-export-ban-to-boost-domestic-smelter-industry#google_vignette).

<sup>104</sup> Ramdhani et al. : "Characterisation of Bauxite Cleaning Waste in Tanjungpinang Indonesia", *op. cit.*

<sup>105</sup> "RI 78th Anniversary, MIND ID Track Record Provides Added Value for Indonesia in the Mining Industry Downstream Sector", *op. cit.*

<sup>106</sup> Ramdhani et al. : "Caracterisation of Bauxite Cleaning Waste in Tanjungpinang Indonesia", *op. cit.*



supports extending the eclectic paradigm toward an OLIN logic, in which Networking is treated as an explicit analytical dimension to explain how relational embeddedness and collaborative governance generate internalization-like benefits, particularly in host environments marked by institutional complexity and political salience.

Importantly, network internalization also provides stronger explanatory leverage for political-risk management than the classic market-versus-hierarchy dichotomy. By embedding investments within networks that include locally influential partners, firms can reduce exposure to adverse policy shifts, enhance responsiveness to regulatory and stakeholder pressures, and access informal coordination channels that facilitate compliance adaptation and conflict resolution. Consequently, incorporating networking dynamics refines the internalization pillar by capturing contemporary governance forms that OLI's conventional hierarchy-centric logic does not fully accommodate<sup>107</sup>.

#### **4.5.4. Accounting for Dynamic Reconfiguration Under Institutional Shocks (Dynamizing OLI)**

A persistent criticism of OLI is its static character, it often provides a snapshot of O, L, and I advantages at a given time but offers limited guidance on how these advantages evolve. The Indonesia–China bauxite cooperation, however, unfolds under continuous policy and market change, making it necessary to incorporate dynamic reconfiguration especially the capacity to adjust to institutional shocks<sup>108</sup>. A dynamic capabilities lens is useful here because it emphasizes firms' abilities to integrate, build, and reconfigure competencies in response to changing environments. In the Indonesian downstreaming landscape, investors and their local partners must adapt to shifting governance expectations, tighter sustainability pressures, and evolving participation requirements (including discussions and trajectories toward stronger local ownership and greener industrial standards). Under this lens, institutional changes are not merely barriers that reduce FDI; they can also become drivers that force capability upgrading, partner recombination, technology adjustments, and governance redesign. Dynamizing OLI therefore improves its explanatory power by capturing how the value of O, L, and I advantages is maintained or eroded through ongoing adaptation rather than assumed as fixed at the point of entry.

#### **4.5.5. Synthesis: An Ameliorated Framework for Analyzing Indonesia–China Bauxite Cooperation and Upgrading Outcomes**

The four modifications proposed above, (1) re-specifying ownership advantages from asset exploitation to asset augmentation through the explicit incorporation of political capital, (2) conceptualizing location advantages as state-contrived/forced outcomes illuminated by institutional theory, (3) reframing internalization through network internalization within an OLIN extension, and (4) dynamizing the framework via dynamic capabilities under conditions of institutional shocks, materially strengthen the explanatory reach of the eclectic paradigm for capturing the distinctive governance and investment patterns observed in Indonesia–China bauxite downstream cooperation.

Crucially, the ameliorated framework enhances analytical traction over developmental and upgrading outcomes, particularly the conditions under which downstreaming trajectories become locked into lower-value processing or, alternatively, transition toward higher-value manufacturi<sup>109</sup>. By integrating policy-induced investment imperatives (state-contrived location

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<sup>107</sup> *Ibid.*

<sup>108</sup> "Indonesia's 900,000 t Aluminum Goal's Reality Check: 7 Stalled Refineries, 24 Mln t of Lost Bauxite Demand", *op. cit.*

<sup>109</sup> *Ibid.*



advantages), JV-centered coordination and control (network internalization), and capability reconfiguration under evolving constraints (dynamic reconfiguration), the framework demonstrates that upgrading beyond alumina is neither linear nor automatic. Progress toward higher-value downstream products, such as advanced aluminium-based materials and potential EV-related components, depends on a co-evolutionary process shaped by institutional design, domestic capability formation (R&D capacity, skills development, supplier upgrading), sustainability compliance (including energy transition), and the distribution of bargaining power within investor–host networks.

Accordingly, while OLI remains a useful organizing logic, its explanatory adequacy in this case is significantly enhanced when it is deployed as a core meta-framework complemented by mechanisms drawn from institutional analysis, political economy, network perspectives, and dynamic capabilities, perspectives that are essential for understanding strategic mineral sectors and contemporary state–MNE interdependencies. To consolidate these theoretical refinements and clarify how each modification extends the traditional OLI logic, Table 3 synthesizes the shift from conventional OLI conceptualizations to the amended framework and summarizes the associated analytical implications for Indonesia–China bauxite downstream cooperation.

**Table 3. Synthesizes the shift from conventional OLI conceptualizations**

<b>Component</b>	<b>Traditional OLI Conceptualisation</b>	<b>Ameliorated Conceptualisation (This Study)</b>	<b>Analytical Implications for Indonesia–China Bauxite Case</b>
<b>Ownership (O)</b>	Asset exploitation: firms internationalize mainly to deploy pre-existing proprietary advantages (technology, capital, managerial know-how).	Asset augmentation / strategic asset-seeking: firms invest to secure strategic resources and co-produce advantages with host-state arrangements; Political Capital treated as a core ownership advantage for state-linked firms.	Explains why Chinese MNEs invest not only for efficiency but for long-term resource security and strategic positioning; captures political pull (state-backed motives, diplomacy, BRI-linked leverage) that classic OLI under-specifies. <sup>110</sup>
<b>Location (L)</b>	Passive endowments: location attractiveness derives from relatively stable economic factors (resources, costs, infrastructure, market size).	State-contrived / forced location advantages: location attractiveness is constructed by institutions and regulation (e.g., export ban, licensing compliance regimes, RKAB-related controls, evolving local participation expectations).	Explains why FDI occurs under regulatory compulsion, not purely market attractiveness; highlights how institutional design and implementation define the “L” that investors experience (beyond resources/energy costs).

<sup>110</sup> Shumin, Liao: “China’s Tianshan Aluminum Sinks on Plan to Buy Three Bauxite Mines in Indonesia for USD30.3 Million”.



Component	Traditional OLI Conceptualisation	Ameliorated Conceptualisation (This Study)	Analytical Implications for Indonesia–China Bauxite Case
<b>Internalization (I)</b>	Hierarchy vs market: internalization gains come from keeping transactions within the firm to reduce transaction costs and market failure.	Network internalization: coordination and control achieved through dense interorganizational networks (JVs, strategic alliances, SOE/local license holder partnerships) rather than unitary ownership; extension toward OLIN (Networking as explicit advantage).	Explains why bauxite downstreaming is dominated by JV-centered governance; clarifies how networks reduce political risk, enable regulatory navigation, and provide control without full ownership—phenomena classic I logic struggles to explain.
<b>Dynamic dimension (added lens)</b>	OLI often treated as a static snapshot at entry.	Dynamic reconfiguration via dynamic capabilities: firms continuously adapt O/L/I advantages in response to institutional shocks (policy shifts, tightening ESG/green standards, changing participation rules).	Explains investment behavior as co-evolution (state policy ↔ firm strategy), not a one-off decision; captures how regulatory volatility can erode or reshape internalization benefits and drive capability upgrading.
<b>Developmental outcome / upgrading (explicit focus)</b>	OLI explains investment choice, but is weaker on power asymmetries and host-country value capture.	Upgrading viewed as a co-evolutionary outcome shaped by institutions + networks + capabilities (supplier development, R&D, skills, green energy transition) and bargaining power distribution. <sup>111</sup>	Helps explain why downstreaming may be locked into lower-value processing (e.g., alumina) versus conditions for upgrading into higher-value manufacturing, including advanced aluminium-based products and EV-related components (not an automatic outcome of FDI). <sup>112</sup>

<sup>111</sup> Andy Yahya Al Hakim et al.: “Critical Raw Materials Associated with the Lateritic Bauxite and Red Mud in West Kalimantan, Indonesia”; *Geochemistry Exploration Environment Analysis* Vol.23, n°3 (2023), pp. 1–19.

<sup>112</sup> “Indonesia’s 900,000 t Aluminum Goal’s Reality Check: 7 Stalled Refineries, 24 Mln t of Lost Bauxite Demand”, *op.cit.*



**Source:** Author's synthesis based on the integration of OLI with institutional theory, strategic asset-seeking perspectives, network dynamics (OLIN), and dynamic capabilities.

## **5. Conclusion**

This study analyzes the bauxite downstreaming cooperation between Indonesia and China through an eclectic paradigm (OLI Model) and finds that the three pillars of excellence interact in complex ways to shape the investment pattern. From the dimension of ownership advantage (O), Chinese companies demonstrate strong firm-specific capabilities through access to cheap funding from state financial institutions, mastery of advanced bauxite processing technologies (such as the carbonization-calcination and direct flotation methods), and economies of scale that enable cost efficiency and high acquisition rates. From the dimension of location advantage (L), Indonesia offers abundant bauxite reserves (ranked sixth in the world), tropical geoclimatic advantages that produce high-quality laterite bauxite, and downstreaming policies through a ban on raw ore exports that create a state-contrived location advantage. From the dimension of internalization advantage (I), Chinese companies choose hierarchical governance structures through joint ventures or direct investment to reduce transaction costs, protect proprietary technology, achieve vertical efficiency, and manage supply risks, as seen in the PT Well Harvest Winning Alumina Refinery project and the development of integrated industrial estates such as IMIP.

This cooperation has had significant strategic implications for national industrial development, reflected in the increased contribution of the mineral processing sector to manufacturing GDP (8.2% in 2015 to 12.7% in 2022), the realization of 14 bauxite-alumina smelters worth US\$9.8 billion (78% from China), an increase in alumina production capacity from 1.2 million tons (2019) to 4.3 million tons (2023), and a reduction in alumina import dependency by up to 60%. However, this study also reveals structural challenges that cannot be fully explained by the classic OLI framework, including the dominance of foreign technology (85% control of processing technology), value chain dependence (65% still integrated into the Chinese industrial ecosystem), as well as sustainability pressures from red mud waste (1.8 tons per ton of alumina production) and dependence on coal energy (90% of alumina production), which increases the sector's carbon footprint.

To overcome these explanatory limitations, this study proposes improvements (amelioration) to the eclectic paradigm through four modifications. First, ownership advantage (O) needs to be reconceptualized from asset exploitation to asset-seeking by incorporating political capital as a core component. Second, location advantage (L) must be understood as state-contrived through regulatory intervention. Third, internalization (I) is expanded to include network internalization within the OLIN framework, which emphasizes coordination through interorganizational networks. Fourth, the OLI framework needs to be dynamized with a dynamic capability lens to explain continuous adjustments to institutional shocks. Thus, this study contributes to the development of foreign direct investment theory by showing that the Indonesia-China bauxite downstreaming cooperation is a co-evolutionary process involving state agency, corporate strategic motives, institutional dynamics, and interorganizational networks. The policy implications emphasize that national industrial independence requires strengthening domestic capabilities through R&D incentives, enforcement of technology transfer rules, circular economy-based environmental governance, and diversification of trading partners to reduce dependence on one dominant country.



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