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Indonesia's Shipping Network: Connectivity, Supply Chains, and the Strategic Role of West Kalimantan

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Indonesia's Shipping Network: Connectivity, Supply Chains, and the Strategic Role of West Kalimantan[1]

Miranda Lu and Yi Xin

Abstract

Indonesia's geographic position as the world's largest archipelago offers substantial potential for maritime-led economic growth, yet underdeveloped port infrastructure continues to entrench subnational disparities. This paper critically examines Indonesia's maritime shipping networks, using West Kalimantan as a representative case study. We show that Indonesia trails ASEAN peers and China in port performance, with the poorest-performing ports concentrated heavily outside Java. This imbalance locks peripheral regions into upstream roles to supply a narrow range of minimally processed raw materials to Java and regional hubs, while leaving midstream value largely unrealised. West Kalimantan exemplifies this structural problem: despite its proximity to the Strait of Malacca and abundant mineral reserves, its exports remain narrowly confined to primary commodities like aluminium oxide, reflecting weak logistics capacity and industrial depth. With the Port of Tanjungpura already under construction, a phased approach can help address these structural challenges: complete and operationalise the port to ease logistics bottlenecks; anchor midstream aluminium processing to retain more value locally; and expand vocational training to shift labour from low-productivity sectors. Progress in these areas can serve as a scalable template for provinces with similar mineral strengths, where weak maritime connectivity and limited processing capacity continue to hinder industrial deepening and value capture.

Key Words: Shipping Networks; Subnational Disparities; Supply Chains; Value Chain; Value Capture; Indonesia; West Kalimantan; Ports; Port of Tanjungpura

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1 Introduction

1.1 Overview of the Study

Shipping networks are essential to a country's connectivity and participation in the global supply chain. With 80% of global trade by volume and 70% by value transported by sea, maritime trade is the most cost-effective method for moving goods over long distances. However, despite its vast archipelago with immense potential for maritime trade, Indonesia's maritime infrastructure hampers its development. West Kalimantan exemplifies this gap: despite its strategic location near the Strait of Malacca and its abundant resources, it remains an underutilised gateway for linking domestic supply chains to global markets.

This paper aims to explore Indonesia's maritime shipping networks through the lens of infrastructure, supply chains, and local endowments. Several key findings have emerged. First, we show that Indonesia's maritime infrastructure is underdeveloped compared to its ASEAN neighbours and falls significantly short of China's, whose advanced infrastructure has been crucial to its phenomenal export growth.

Second, we find that although domestic shipping connectivity is dense, there are significant disparities in export patterns across regions. Provinces such as Sumatra, Sulawesi, and Kalimantan play vital roles in the domestic supply chain but contribute minimally to international manufacturing exports. These upstream regions primarily supply agricultural products, intermediates, and natural resources such as oil and gas, which are processed and assembled into manufactured goods in Java. Given that manufacturing activities are largely concentrated in Java and underdeveloped elsewhere, the direct international trade potential of the upstream regions is primarily limited to exporting raw materials to other regional manufacturing hubs. This dynamic restricts the ability of Indonesian provinces outside Java to access major consumer markets such as the US and EU. Furthermore, these resource trades are also heavily concentrated at HS 6-digit level and limited to a few provinces, reinforcing subnational disparities.

We use West Kalimantan as a case study to illustrate how underdeveloped maritime infrastructure constrains the full utilisation of regional economic potential. Despite its strategic proximity to the Strait of Malacca and rich mineral reserves, six-digit trade data reveal a narrow export base dominated by upstream commodities such as aluminium oxide, with little presence in midstream or high-value-added segments. This pattern underscores the province's weak integration into downstream manufacturing value chains. Structural deficits in both physical and human capital (Tan, Kurniawati and Ng, 2025) further compound these challenges, leading to persistent underperformance in maritime trade. To address these challenges, we recommend upgrading port and hinterland logistics infrastructure to enhance global connectivity; anchoring midstream aluminium processing and other high-value-added industries to capture greater economic rents; and investing in workforce upskilling and reskilling to support this industrial transition.

The remainder of this paper is organised as follows. The rest of this introduction section will be devoted to illustrating Indonesia's maritime infrastructure in comparison with other ASEAN

countries as well as that of China, before we briefly touch on why we chose West Kalimantan as a case study. Section 2 introduces our data and provides an overview of Indonesia's maritime shipping network. Section 3 provides a dissection of Indonesia's maritime shipping network at provincial level. Section 4 uses West Kalimantan as a case study and examines its strategic potential in maritime trade. Section 5 evaluates whether West Kalimantan has fully capitalised this potential. Section 6 recommends a set of targeted policies considering our analysis of West Kalimantan. Section 7 concludes.

1.2 Indonesia's Port Development: A Cross-Country Comparison

Indonesia is the world's largest archipelago and holds immense potential for maritime trade. Table 1 shows that Indonesia's coastline length is unmatched in the region, being 50% longer than that of the Philippines and twice that of China. Ideally, Indonesia's expansive coastline would correspond to a proportionally higher number of ports for transporting goods.

However, despite its vast coastline, Table 1 shows that Indonesia has the second lowest density of ports per thousand kilometres, surpassing only the Philippines. With a port density of just 1.2 per thousand kilometres, Indonesia significantly lags behind China, known for its efficient maritime infrastructure which boasts three times as many ports per thousand kilometres. This figure also falls short compared to other ASEAN manufacturing nations such as Thailand, Vietnam, and Malaysia, which have between 2.2 and 3.9 ports per thousand kilometres of coastline. This sparsity of ports suggests that Indonesia is not fully utilising its maritime trade potential.

Table 1: Cross-Country Comparison of Ports per Thousand Kilometres of Coastline

Country	Coastline (km)	Number of Ports	Ports Per 1,000 KM
China	18,000	65	3.6
Indonesia	55,000	64	1.2
Malaysia	4,675	18	3.9
Philippines	36,289	18	0.5
Singapore	193	2	10.4
Thailand	3,219	7	2.2
Vietnam	3,444	10	2.9

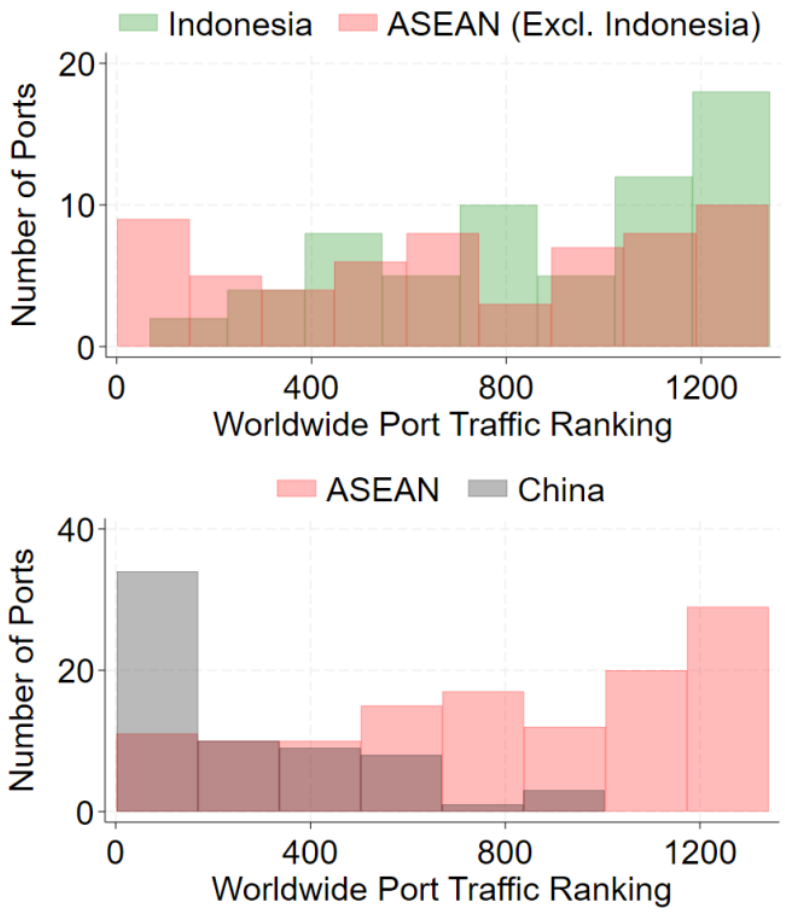
Source: IMF PortWatch, The World Factbook, and ACI authors' calculations

Adding to these challenges, Indonesia's ports also experience low traffic. Figure 1 compares the number of ports in Indonesia, other ASEAN countries, and China across different ranges of worldwide port traffic rankings. The horizontal axis represents the rankings of ports worldwide from high traffic (left) to low traffic (right), while the vertical axis indicates the number of ports within each traffic ranking range.

The figure shows that Indonesia has fewer ports in the higher traffic rankings compared to other ASEAN countries and significantly fewer than China. As the rankings increase (indicating lower traffic), the number of Indonesian ports increases, suggesting that most of Indonesia's ports

fall into lower traffic categories. Conversely, other ASEAN countries and China have more ports in higher traffic categories, indicating busier and potentially more developed port facilities.

Figure 1: Comparison of Port Traffic Rankings



Source: IMF PortWatch

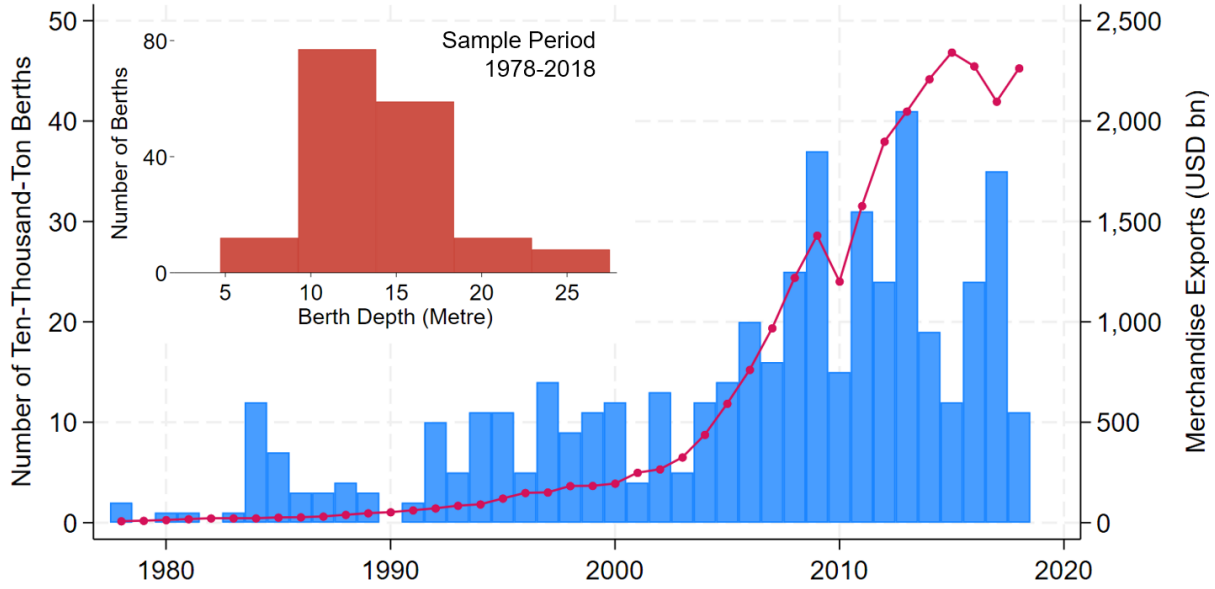
Impact of Port Infrastructure on Exports

Indonesia's underdeveloped maritime infrastructure not only limits Indonesia's role in global maritime trade but also weakens its connectivity to key international markets. The importance of maritime infrastructure can be further underscored by the case of China, which has vitally developed its maritime infrastructure to become a dominant force in global exports.

Figure 2 highlights this by displaying two data trends from 1980 to around 2020. The blue bars represent the number of new containerised berths in Chinese ports, measured in units of ten-thousand-ton berths, showing a substantial increase particularly from the early 2000s onward. Additionally, the subfigure highlights that these berths are primarily deep-water berths of at least 10 meters, making them ideal for accommodating large container ships and reducing trade costs through economies of scale (Ganapati et al. 2024). Correspondingly, the red line illustrates the growth of

China's merchandise exports in billions of USD, marking a considerable rise over the same period, with a particularly sharp acceleration starting also in the 2000s.

Figure 2: New Containerised Berths and the Growth of Chinese Exports



Source: Chronicle of China's Water Transport Engineering Projects (1978-2018) and ACI authors' calculations.

The evident correlation between the expansion of port infrastructure and the surge in export volume underscores how vital investments in maritime infrastructure can profoundly enhance a country's export capabilities. The data showcases the effectiveness of China's approach to developing its maritime capabilities, which has very successfully supported its export growth. Thus, this compelling example strongly suggests that countries like Indonesia should fully develop its maritime infrastructure to fully capitalise on their extensive archipelago.

1.3 Significance of West Kalimantan

West Kalimantan serves as a compelling case study that illustrates Indonesia's maritime deficiencies. Strategically located between the busiest shipping lanes in the Strait of Malacca and the manufacturing hubs in Java, West Kalimantan is also rich in resources essential for downstream manufacturing sectors. However, despite these key advantages, both international and domestic trade in West Kalimantan remain disappointingly low. This positions West Kalimantan as a prime example of Indonesia's maritime underdevelopment, showcasing significant untapped potential alongside substantial shortcomings in trade development. Focusing on a specific case study like West Kalimantan allows us to contextualise broader issues and zoom in on the specifics, which helps identify targeted strategies that can be applied to similar regions facing comparable challenges.

1.4 Related Literature

Our research contributes significantly to the field of transportation economics, particularly in the context of Indonesia and maritime Southeast Asia's shipping networks. It builds upon existing literature such as the studies by Yudhistira and Sofiyandi (2018), Karimah and Yudhistira (2020), Rodríguez-Pose et al. (2013), Reza et al. (2015), and Trace et al. (2019), which have primarily focused on the region's port infrastructure and its impact on local economic activities. While these works have greatly enhanced our understanding of Indonesia's maritime infrastructure, they do not examine Indonesia's actual shipping network which restricts our comprehension of how domestic provinces interact with each other and with international partners.

Our work fills this gap. Using the latest data from the IMF PortWatch, which collects satellite information from commercial ships, we provide a detailed analysis of the supply chain structure within Indonesia's shipping network as well as targeted policy recommendations for subnational economic development. In this sense, we are closer to Wiradanti (2019) and Tu et al. (2018), though our study differentiates itself through a robust empirical orientation based on trade-route data.

Second, this paper also relates to the ongoing study of the network structure of international trade, with a specific focus on the strategic role of entrepôts as explored by researchers such as Ganapati et al. (2024), Heiland et al. (2019), and Medin (2022). Entrepôts, serving as intermediary ports, are critical in facilitating the import, storage, and subsequent re-exportation of goods without significant processing. Given its strategic location, West Kalimantan holds potential to enhance the existing network of major transshipment hubs like the Port of Singapore, Port Klang, and Port of Tanjung Pelepas along the Strait of Malacca. Integrating West Kalimantan into this network could provide valuable insights and practical policy applications, particularly in optimizing regional trade flows and strengthening economic ties across Southeast Asia.

Third, our study also relates to the academic literature on the economic impact of maritime infrastructure improvement, in particular those related to ports and containerisation, such as Ardelean et al. (2022), Bernhofen et al. (2016), Brancaccio et al. (2020, 2024), Coşar et al. (2018), Feyrer (2021), Ganapati and Wong (2023), Hidalgo-Gallego and Núñez-Sánchez (2023), Koenig et al. (2024), Xu and Yang (2021). Our work contributes to this literature by shifting the focus to Indonesia and provides more policy-oriented empirical evidence.

2 Data Overview

Our primary data come from two sources. The first is the PortWatch developed by the International Monetary Fund (IMF), which offers daily estimates of maritime trade volumes at the port-to-port level using satellite data on commercial ships. We focus on 64 ports within Indonesia, aggregating the data from a total 1,078 port-to-port routes down to 354 province-to-province shipping routes. The second source is from the Badan Pusat Statistik Indonesia, which provides data on province-level export and import values based on both HS two-digit and six-digit classifications. This data was manually digitised for our analysis.

2.1 Domestic Trade Volume at Province-to-Province Level

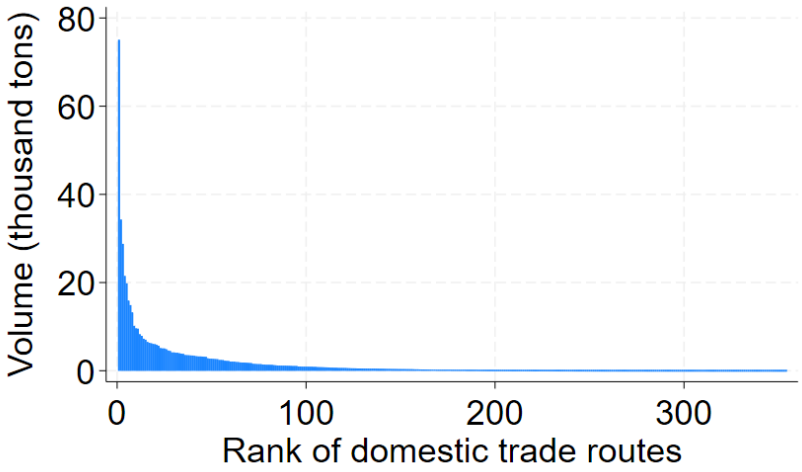
In Figure 3, we plotted the 354 province-to-province shipping routes, revealing an extremely dense domestic shipping network. This density indicates that nearly every Indonesian province is trading with almost all of its neighbouring provinces. However, without detailed information on route-level trade, it's challenging to appropriately characterise the shipping network.

Figure 3: Indonesia's Province-to-Province Level Shipping Network

Source: IMF PortWatch and ACI authors' calculations

Figure 4 plots the trade volume across Indonesia's 354 domestic trade routes, measured in thousands of tons against the rank of each route. The graph shows a steep drop in volume from the highest-ranked routes to those ranked lower, indicating a significant concentration of trade along a few key routes. Together with Figure 3, this suggests that while Indonesia has an extensive network of maritime routes, the bulk of trade is concentrated along a few crucial pathways.

Figure 4: Trade Volume and Rank of Domestic Trade Routes



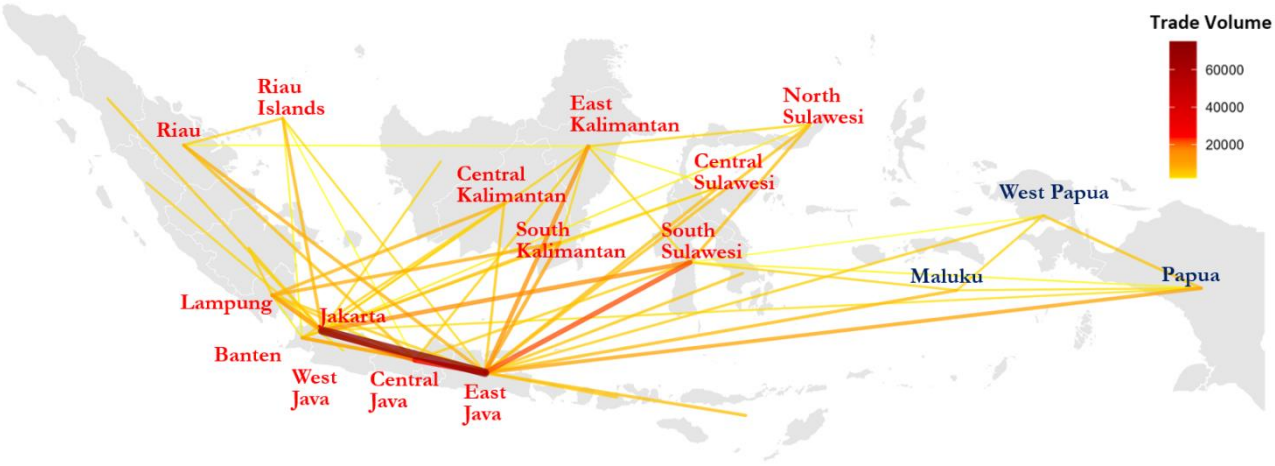
Source: IMF PortWatch and ACI authors' calculations

As a result, we decided to focus on the top 60 trade routes, which cover more than 80% of Indonesia's total domestic shipping volume. The result is plotted in Figure 5. The figure maps the trade volumes between various provinces in Indonesia, with lines connecting regions and colour intensity indicating the volume of trade, measured in tons. The brighter and thicker the line, the higher the trade volume. This focused visualisation allows us to pinpoint the regions connected by multiple top trade routes and identify the major trade hubs.

Figure 5 reveals several key aspects of Indonesia's domestic trade routes. First, most trade activity is concentrated on Java Island, with Jakarta serving as a central hub connected by high-volume routes to West Java, Central Java, East Java, and South Sulawesi. Second, East Java stands out as another significant trade hub, particularly in its high-volume connections with Jakarta and Central Java—these routes are represented by the thickest, brightest lines on the map. Additionally, East Java's trade with East Kalimantan and South Sulawesi is also notably high. Lastly, the majority of the top 60 trade routes are within major regions such as Java, Sumatra, Kalimantan, and Sulawesi, with fewer routes extending to more remote areas such as Maluku, West Papua, and Papua.

In summary, Figure 5 details the geographical distribution of Indonesia's domestic shipping network. To fully grasp the implications of this distribution, particularly its relationship with the domestic supply chain, it is crucial to analyse the sectoral distribution of trade across these provinces. We will now proceed to examine this aspect.

Figure 5: Indonesia's Top 60 Domestic Trade Routes

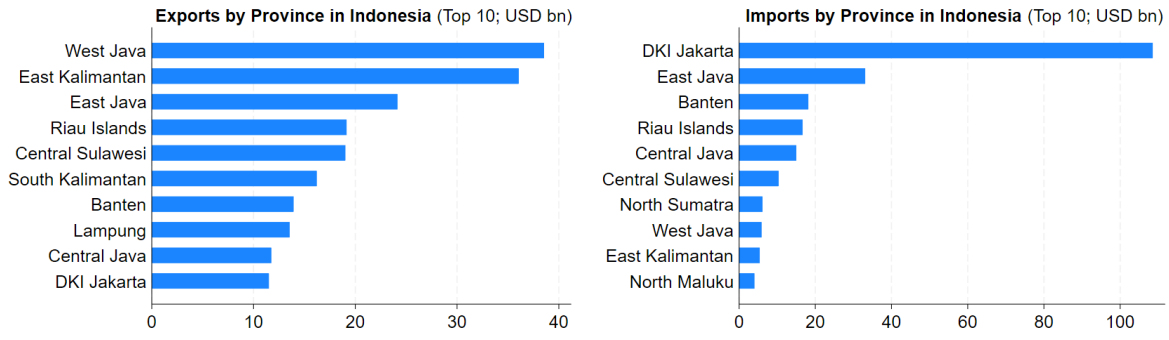


Source: IMF PortWatch and ACI authors' calculations

2.2 International Trade Value at Province and Sector Levels

Figure 6 describes the exports and imports of the top ten provinces in Indonesia by trade value, measured in billions of USD. West Java leads with the highest export value, closely followed by East Kalimantan and East Java. Other provinces like Riau Islands, Central Sulawesi, South Kalimantan, Banten, Lampung, Central Java, and Jakarta also feature on the list, each contributing significantly but less than the leading provinces. For imports, Jakarta is the primary entry point, significantly outpacing other regions. East Java and Banten are also major importers, though their trade values are considerably lower than Jakarta's.

Figure 6: Exports and Imports of Provinces in Indonesia

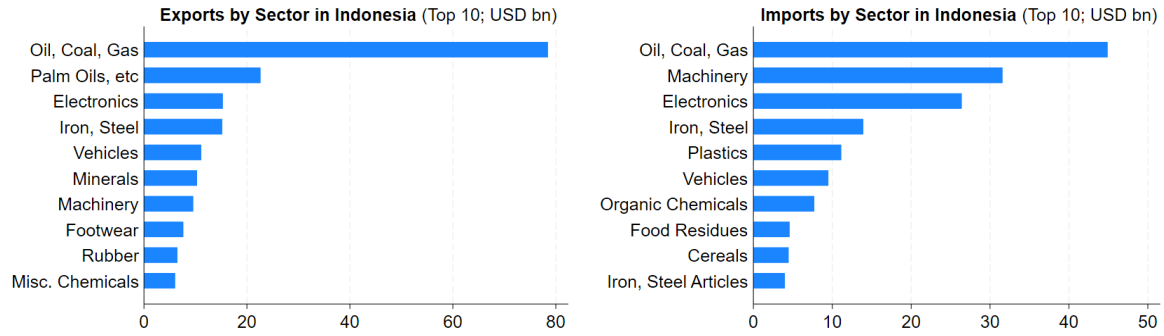


Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

Figure 7 further shows the sectoral distribution of Indonesia's international trade, presenting the top 10 sectors by trade value in billions of USD. Leading the exports are oil, coal, and gas, which significantly outpace the second-ranked sector, palm oils and related products. The list continues with electronics, iron and steel, vehicles, minerals, machinery, footwear, rubber, and miscellaneous chemicals. This variety illustrates a diverse export profile that includes both resource-based and manufactured products. On the import side, oil, coal, and

gas also dominate, underscoring the country's substantial industrial and energy requirements. Additional key import sectors include machinery, electronics, iron and steel, plastics, vehicles, organic chemicals, food residues, cereals, and iron and steel articles, which are mostly intermediates needed for production. Combined with the domestic shipping network, Figures 6 and 7 contribute to a comprehensive view of both the international and domestic supply chains vital to Indonesia's economy, a topic we will explore further in the next section of our analysis.

Figure 7: Exports and Imports by Sector in Indonesia

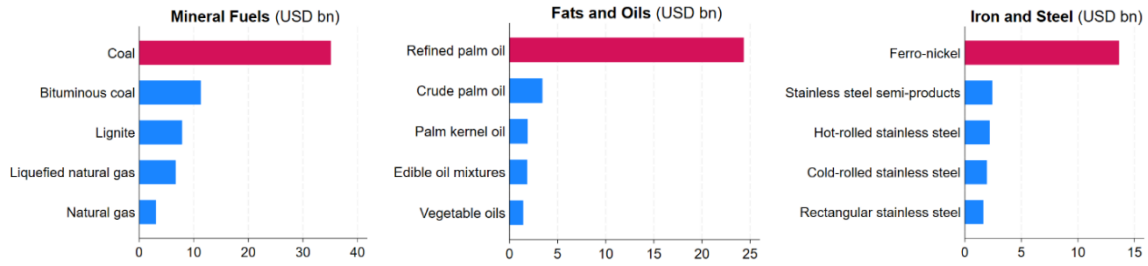


Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

Furthermore, while Indonesia's national export portfolio appears diverse and spans across resources and manufacturing products, exports in the resource sector are highly concentrated when examined at a more disaggregated level. Figure 8 zooms in on the top three resource exports at the HS two-digit level and examines its concentration at the HS six-digit product level.[2] In the mineral fuels sector (HS 27), coal overwhelmingly dominates exports, accounting for nearly USD 40 billion, while other products such as bituminous coal, lignite, liquefied natural gas, and natural gas contribute far less. A similar pattern is observed in the fats and oils sector (HS 15), where refined palm oil alone generates close to USD 25 billion in export value, far exceeding other products like crude palm oil, palm kernel oil, and vegetable oils. In the iron and steel sector (HS 72), ferro-nickel leads by a wide margin, with export values nearing USD 15 billion, while other stainless-steel products make up only a small share.

[2] The numbers reported in Figure 7 and Figure 8 might be slightly inconsistent for some categories due to compilation of data across different sources, such that Figure 7 reports the national statistics on 2-digit level trade, while Figure 8 is aggregated from provincial data source on 6-digit level trade.

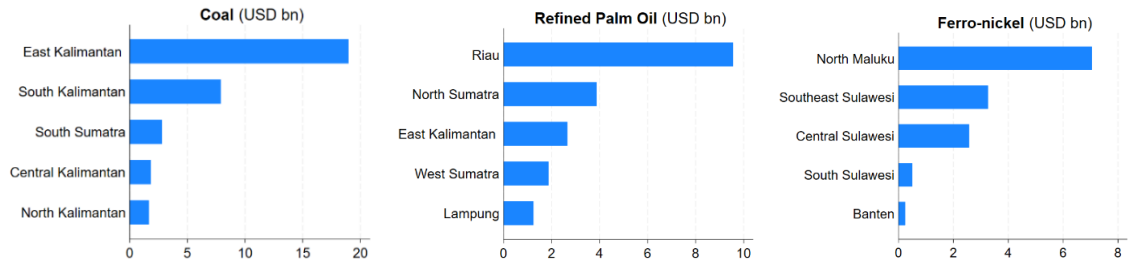
Figure 8: Export Composition of Indonesia's Resource Sectors at HS Six-digit Level



Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

This product-level concentration is mirrored geographically. Figure 9 shows that exports of Indonesia's top commodities at the HS six-digit level are heavily concentrated in a few provinces. Coal exports are dominated by East Kalimantan (nearly USD 20 billion), followed by South Kalimantan, while contributions from South Sumatra, Central Kalimantan, and North Kalimantan are much smaller. Refined palm oil is similarly concentrated, with Riau alone approaching USD 10 billion in exports—well ahead of North Sumatra, East Kalimantan, and West Sumatra. Ferro-nickel exports are led overwhelmingly by North Maluku (almost USD 8 billion), with Southeast and Central Sulawesi trailing far behind. These spatial patterns underscore a deeper structural imbalance: not only are Indonesia's exports dominated by a narrow set of resource-based products, but the production and trade of those products are also concentrated in a small number of provinces.

Figure 9: Geographical Distribution of Top Commodities by Province at HS Six-digit Level



Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

The dual concentration of Indonesia's resource exports illustrated by Figure 8 and Figure 9, both by individual product and geographic location, highlights the need for more balanced regional industrial development to broaden the export base and promote more equitable national growth. It also raises the risk that localised disruptions could have outsized effects on national trade performance and the stability of regional supply chains.

Viewed in conjunction with the domestic shipping network, the sectoral and geographical patterns here offer a more integrated understanding of the maritime trade underpinning Indonesia's economy. This interconnection between production hubs, export flows, and internal logistics form the basis for the next section of our analysis.

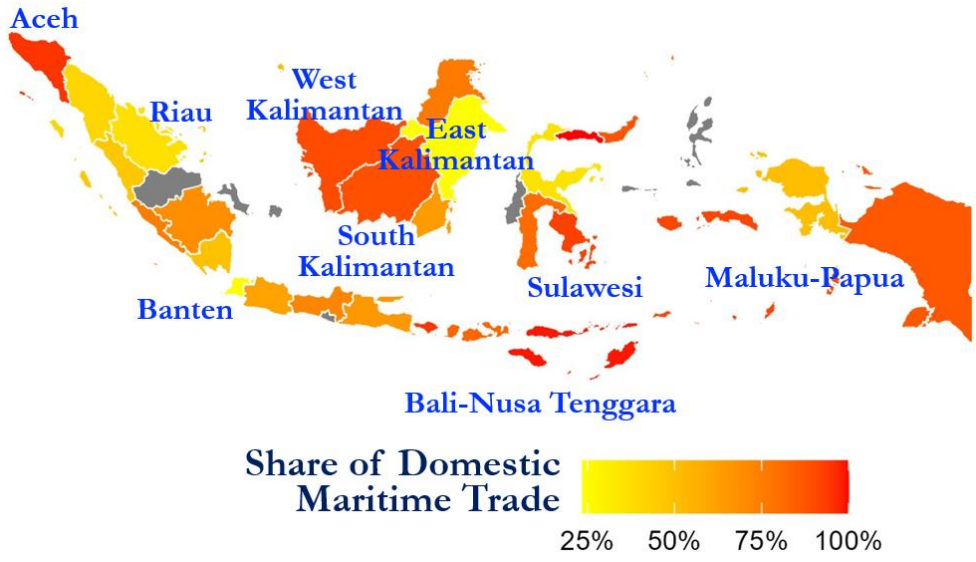
3 Provincial Analysis of Indonesia's Shipping Network

In this section, we integrate information about trade volumes from the shipping network with international trade value data to characterise Indonesia's shipping network, particularly highlighting its relevance to supply chains.

3.1 Connectivity with International Supply Chains

We begin our analysis by examining which provinces engage more in international trade before we examine the specific trade partners. Figure 10 shows that many provinces in the upstream regions of Sumatra, Sulawesi, and Kalimantan are primarily focused on domestic trade, with some reaching up to 90% domestic trade participation. While provinces such as Sumatra, Sulawesi, and Kalimantan play essential roles within the domestic supply chain, their contributions to international trade, particularly in manufacturing exports, are minimal. Even in cases where provinces like East Kalimantan have a relatively higher share of international trade, these trades are predominantly in resource and energy supplies to regional manufacturing hubs in ASEAN and China, as indicated in Figure 11. Consequently, the manufacturing capacity in these regions remains largely underdeveloped. This underdevelopment restricts the ability of Indonesian provinces outside Java to access major consumer markets such as the US and EU, which offer richer and potentially more lucrative economic development opportunities as export destinations.

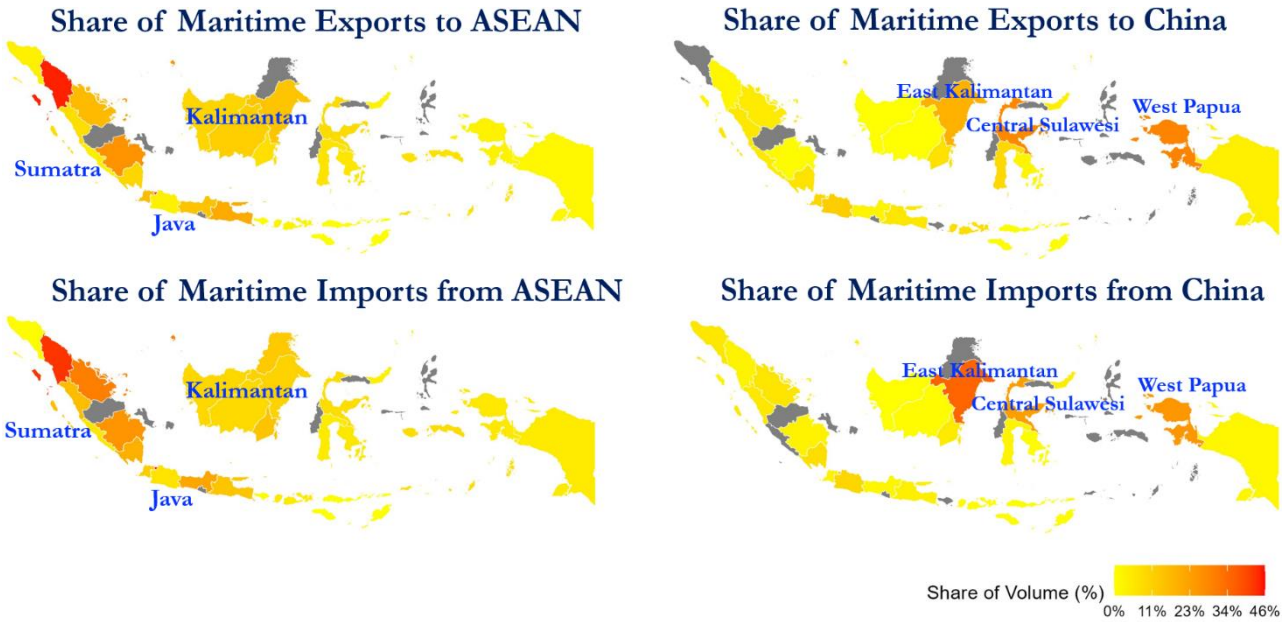
Figure 10: Share of Domestic Trade Share



Source: IMF PortWatch and ACI authors' calculations

Turning to trade partners, we first identify the major trade partners of Indonesian provinces by comparing their trade shares with key partners such as ASEAN, Australia, China, India, Japan, Korea, the EU, and the US. We discover that ASEAN and China are the two dominant trade partners in terms of overall trade volume, with provincial trade shares ranging from 20% to nearly 50%. Figure 11 displays the trade shares with these two economies by province, spread across four panels. The intensity of the red colour in each panel corresponds to higher trade shares in terms of volume with ASEAN and China for each province.

Figure 11: Share of Maritime Trade with Major Partners



Source: IMF PortWatch and ACI authors' calculations

We have a few observations from these maps. First, the maps on the left panel highlight that regions such as Sumatra, Java, and Kalimantan conduct up to half of their trade by volume with ASEAN. Second, the maps on the right panel reveal that East Kalimantan, Central Sulawesi, and West Papua are the leading trading provinces with China, with nearly 40% of their trade volume concentrated there. These regions are rich in mineral resources such as nickel, gold, and rare earth elements. Third, there is a notable similarity between the export shares depicted in the top panel and the import shares in the bottom panel, a phenomenon known as the 'round-trip effect' (Wong, 2022). This arises because our trade volume data is derived from satellite images of actual ships, which often make round trips between two ports, leading to similar volumes for imports and exports.

3.2 Production Specialisation in Domestic Supply Chains

Previously, we have argued in Figure 5, that the top domestic trade routes are among the provinces on the Java Islands, as well as those between East Java and East Kalimantan or South Sulawesi. We now further characterise the specialisation in production pattern within these domestic supply chains.

Table 2 summarizes this information, showing that the major products of Indonesia's provinces in the main regions of Java, Sumatra, Kalimantan, and Sulawesi can be classified into two categories: manufacturing and resources. Geographically, these industries are concentrated, with Java and the Riau Islands primarily focusing on manufacturing, while Sumatra, Kalimantan, and Sulawesi are mainly centred around resources such as oil and gas.

Table 2: Production Specialisation in Domestic Supply Chains

Region	Major Hubs	Major Products	Classification
Java	Jakarta	Vehicles, machinery, metals	Manufacturing
	West Java	Vehicles, electronics, rubber	
	East Java	Palm oil, petroleum oils, machinery, chemicals,	
	Banten	Footwear, steel, plastics, rubber	
	Central Java	Apparel, footwear, petroleum oils, furniture	
Sumatra	Riau	Oil, gas, , palm oil	Resources
	Lampung	Oil, gas, food, palm oil, coal	
	Riau Islands	Oil, gas, machinery, electronics	Manufacturing
Kalimantan	East Kalimantan	Oil, gas, coal, palm oil, rare earth	Resources
	South Kalimantan	Oil, gas, coal, rare earth, palm oil, chemicals	
	Central Kalimantan	coal, palm oil, jewellery	
	West Kalimantan	metals, palm oil, rare earth, jewellery	
Sulawesi	Central Sulawesi	Steel, nickel, oil, gas, rare earths	Resources
	North Sulawesi	Agriculture,	
	South Sulawesi	Nickel, agriculture	

Together with the information on the top domestic trade routes, our analysis paints a production specialisation pattern such that each province plays a complementary role in the domestic supply chain. Upstream regions such as Sumatra, Sulawesi, and Kalimantan mainly supply their agricultural products, intermediates, and natural resources such as oil and gas to the Java Island. Provinces on the Java Island then process and assemble these resources and raw materials into manufactured goods which are then destined for international and regional markets.

We now turn to West Kalimantan as a specific example which allows us to contextualise these broader issues.

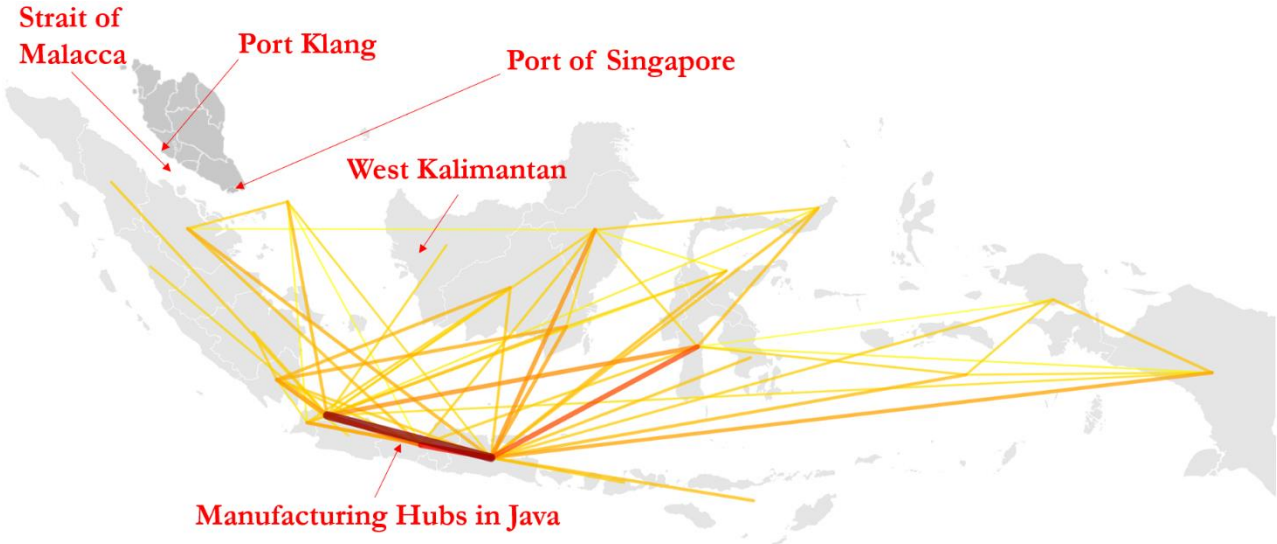
4 Strategic Potential of West Kalimantan in the Shipping Network

West Kalimantan has recently come into focus for its strategic position in Indonesia's shipping network, with plans underway to significantly enhance its maritime capabilities. The construction of a new container terminal, the Kijing International Port, capable of handling up to 2 million 20-foot equivalent units (TEUs), represents a major expansion from the current capabilities at Dwikora Port, which accommodates just 0.3 million TEUs (Mufti, 2019). In what follows, we will first explore the unique advantageous potential of West Kalimantan within Indonesia's shipping network. Subsequently, we will discuss how, despite these key advantages, West Kalimantan has not fully capitalised on its potential, illustrating the broader challenges faced by Indonesia's maritime trade sector.

4.1 Geographic Positioning: Between the Strait of Malacca and Java

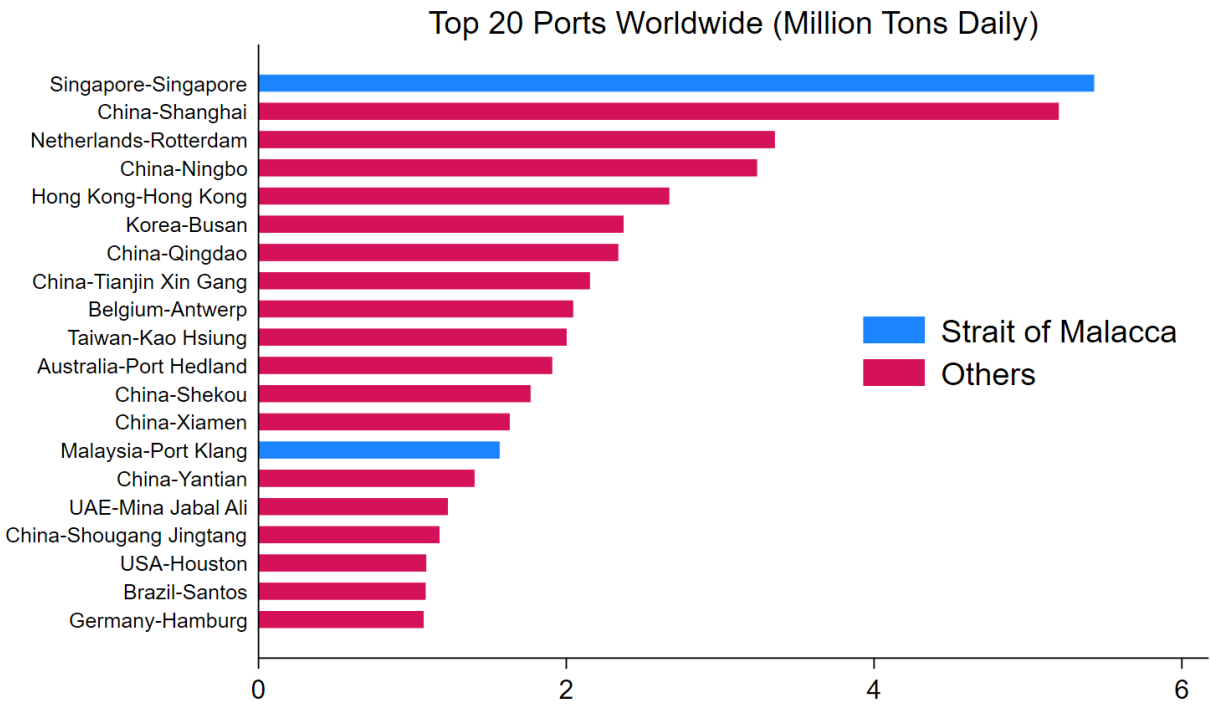
First, we highlight that West Kalimantan's strategic positioning is a significant advantage in regional trade. As depicted in Figure 12, West Kalimantan lies between the shipping lanes of the Strait of Malacca and Java's manufacturing hubs. On one side, it faces the Port of Singapore and Port Klang, both ranked among the top 20 ports globally in trade volume, as illustrated in Figure 13. On the other side, it connects to Java, home to Indonesia's busiest domestic trade routes, indicated by the thickest and darkest lines on the map. This unique location positions West Kalimantan as a pivotal hub, potentially facilitating trade between the busiest shipping lanes of the Strait of Malacca and the industrial centres in Java.

Figure 12: The Strategic Location of West Kalimantan



Source: IMF PortWatch and ACI authors' calculations

Figure 13: Worldwide Busiest Ports by Trade Volume

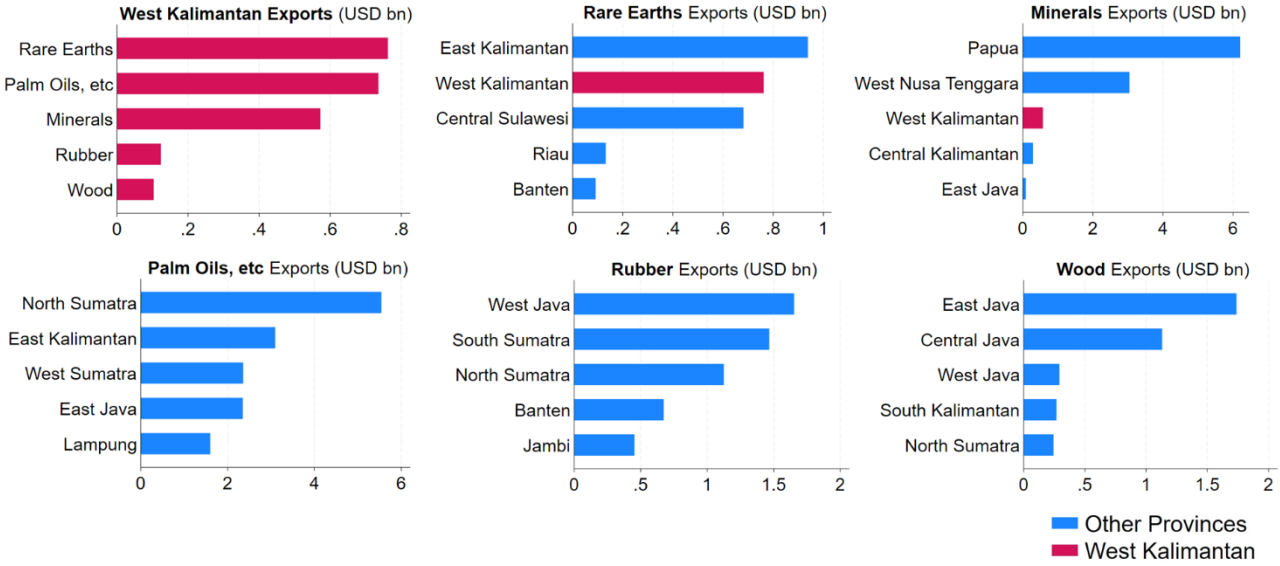


Source: IMF PortWatch and ACI authors' calculations

4.2 Natural Resource Reserves and Their Strategic Importance

The second strategic potential of West Kalimantan lies in its endowment of natural resources. The province is known for its significant reserves of bauxite, timber, and rubber; an advantage clearly reflected in its export profile. As shown in the first subfigure of Figure 14, rare earth and inorganic chemicals, palm oils, minerals, rubber, and wood are among West Kalimantan's top exports. Subsequent subfigures, which plot the top five exporting provinces by sector, indicate that West Kalimantan consistently ranks among the leading provincial exporters for inorganic chemicals and minerals.

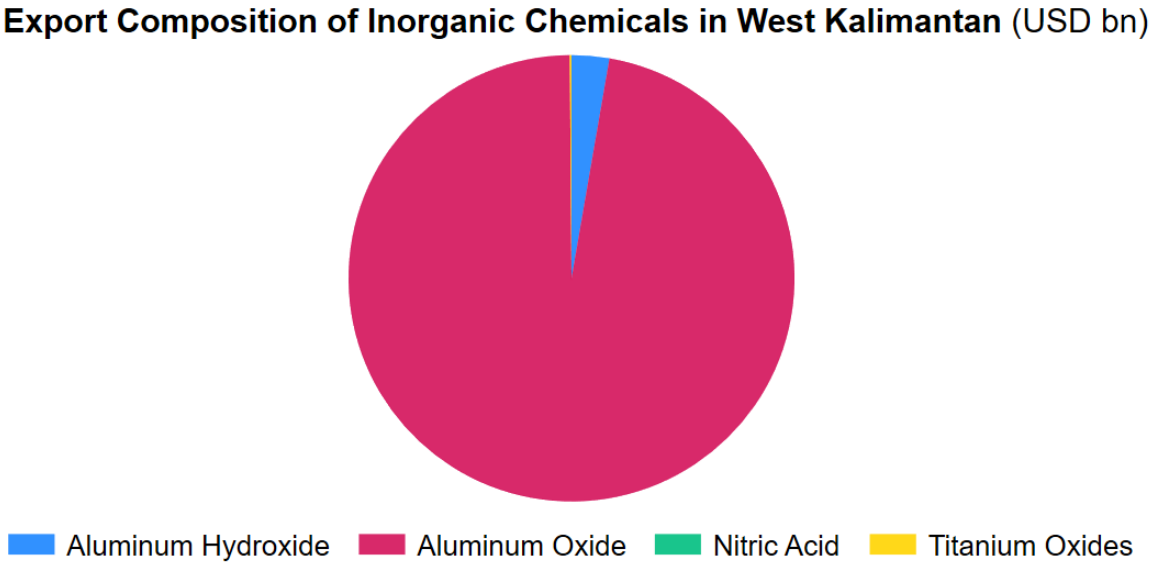
Figure 14: Top Exporting Sectors of West Kalimantan and Their Comparative Positions



Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

A closer examination at the six-digit HS level reveals that West Kalimantan's inorganic chemical exports are overwhelmingly concentrated in aluminium oxide, which accounts for 97% of the province's exports in this category, as shown in Figure 15. Aluminium oxide is an intermediate product derived from bauxite via the Bayer process, which involves mechanical and chemical treatment to extract alumina. This suggests that West Kalimantan's comparative advantage in this sector is closely tied to its abundant bauxite reserves, rather than reflecting a broader base of downstream industrial capabilities.

Figure 15: Export Composition of Inorganic Chemicals in West Kalimantan



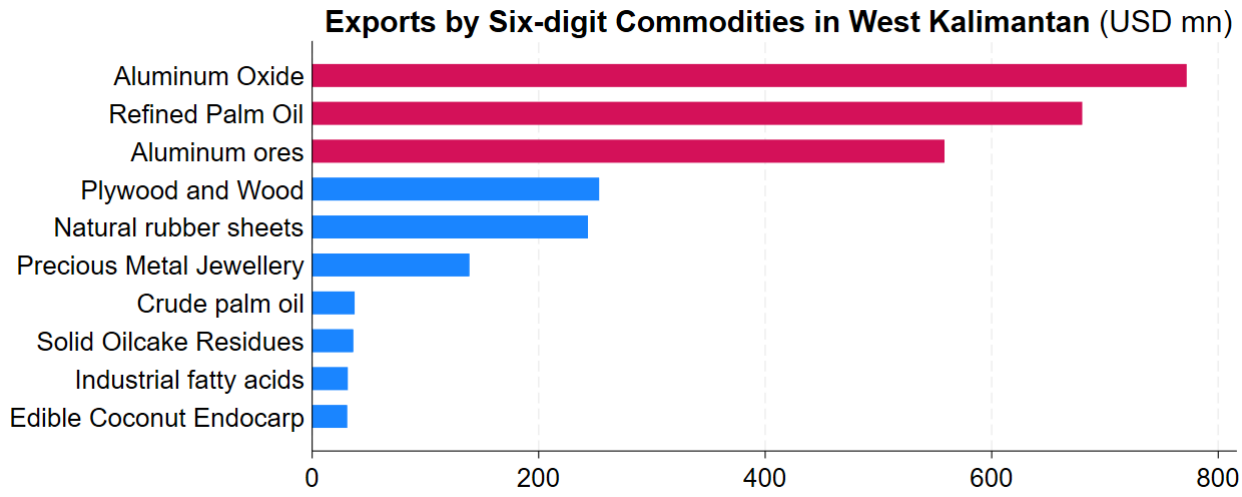
Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

This upstream profile is further reflected in the province's export data as shown in Figure 16: alongside aluminium oxide, West Kalimantan also exports substantial quantities of

unprocessed bauxite (aluminium ores).[3] The presence of both raw and intermediate mineral exports indicates a locally embedded supply chain segment, where bauxite is mined and partially refined.

However, large-scale aluminium smelting capacity has yet to be developed in the province, as evidenced by the lack of unwrought aluminium (HS 7601) exports. This product typically results from the further transformation of aluminium oxide into aluminium metal, a critical input for downstream manufacturing such as automotive parts and electronic components. This pattern, where upstream extraction is established but deeper processing remains limited, is consistent with structural features observed in other resource-rich regions.

Figure 16: West Kalimantan's Top 10 Commodities by Six-digit HS Codes



Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

For West Kalimantan, this suggests that its current export advantage is primarily rooted in its natural resource base and early-stage industrial processing. More broadly, it reflects the transitional nature of Indonesia's mineral-based industrialisation, where resource-endowed provinces are incrementally expanding participation in higher-value segments of domestic and regional supply chains.

From a regional perspective, West Kalimantan represents a relatively early stage but strategically positioned node in the emerging aluminium value chain. Its combination of resource availability, intermediate processing capacity, and maritime access via Pontianak Seaport and Sintete Riverport positions it as a potential candidate for targeted logistics investment, regional processing partnerships, or supply chain risk mapping particularly for sectors reliant on aluminium inputs.

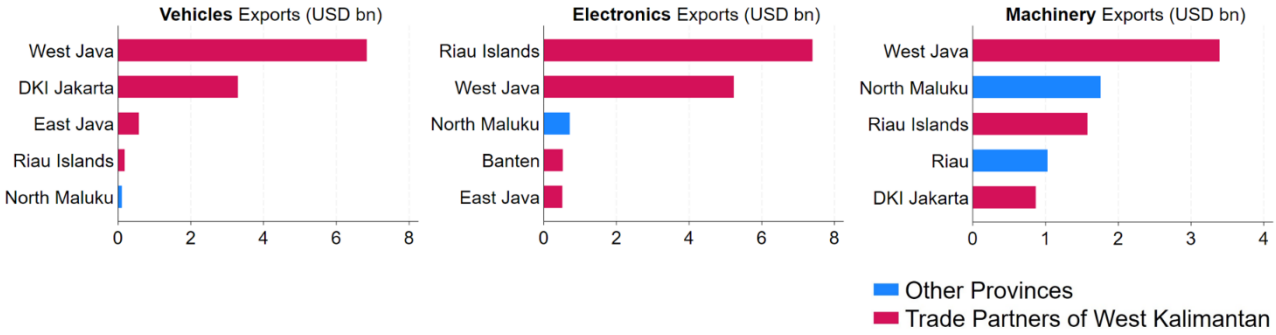
Looking ahead, West Kalimantan's mineral reserves may offer meaningful opportunities for deeper integration into Indonesia's industrial networks. As shown in Figure

[3] Indonesia implemented a ban on bauxite ore exports in June 2023 to encourage domestic processing of the mineral. The trade data used in this analysis reflects conditions prior to the ban and is based on 2022 figures.

7, critical minerals and rare earth elements—key to sectors such as vehicles, electronics, and machinery—are among Indonesia's top exports. By supplying these inputs, West Kalimantan could position itself as a contributor to national industrial growth while advancing its own development trajectory.

Figure 17 reinforces this potential. In the vehicles, electronics, and machinery sectors, West Kalimantan's major trade partners are also among the top-performing exporters. This overlap suggests a possible pathway through which West Kalimantan, by leveraging its mineral base, could consolidate its role in Indonesia's industrial ecosystem and contribute to more geographically balanced economic expansion.

Figure 17: Top Exporting Provinces of Selected Sectors



Source: Badan Pusat Statistik Indonesia and ACI authors' calculations

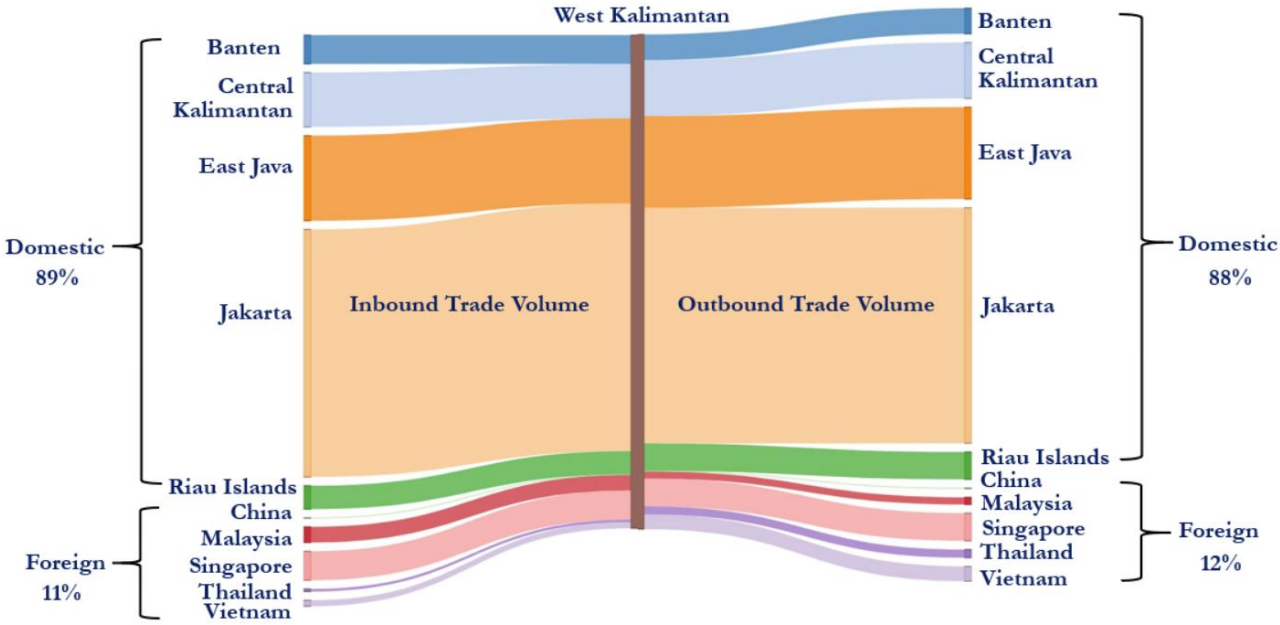
5 Evaluating West Kalimantan's Capitalisation of Potential

Despite its strategic location along key maritime and proximity to regional trade hubs, West Kalimantan captures only a fraction of its geographic and resource-based economic potential. The province contributes only 1.1% ($3 billion) to Indonesia's total exports, ranking among the lowest of the country's 34 provinces. This underscores its limited current integration into global supply chains and the significant untapped opportunities for trade and industrial development.

5.1 Underutilisation of International Connectivity

Previously, we posited that West Kalimantan's strategic position between the bustling shipping lanes of the Strait of Malacca and Java's industrial hubs placed it in an ideal location to bridge international shipping routes with domestic trading centres. However, Figure 18 contradicts this assumption. It reveals that the majority of West Kalimantan's trade is with domestic partners, with international trade accounting for less than 10% of its total trade volume. This suggests that despite its advantageous location, West Kalimantan has not fully leveraged its international connectivity to enhance its trade capabilities. Thus, there is a significant opportunity for the region to expand its role in global trade networks, potentially increasing its economic footprint both domestically and internationally.

Figure 18: Trade Volume Share of West Kalimantan by Trade Partners



Source: IMF PortWatch and ACI authors' calculations

5.2 Underexploitation of Resource Potential

Second, we show that although West Kalimantan primarily engages in maritime trade with domestic partners, its total trade volume remains significantly low compared to other domestic routes that similarly supply resources to provinces on Java Island. We focus on comparing West Kalimantan to East Kalimantan and South Sulawesi, regions that also possess abundant natural resources. The Kalimantan areas are rich in coal and various minerals, while South Sulawesi is distinguished by its extensive nickel and bauxite reserves.

Table 3 starkly illustrates these disparities: the trade volumes of resources from West Kalimantan are considerably lower than those from South Sulawesi and East Kalimantan, both in absolute numbers and relative domestic rankings. This comparison underscores a significant underutilisation of West Kalimantan's resource potential. By enhancing its role within domestic trade networks, West Kalimantan could elevate its status to become a major domestic resource trade hub, akin to its counterparts in South Sulawesi and East Kalimantan.

Table 3: Comparative Trade Volumes and Rankings for Domestic Resource Trade Routes

Resource Supplier to Manufacturing Hub Trade Routes	Volume (1,000 Tons)	Rank (Out of 354)
South Sulawesi – East Java	21.5	4
East Kalimantan – East Java	14.9	7
West Kalimantan – Jakarta	3.2	45
West Kalimantan – East Java	1.1	86
West Kalimantan – Riau Islands	0.4	153
West Kalimantan – West Java	0.2	180

Source: IMF PortWatch and ACI authors' calculations

6 Policy Recommendations for West Kalimantan

Building on the analysis presented in Sections 4 and 5, we will now further analyse the factors behind the underutilisation and make a series of policy recommendations.

6.1 Upgrades of Maritime and Multimodal Transport Infrastructure

A critical factor limiting West Kalimantan's ability to fully capitalise on its trade potential is the underdevelopment of its transportation infrastructure, particularly in maritime connectivity. As shown in Table 4, the province faces persistent gaps in both the length of paved roads and inter-island cargo handling. Its overall physical infrastructure is the second lowest nationally, suggesting a structural bottleneck that constrains participation in domestic and international trade flows. In a resource-rich but logistically fragmented province such as West Kalimantan, improving connectivity is central to realising the region's strategic location along key regional shipping routes.

Table 4: Infrastructure Provincial Ranking of West Kalimantan

Infrastructure Indicators	Provincial Rank of West Kalimantan
Length of paved roads	17/34
Inter-island cargo	18/33
Physical infrastructure	32/34

Source: Tan et al. (2025)

To address these shortcomings, our first recommendation is to develop a robust infrastructure network that includes deep-water seaports equipped with specialized storage and handling equipment for critical minerals, potentially reducing shipping costs significantly. However, simply improving infrastructure is not enough. Given West Kalimantan's vast territory and relatively small population of 5 million, it is crucial to create an infrastructure ecosystem tailored to its unique needs. We suggest a focus on developing multimodal trade

infrastructure that facilitates seamless transitions between various transport modes—such as railways, roads, river ports, and seaports—to efficiently move resources from inland areas to coastal seaports. Incorporating automation in these processes is essential for enhancing efficiency in multimodal trade.

6.2 Strategies for Value Chain Upgrades and FDI Attraction

In addition to upgrading transportation infrastructure, our second recommendation centres on enhancing the value chain in West Kalimantan. This strategic shift is influenced by the changing dynamics of Indonesian exports, where major hubs on Java Island are moving towards high-end manufacturing sectors like electric vehicles (EVs) and semiconductors. With this transition, West Kalimantan is well positioned to attract industries focused on low-end manufacturing, processing, and refining. Currently, these sectors are concentrated in major trading centres such as Jakarta, West Java, Riau Islands, Banten, East Java, and Central Kalimantan. By drawing these industries to West Kalimantan, the region can leverage the redistribution of industrial activities across Indonesia, promoting economic growth and diversification locally.

At the same time, West Kalimantan's mineral profile offers scope to deepen its participation in regional aluminium-based manufacturing supply chains. While the province already engages in upstream and early midstream activities—such as bauxite extraction and aluminium oxide production—it remains underutilised in terms of value-added processing, including aluminium smelting (to produce aluminium metal) as well as further midstream processing like alloy preparation and modular casting. Expanding these capabilities, where feasible, could enable greater local value retention, support industrial clusters elsewhere in Indonesia, and better position the province within ASEAN's manufacturing ecosystem particularly in aluminium-intensive sectors such as automotive components, electronics, and machinery.

In doing so, it would also align with broader ASEAN efforts to reduce reliance on concentrated supply sources—complementing existing trade flows such as imports from China, which currently account for a dominant share of ASEAN's aluminium metal supply and represent a single-point vulnerability. By building aluminium metal production nodes within ASEAN, the region can progressively diversify supply base, reduce vulnerability to external disruptions, and strengthen intra-ASEAN trade integration.

Over the long term, West Kalimantan may progressively build capabilities in higher-value sectors such as clean-tech, electronics, and machinery. Its mineral endowment and location near the Strait of Malacca offer a strategic base, particularly if supported by infrastructure upgrades and targeted investment. Lessons may be drawn from the Riau Islands, where proximity to Singapore, reliable connectivity, and government-to-government cooperation have helped anchor foreign investment through initiatives such as Batamindo Industrial Park and Bintan Industrial Estate. While the context in West Kalimantan is different, elements of this experience may offer useful reference points. Any comparable trajectory would require a phased and calibrated approach, beginning with foundational enablers such as

logistics reliability, industrial site development, and skills training which we now turn to in the next section.

6.3 Workforce Upskilling and Reskilling to Support Value Chain Upgrades

For these industrial upgrades to be effective, a transformation of the labour force in West Kalimantan is necessary. Table 5 indicates that the workforce currently has a high proportion of employment in primary sectors such as agriculture and mining, with many engaged in low-paying agricultural jobs. This situation is exacerbated by a low urban population percentage and insufficient levels of education, as evidenced by low rates of senior high school enrolment and average years of schooling. Addressing these challenges requires substantial investment in public education, including vocational, technical, and higher education, to equip the workforce for better-paying, skill-demanding jobs. Specifically, reskilling initiatives must target existing workers in the agriculture sector to prepare them for new opportunities in emerging industries. Simultaneously, upskilling efforts should focus on raising the overall educational attainment of future workers to ensure a more competent and versatile workforce.

Table 5: Provincial Ranking of Labor Market Indicators in West Kalimantan

Labour Market Indicators	**Provincial Rank of West Kalimantan**
% Primary employment	4/34
% Senir high enrolment	28/34
Average years of schooling	33/34

Source: Tan et al. (2025)

Additionally, it is crucial to balance the attraction of foreign investment in high-tech manufacturing with the creation of low-tech manufacturing jobs, which provide broader employment opportunities. This balance is essential because while high-tech industries drive innovation and economic growth, low-tech sectors are often more labour-intensive and can employ a larger number of people, thus reducing unemployment and improving living standards across the region. Given that the processes of upskilling and reskilling the workforce to meet the demands of these varied industries may take at least a decade, maintaining this strategic balance is vital for the sustainable development of West Kalimantan.

7 Concluding Remarks

Our study underscores the vital role that ports play in reducing trade costs and promoting maritime trade. Despite its vast archipelago, Indonesia faces substantial challenges due to underdeveloped port infrastructure, which significantly impedes its economic development. Additionally, our analysis details the domestic and international shipping networks of Indonesia, revealing that while international trade is predominantly driven by manufacturing hubs on Java Island, other regions like Sumatra, Sulawesi, and Kalimantan, situated more upstream in the domestic supply chain, mainly provide industrial inputs for manufacturing in

Java. As a result, international trade in these regions is more resource-oriented, relatively small, and influenced by their geographical proximity to regional manufacturing hubs.

Using West Kalimantan as a key example, our analysis highlights issues within Indonesia's shipping network. Despite its strategic location and rich resources, both international and domestic trade remain limited in West Kalimantan. To fully capitalise on West Kalimantan's potential, there is a pressing need to enhance transportation infrastructure, upgrade the local value chain, and invest in upskilling and reskilling the workforce. By implementing these improvements, West Kalimantan can better integrate with national and regional markets and maximise its economic opportunities. Furthermore, successfully addressing these challenges in West Kalimantan could serve as a model for other similar regions across Indonesia, which are facing similar constraints in their economic development.

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