THE STUDY ON ENHANCING THE EFFICIENCY OF THAILAND'S LOGISTICS AND SUPPLY CHAIN SYSTEM

Executive Summary

Acknowledgements

The Study on Enhancing the Efficiency of Thailand's Logistics and Supply Chain System was completed through extensive collaboration among the government, the private sector, and the public. The study team would like to express its sincere appreciation to all relevant parties for providing data and participating in interviews on the supply chains of target products, opinion surveys, workshops and seminars, as well as facilitating visits to operational sites.

Appreciation is also extended to the Office of the National Economic and Social Development Council (NESDC) for commissioning Chula Unisearch to conduct this study project.

CHULA UNISEARCH
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EXECUTIVE SUMMARY

The Study on Enhancing the Efficiency of Thailand's Logistics and Supply Chain System

1. Introduction

The Office of the National Economic and Social Development Council (NESDC), as the secretariat of the National Logistics Committee, plays a key role in coordinating and collaborating with relevant agencies to improve Thailand's logistics system through the formulation of strategic plans and the monitoring of their implementation. Currently, the implementation is undertaken under Action Plan on Thailand Logistics System Development 2023–2027, which highlights logistics system development as a strategic enabler for reinforcing Thailand's position as a regional and subregional trade gateway. **The plan emphasizes continuity and further leverages the utilization of infrastructure and facilities, while strengthening management efficiency across the supply chain.** In recent years, the government has developed various infrastructure and facilities to support freight transportation across the supply chain; however, their utilization has yet to reach optimal levels. Accordingly, NESDC initiated the Study on Enhancing the Efficiency of Thailand's Logistics and Supply Chain System **to assess the current state of logistics development, evaluate the cost-effectiveness of infrastructure utilization, and identify policy options to improve infrastructure and facilities in order to minimize cost or increase the efficiency of key agricultural and manufacturing supply chains.** This aims to enhance Thailand's capacity to become a trading nation and to adjust to changing business environment.

1.1 Objectives of the Study

1.1.1 To assess the cost-effectiveness of utilizing government-funded logistics infrastructure and facilities developed in past years as well as to systematically examine the current state of logistics development and potential impacts arising from evolving internal and external conditions.

1.1.2 To study management guidelines for logistics infrastructure and facilities aimed at strengthening value addition along the supply chains of key agricultural and manufacturing products.

1.1.3 To formulate policy recommendations, development guidelines, and action plans/measures to drive logistics system development aligned with global trends and national competitiveness objectives.

1.2 Study Approach and Project Implementation Plan

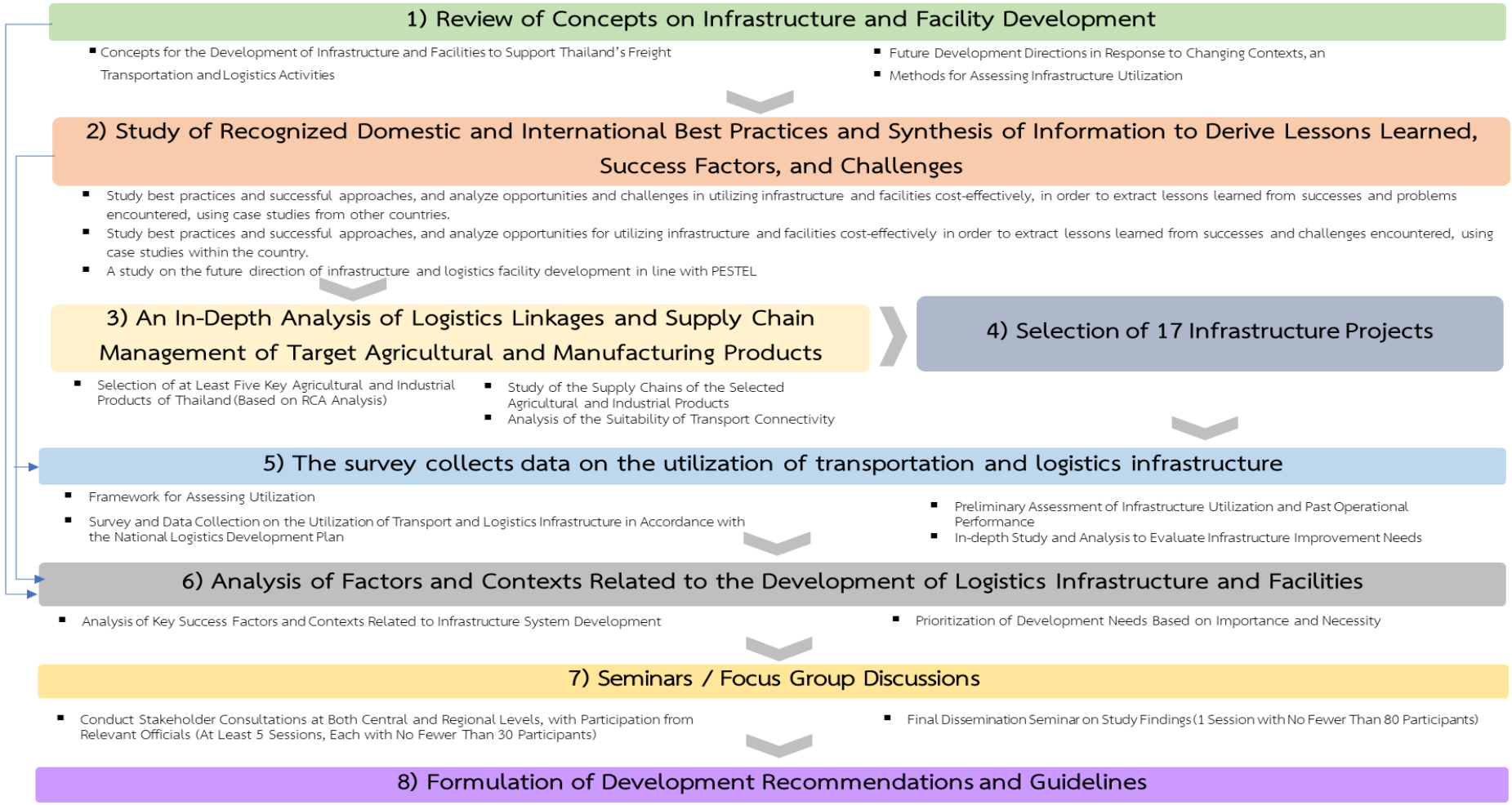


Figure 1 Components and Overview of Project Implementation

2. An In-Depth Analysis of Logistics Linkages and Supply Chain Management of Target Agricultural and Manufacturing Products

This section compiles and reviews development plans of agricultural and manufacturing products to identify at least 5 priority products, with an emphasis on utilization of logistics infrastructure and facilities to strengthen transport connectivity across the supply chain. Following the identification of the target products, the study conducts an in-depth analysis of their supply chain structures from upstream, middle stream, to downstream, by using both secondary and primary data from interviews. The goal is to identify the logistics infrastructure and facilities required to support transportation and trade, which then serves as the basis for assessing their levels of utilization in order to optimize efficiency of targeted product supply chains.

2.1 Selection of Key Agricultural and Manufacturing Products for Thailand

The selection of target products for this in-depth study was based on the combined application of the Revealed Comparative Advantage (RCA)[1] framework and national target industry policies covering ten product groups (the First and New S-Curve initiatives), endorsed by the Cabinet.

2.1.1 The selection process comprises the following operational steps:

Step 1 Preliminary Screening by RCA: The assessment was conducted using RCA values for product groups classified at the HS 2-digit level. This step serves as a preliminary screening to identify product categories in which Thailand demonstrates a comparative advantage.

Step 2 Screening by Multiplying Key Export Product by RCA: Selection was based on multiplying the export values of Thailand's main product groups by their corresponding RCA score level. This ensures that the selection process encompasses both major products with high export volume and those possessing a competitive advantage.

Step 3 Product Champion Selection: Product champions were selected from sub-product categories within the groups identified in Step 2. These products exhibit diverse logistics characteristics—covering service requirements, delivery routes, and supporting infrastructure—which makes them suitable as pilot projects for subsequent analysis. Detailed selection criteria are provided below.

Sub-step 3.1: Sub-products (HS 6-digit classification) were selected by identifying the top three items with the highest export value within each product group. Their RCA values were then calculated. For instance, in the Rubber and Rubber Products group, key exports included tires, natural rubber, and synthetic rubber. Among these, natural rubber exhibited the highest RCA value, followed by synthetic rubber and tires.

Sub-step 3.2: Qualitative Criteria recommended by the Committee were taken into consideration. These factors include the use of local content, the existence of a

[1] Revealed Comparative Advantage (RCA), developed by Balassa (1965), is an index used to measure a country's comparative advantage in exporting a specific product relative to global trade or a reference group. It is widely applied in analyses of trade structure and national competitiveness.

master plan or industry development plan, current transport behavior for export, and the feasibility of a modal shift to rail and water/coastal transport, which aligns with government policy to increase the domestic share of these modes.

2.1.2 Results of Key Agricultural and Manufacturing Product Selection : A total of six supply chain systems were chosen as pilot projects for this study, with the following supporting justifications:

1) Rubber Tires (Representative of Rubber and Rubber Products)

○ Justification: an industry with a comparative advantage (RCA 5.85) and extensive utilization of local contents, making it highly feasible to shift transportation from road to rail, especially for block rubber initially processed from natural rubbers as well as locally produced synthetic rubber from the South, East, and Northeastern regions.

2) Processed Chicken (Representative of Processed Meat and Aquatic Products)

○ Justification: an industry with the strongest comparative advantage (RCA 12.38). It uses domestically raised chicken as raw materials and can represent products that require cold chain logistics.

3) Sugar and Molasses (Representative of Sugar and Confectionery Products)

○ Justification: an industry with a comparative advantage (RCA 7.66), using domestic sugarcane as a raw material and supporting multiple transport modes, including bulk, containerized, and multimodal transport (road, inland waterway, and rail).

4) Passenger Cars and Pickup Trucks (Representative of Vehicles and Components)

○ Justification: an industry with a comparative advantage but a moderate RCA level (RCA 4.00), identified as a high-value export industry (meeting Step 2 criteria), with reliance on domestic raw materials and distinct logistics infrastructure and facility requirements (e.g., Ro/Ro ships, car terminal, and parking yards).

5) Air Conditioners (Representative of Machinery and Components)

○ Justification: an industry with a comparative advantage (RCA 9.00) (meeting Step 2 criteria), representing air- and sea-shipped export products.

6) Durian (Representative of Fruit Products)

○ Justification: an industry with a very high RCA value (RCA 58.85), made from domestic raw materials, representing perishable agricultural products that require time-critical transport and rely most extensively on multimodal transport (road, rail, maritime, and air).

Based on an analysis of Thailand's average total export value from 2019 to 2023 (in million USD), combined with the applied selection framework, the six target product groups collectively accounted for approximately 15% of the country's total exports. In detail, Automobiles constituted the highest proportion within the group, at approximately 7%. The remaining manufacturing products—Processed Chicken, Rubber Tires, and Air Conditioners—had similar proportions, at around 2% each. The key agricultural products, namely Durian and Sugar, each accounted for only 1-2% of total export value. This overview therefore shows that the export value structure of the six target products is heavily concentrated in manufacturing goods, particularly automobiles, while agricultural products, despite their strategic importance, contribute a relatively small share of total export value.

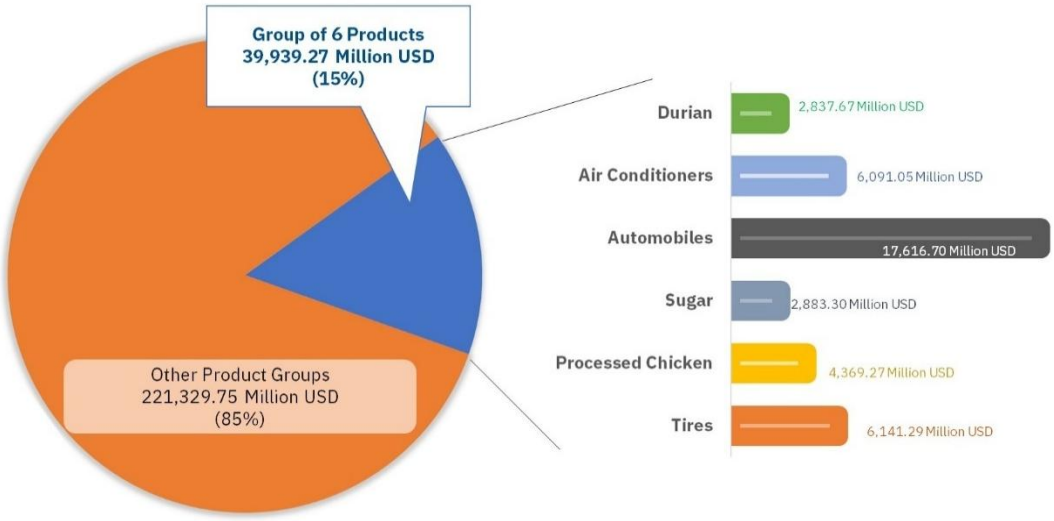


Figure 2 Proportion of the Average Export Value of Target Products Compared with Thailand's Total Exports from 2019 to 2023.

2.2 Supply Chains of Selected Agricultural and Manufacturing Products

2.2.1 Supply Chain of Automotive Tires

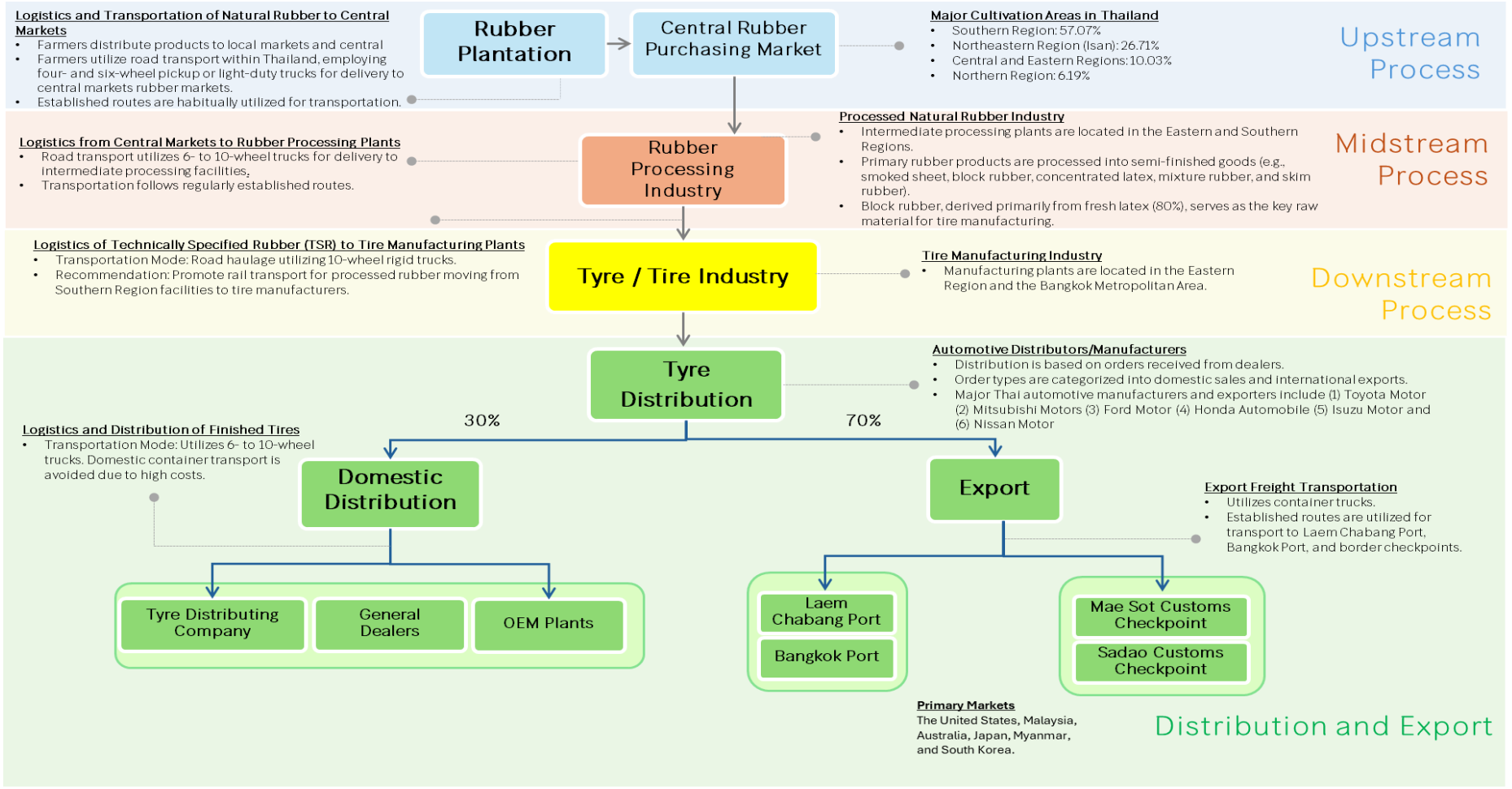


Figure 3 Supply Chain of Automotive Tires

Source: Compiled and processed by the consultants

1) Overview and Key Facts of the Automotive Tire Supply Chain

Source: Trade map. List of importing markets for a product exported by Thailand Product 4011 New pneumatic tyres of rubber.

The export value of Thailand's automotive tire from 2020–2024 exhibited a clear upward trend throughout the period. In 2023, export value continued to rise to 6.958 billion USD, before expanding to reach its highest level in 2024 at 7.363 billion USD. Major export markets included the United States, Malaysia, Australia, Japan, Myanmar, and South Korea. However, the industry continues to face several significant challenges, including:

- Intensifying competition from China, India, and Vietnam
- Price volatility in the global natural rubber market
- Increased import tariffs imposed by the United States, Thailand's primary export market, rising from 3.4% to 10% after August 2025. Non-tariff measures and stringent quality standards imposed by tire-importing countries
- Growth in electric vehicle (EV) adoption requiring stronger tire structures to support battery weight and noise-reducing tread designs
- Heavy reliance on foreign-owned factories, especially Chinese manufacturers investing in Thailand to avoid U.S. import tariffs.

2) Transport Connectivity Within the Automotive Tire Supply Chain

The supply chain for automotive tires can be divided into four main stages:

2.1) Upstream Stage

Rubber farmers harvest natural rubber or raw rubber sheets, with most production coming from the Southern region (57.07%) and the Northeastern region (26.71%). The harvested rubber is then transported to central markets, cooperatives, or intermediaries using pickup and small trucks. Transport routes are primarily local rural roads connecting to district or provincial roads. Many rubber farmers operate individually rather than as organized groups. This reduces their bargaining power and limits access to price information amid volatile global market conditions. Key upstream challenges include:

- Many rubber farmers operate individually rather than as organized groups , which weakens their bargaining power in selling rubber.
- Limited access to real-time purchase prices information, which fluctuates with global market conditions.

2.2) Midstream Stage

Once natural rubber or raw sheets are aggregated at local markets, cooperatives, or by collectors, these products are transported by road to primary rubber processing plants. These facilities process raw rubber into Technically Specified Rubber (TSR), the internationally standardized rubber block widely used as a key raw material in tire manufacturing.

Spatial distribution of rubber-processing plants:

- Southern region (largest concentration): Songkhla, Surat Thani, Nakhon Si Thammarat, and Trang
- Eastern region (secondary concentration)**:** Rayong and Chonburi
- Northeastern region (tertiary concentration): Bueng Kan, Nong Khai, Nakhon Phanom, and Sakon Nakhon

In addition, a portion of natural rubber is processed into synthetic rubber, the second most essential raw material for tire production. Production of synthetic rubber in Thailand is mainly concentrated in the Eastern region (Rayong and Chonburi)**.**

From a locational perspective, rubber processing factories in the Northeastern and Northern regions are not equipped to process natural rubber into tire-grade raw materials, . Consequently, rubber must be transported in large volumes by truck to factories in the Eastern and Southern regions.

2.3) Downstream Stage

The transportation of block and synthetic rubber from rubber processing factories to tire manufacturing plants are mostly located nearby automotive production bases in the Eastern region (Rayong and Chonburi)**,** the Greater Bangkok area (Samut Prakan and Nakhon Pathom**)**, and Saraburi Province**.**

Transportation between rubber-processing plants and tire factories primarily relies on large trucks operating along national highways and Motorway No. 7. To date, block rubber or synthetic rubber have not been transported by rail to tire manufacturing plants. Nevertheless, block rubber from the Southern region is transported by containerized rail and coastal shipping for export to overseas markets such as China, the United States, Japan, and South Korea**.**

2.4) Distribution Stage

Approximately one-third of the tires produced in Thailand are sold domestically through distributors, retail stores, and automobile assembly plants. The distribution network relies heavily on major highways and urban ring roads to connect warehouses and distribution centers with key cities nationwide.

Strategic placement of warehouses and distribution centers near major transportation corridors and routes are an enabling factor that improves tire distribution efficiency. Additionally, the well-designed traffic systems and access roads to warehouse areas, which do not overlap with urban traffic, help reduce congestion and delivery time and costs.

Another major distribution channel is exports, which account for more than two-thirds of total tire production. Exports are handled through

- Laem Chabang Port (approximately 82.50%)
- Bangkok Port (approximately 3.52%)
- Key land border checkpoints, including:
    - Sadao Customs House: approximately. 2.44%
    - Aranyaprathet Customs House: approximately. 0.64%
    - Mae Sot Customs House: approximately. 4.86%

3) Supply Chain Governance of the Automotive Tire Industry

Thailand is one of the key players in the global automotive tire supply chain**,** particularly in the upstream and midstream operations. Meanwhile, the downstream operations are dominated by multinational corporations from the United States, Japan, Europe, China, South Korea, etc. These global tire producers determine order volumes, quality standards, and safety requirements. Many leading manufacturers have established manufacturing plants in Thailand or outsource production to local manufacturers. In contrast, the upstream and midstream operations have less bargaining power than the downstream tire manufacturers.

Looking ahead, the development of a dual-track rail system, together with policies encouraging the State Railway of Thailand (SRT) and private operators to expand locomotive and rolling stock services following the enactment of subsidiary laws under the Rail Transport Act, may be opportunities for supplying raw materials for tire production., For instance, rubber sheets produced in the Southern and Northern regions could be transported by rail to tire manufacturing plants. This helps lower logistics cost in production of tires in Thailand.

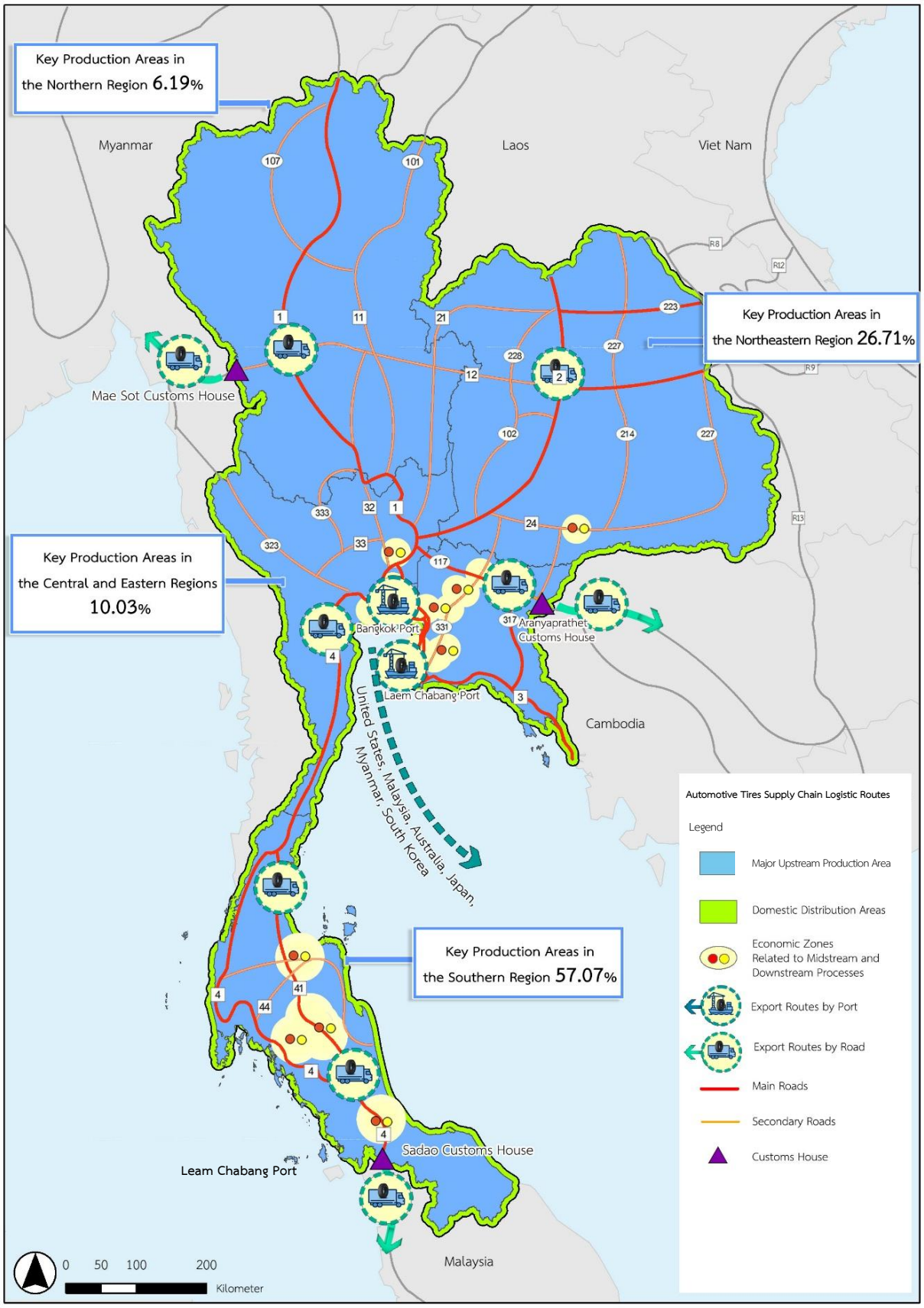


Figure 4 A Map of Origin Points and Major Export Gateways for Automotive Tires

Source: Compiled and processed by the consultants

2.2.2 Supply Chain of Processed Chicken

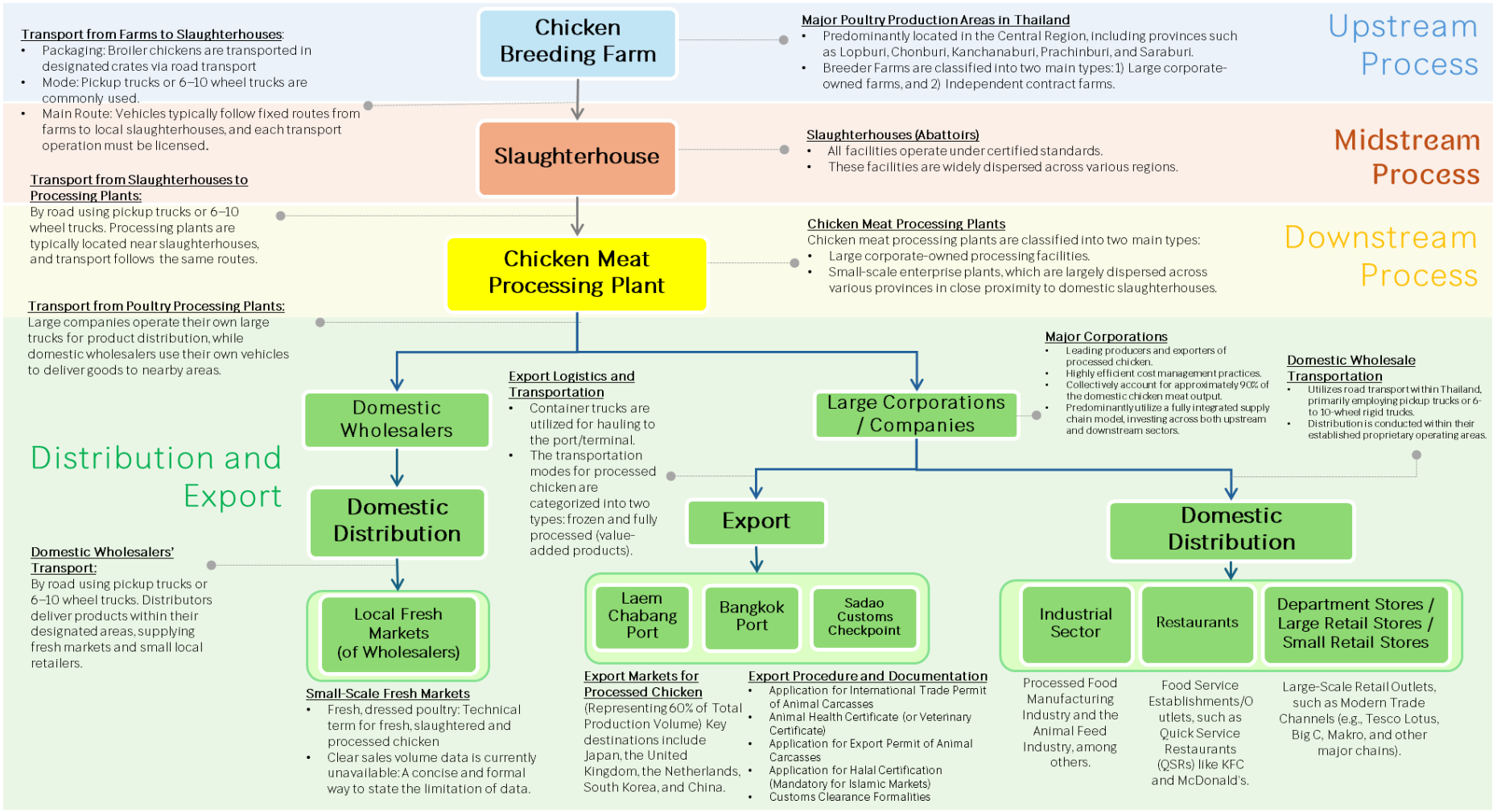
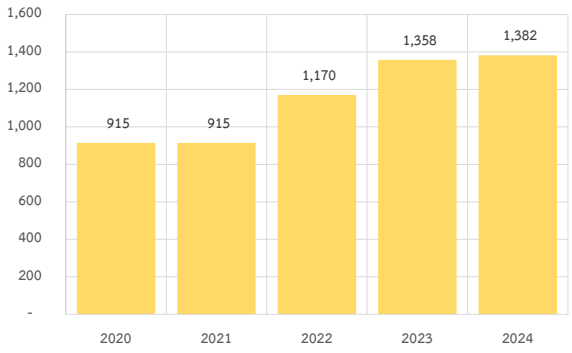


Figure 5 Supply Chain of Processed Chicken

Source: Compiled and processed by the consultants

1) Overview and Key Facts of the Processed Chicken Supply Chain



Source: Trade map. List of importing markets for a product exported by Thailand Product 0207 Meat and edible offal of fowls of the species Gallus domesticus, ducks, geese.

Export performance from 2020–2024 exhibited a clear and continuous upward trend throughout the period, with no year experiencing a decline in value. In 2023, export value continued to increase to 1.358 billion USD, before further rising to its peak of 1.382 billion USD in 2024.

Major export markets included Japan, the United Kingdom, the Netherlands, South Korea, and Singapore.

Thailand's processed chicken industry is fully integrated, encompassing all stages from farming and slaughtering to processing and distribution. Large corporations play a dominate role in controlling the entire supply chain, while most small-scale farmers operate under contract farming system.

2) Transport Connectivity in the Processed Chicken Supply Chain

The supply chain for processed chicken can be divided into four main stages:

2.1) Upstream Stage

This stage involves transporting live chickens from farms to slaughterhouses.

- Large-scale farms typically use 6-wheel or 10-wheel livestock trucks.
- Small-scale farms often use pickup trucks or small trucks.
- Transport routes mainly consist of secondary highways and local rural roads connecting agricultural areas to slaughterhouses.

Every shipment of live poultry must receive electronic authorization from the Department of Livestock Development to ensure animal health monitoring and biosafety control. The relationship between small-scale farms and large integrated companies is structured under a contract farming system, in which farmers have limited bargaining power.

2.2) Midstream Stage

This stage covers transportation from slaughterhouses to processing plants. For large companies, slaughter and processing facilities are often co-located or situated within the same industrial estate to minimize transport distances and maintain raw material quality in compliance with cold chain standards.

Transportation at this stage primarily relies on refrigerated trucks equipped with cooling systems or ice to ensure appropriate temperature control for the chicken meat, thereby preventing contamination and spoilage.

2.3) Downstream Stage

This stage concerns the outbound transportation of processed products from the processing factory to designated distribution and retail points, in accordance with orders placed by originating companies.

Large companies typically utilize 6-wheel and 10-wheel refrigerated trucks with integrated cold-chain control systems to maintain frozen conditions throughout transit. By contrast, small-scale traders source products mainly from local wholesalers—often established suppliers in fresh markets or small retail stores—or directly from processing factories, and distribute them using pickup trucks with ice-based cooling or small refrigerated trucks.

2.4) Distribution Stage

Domestic distribution channels include department stores, supermarkets, retail outlets, restaurants, and food processing factories**.** Processed chicken—whether fresh, chilled, frozen, or fully cooked—are required to meet stringent quality standards throughout transport.

Transportation mostly relies on:

- Pickup trucks or trucks using ice-based cooling
- Refrigerated trucks with cooling systems
- Major national highways
- Urban ring roads
- Distribution centers and cold-storage warehouses located along key transport corridors.

A well-designed cold-storage warehouse (with dedicated entry and exit routes separated from congested urban traffic, and with sufficient space for truck maneuvering) located along a primary transport corridors, can significantly reduce traffic congestion, vehicle waiting times, and logistics costs for operators.

For export distribution**,** processed chicken is transported using refrigerated (reefer) containers from processing plants to key export gateways:

- Laem Chabang Port: approximately 70%
- Sadao Border Checkpoint: approximately 15%
- Bangkok Port: approximately 5%
- Other border points: approximately 10% combined

For recent years, both Laem Chabang Port and Bangkok Port have equipped with sufficient electrical plug-in points to support reefer container operations.

Nevertheless, exporters continue to face several constraints:

- Procedural redundancy in obtaining export permit from the Department of Livestock Development
- Non-Tariff Barriers (NTBs) by importing countries—such as Japan, South Korea, the United States, and the European Union—which entail strict inspections for

chemical residues and the use of antibiotics as growth promoter, and compliance with certification requirements, thereby resulting in higher quality control costs.

3) Supply Chain Management of the Processed Chicken Industry

Governance of the processed chicken supply chain in Thailand is largely controlled by large, vertically integrated agribusiness companies**.** These companies oversee all stages—from poultry farming to domestic and international distribution—due to:

- The dominance of contract farming in poultry production
- High capital requirements for processing, cold storage, and transport
- Stringent traceability systems
- Strict quality assurance standards mandated by export markets

Destination-specific export approval requirements for processing establishments. Consequently, small-scale farmers participate mainly in the upstream stage.

Additionally, export procedures remain fragmented, particularly with respect to permitting requirements such as:

- Form R.10 (permit for exporting carcasses)
- Form R.9 (permit for taking animals and carcasses out of the Kingdom)

Although these permits are issued by the same authority, the absence of a One-Stop Service prevents them from being processed simultaneously, thereby increasing procedural complexity for exporters.

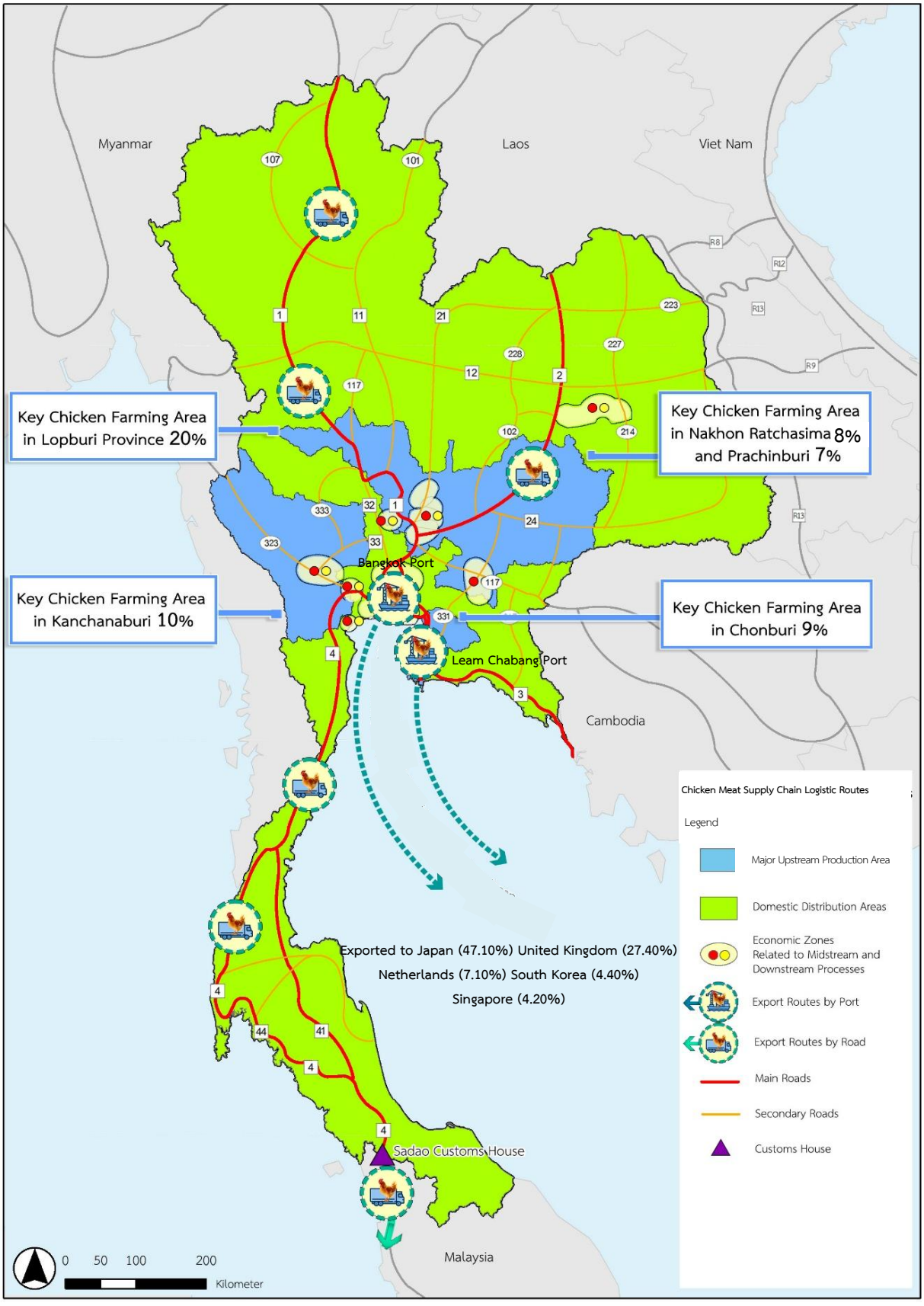


Figure 6 A Map of Origin Points and Major Export Gateways for Chicken Meat

Source: Compiled and processed by the consultants

4) Recommendations for Enhancing the Efficiency of the Supply Chain

Table 1 Soft Measures to Enhance the Processed Chicken Supply Chain

Improvement Measure	Lead Agency	Benefits to the Processed Chicken Supply Chain	Implementation Timeline	
			Short Term (1–2 years)	Medium Term (3–5 years)
Strengthen inter-divisional collaboration within the Department of Livestock Development to streamline export procedures, particularly by reducing duplication in documentation requirements for export permits issued by different divisions within the Department. This includes the Permit for Trading Carcasses for Export (Form R.10) and the Permit to Export Animals and Animal Carcasses (Form R.9), etc.	Department of Livestock Development	Reduction of cost and time for export	✓	

2.2.3 Supply Chain of Sugar and Molasses

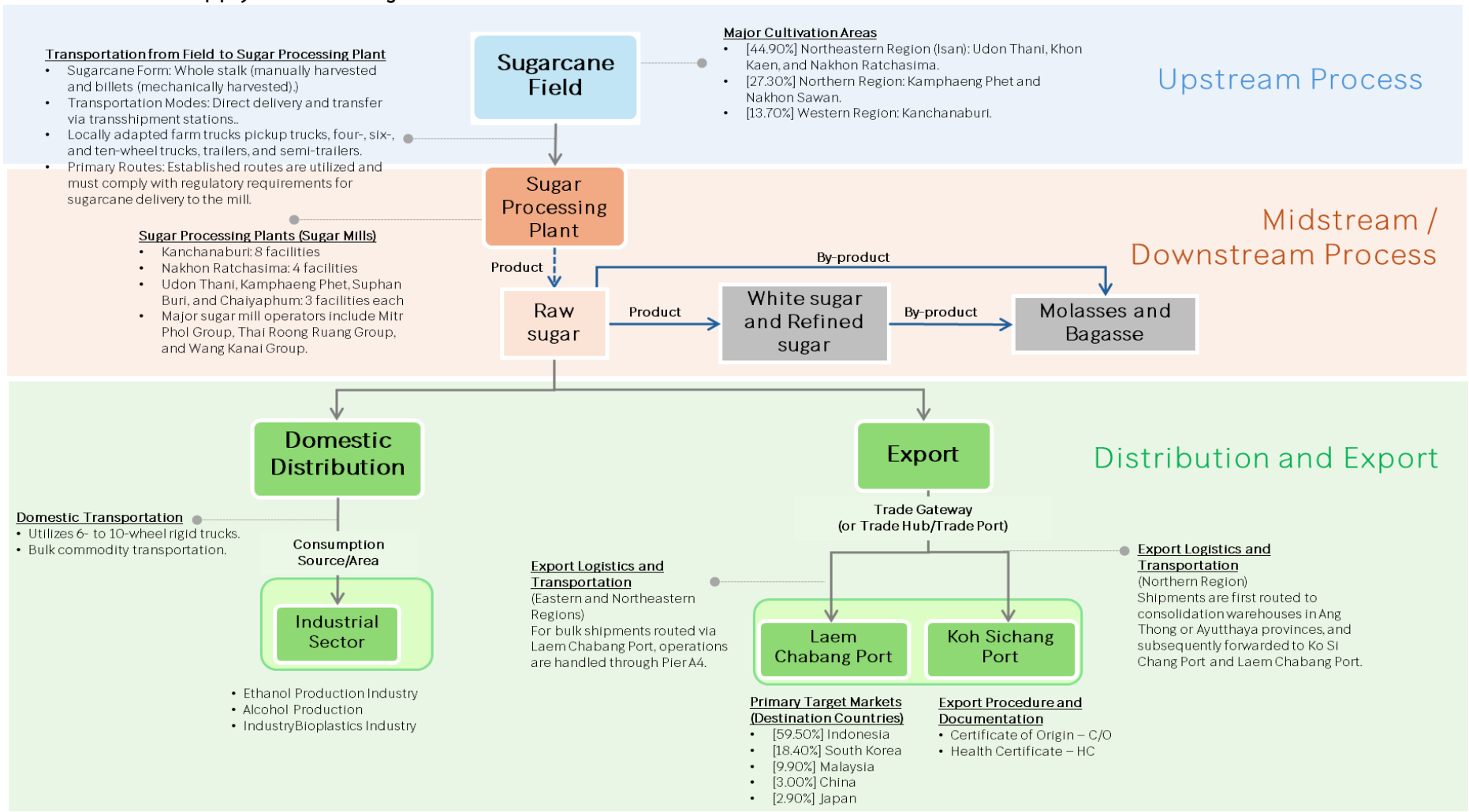


Figure 7 Supply Chain of Raw Sugar

Source: Compiled and processed by the consultants

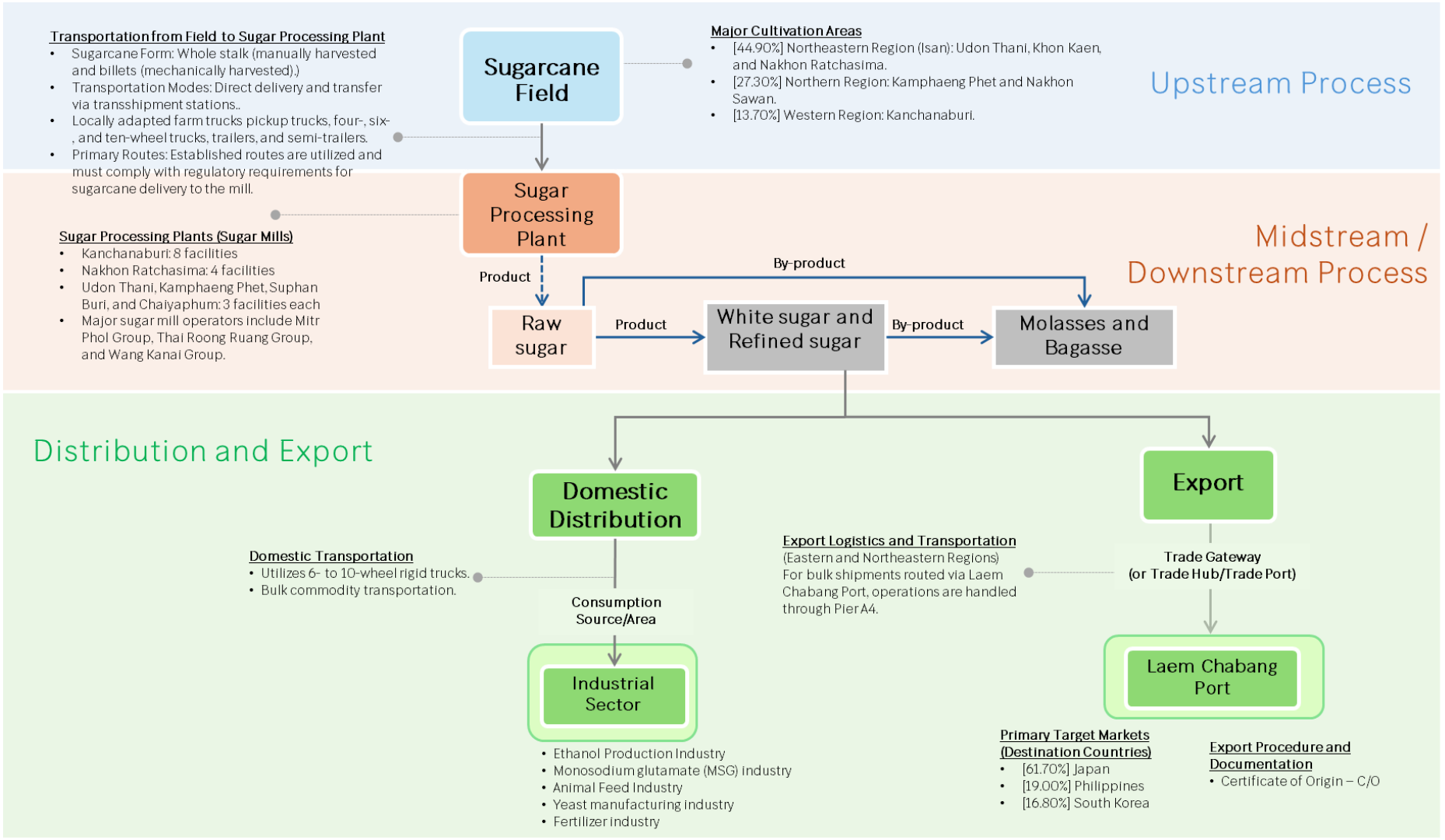


Figure 8 Supply Chain of By-products (Molasses and Bagasse)

Source: Compiled and processed by the consultants

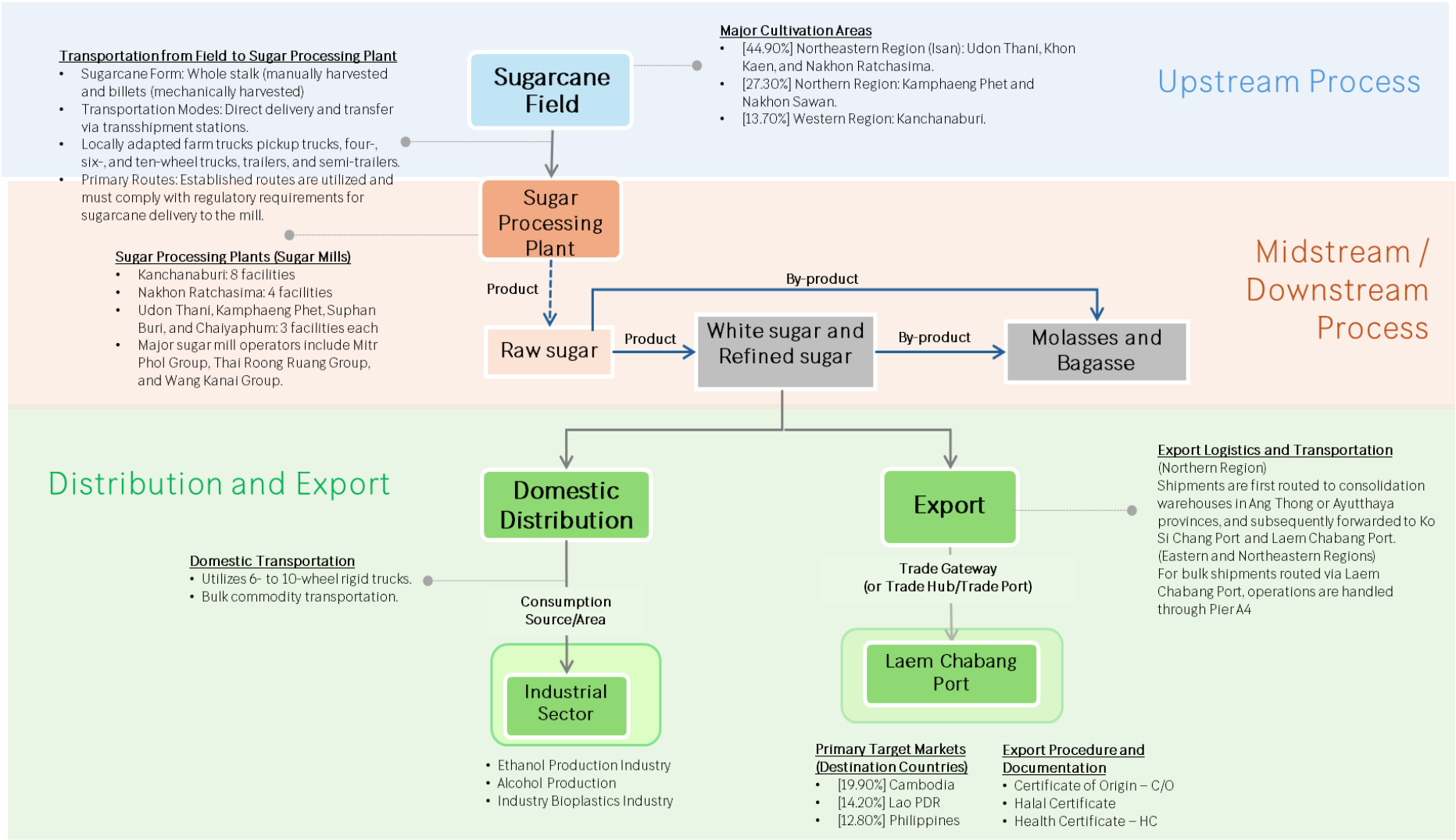


Figure 9 Supply Chain of Refined White Sugar

Source: Compiled and processed by the consultants

1) Overview and Key Facts of the Sugar Supply Chain

Source: Trade map. List of importing markets for a product exported by Thailand Product 1701 Cane or beet sugar and chemically pure sucrose, in solid form.

Export performance from 2020–2024 was generally volatile. Export values increased in both 2022 and 2023; however, in 2024, export value decreased compared to 2023, reaching USD 2.361 billion USD.

Major export markets for white sugar included Japan, the Philippines, and South Korea, while major markets for molasses include Cambodia, the Lao PDR, and the Philippines.

The industry continues to face several constraints, including:

- Fluctuating global sugar prices,
- Drought, which reduces sugarcane yield
- High production costs due to rising prices of raw materials (fertilizer, energy, and labor)
- Shortages of sugarcane cutters and personnel in sugar processing factories
- Post-harvest sugarcane burning to reduce labor shortages and pre-harvest leaf removal costs but contribute to PM2.5 emissions.

2) Transport Connectivity in the Sugar and Molasses Supply Chain

The sugar and molasses supply chain consists of three major stages:

2.1) Upstream Stage

This stage involves transporting sugarcane from farms to sugar mills.

- Medium- and large-scale growers typically transport sugarcane directly from fields to mills using 6-wheel trucks, 10-wheel trucks, or trailers.
- Small-scale farmers generally rely on farm tractors (“E-tan”) or pickup trucks to transport sugarcane to nearby collection stations, where volumes are consolidated and transferred to larger trucks for delivery to mills.

Transport routes primarily rely on secondary roads and local rural roads connecting sugarcane fields to major highways leading to sugar mills.

Key problems in upstream logistics include:

- Long waiting times of 48–72 hours for trucks at mill entrances due to bottlenecks at sugarcane receiving stations, causing sugarcane drying and quality deterioration

- Traffic congestion and overloading on main roads, especially in the Northeastern region, which is a major sugarcane cultivation with a high concentration of sugar mills. This affects road safety, travel time, and transportation expenses.
- Farmers tend to burn sugarcane after harvest as burning makes harvesting easier and faster than cutting fresh sugarcane, reduces labor shortages, and saves on the cost of leaf stripping before cutting. This practice results in PM2.5 emissions from open burning.

2.2) Midstream Stage

This stage covers logistics activities after sugarcane is processed into final products and byproducts.

Sugar products transported from processing plants include:

- Raw sugar
- White sugar
- Refined sugar
- Byproducts, including molasses and bagasse

Transportation from mills to warehouses or distribution nodes is carried out using 10-wheel trucks and trailers, typically to company-owned storage facilities located near processing plants.

2.3) Distribution Stage

Domestic Distribution

Once sugarcane is processed, sugar and molasses are distributed domestically:

- Most of white sugar sold in the country is transported by 10-wheel trucks and trailers to food and beverage factories as well as to the warehouses of modern retail stores.
- Many industry stakeholders believe that greater support for rail transportation and increased opportunities for private sector participation in rail freight services would significantly reduce transportation costs, particularly for long-distance interregional movements. However, rail transport is currently underutilized for domestic sugar transportation.

Molasses Distribution

Molasses, a key raw material for ethanol production, is transported by liquid tank trucks from sugar mills to ethanol production plants nationwide. This stage requires:

- High security storage and tank system that can efficiently handle large volumes of liquid.
- The availability of energy infrastructure and pipelines systems in certain areas also help reduce the burden on road transportation and enhance the continuity of bioenergy production processes in the bioenergy sector.

Exports

- Raw sugar is mainly transported in bulk from sugar factories by trucks to Laem Chabang Port, which serves as the main gateway.
- The cargo is transported via multimodal routes from sugar mills to Ayutthaya by road and inland waterways (Pa Sak and Chao Phraya Rivers), then transferred at offshore midstream points near Ko Si Chang for loading onto ocean-going vessels.
- White sugar, as a finished product, is typically packed in 100 kg bags and shipped in containers for export through:
    - Laem Chabang Port
    - Bangkok Port
    - Border checkpoints including Mukdahan, Nong Khai, and Aranyaprathet
- Molasses exports use liquid tank trucks to Laem Chabang Port (A4 Berth) and Bangkok Port for overseas shipment.

3) Supply Chain Governance in the Sugar Sector

- Thailand's sugarcane and sugar supply chain lacks a single dominant controlling entity, with dynamics largely determined by domestic and global supply-and-demand conditions. In some years, farmers possess greater bargaining power;
- In others, sugar mills hold more leverage.

This necessitates continuous information exchange and coordination between growers and mills. The Office of the Cane and Sugar Board (OCSB) serves as a central coordinating mechanism for production and marketing management.

Future development priorities include:

- Discouraging pre-harvest burning to reduce PM2.5 emissions
- Leveraging the expanded double-track railway system
- Supporting both the State Railway of Thailand and private operators to increase locomotive and rolling stock availability under new rail transport regulations This creates opportunities for rail transport of raw sugar from the Northeastern and Northern regions to Laem Chabang Port, offering a cost-effective alternative to road transport.

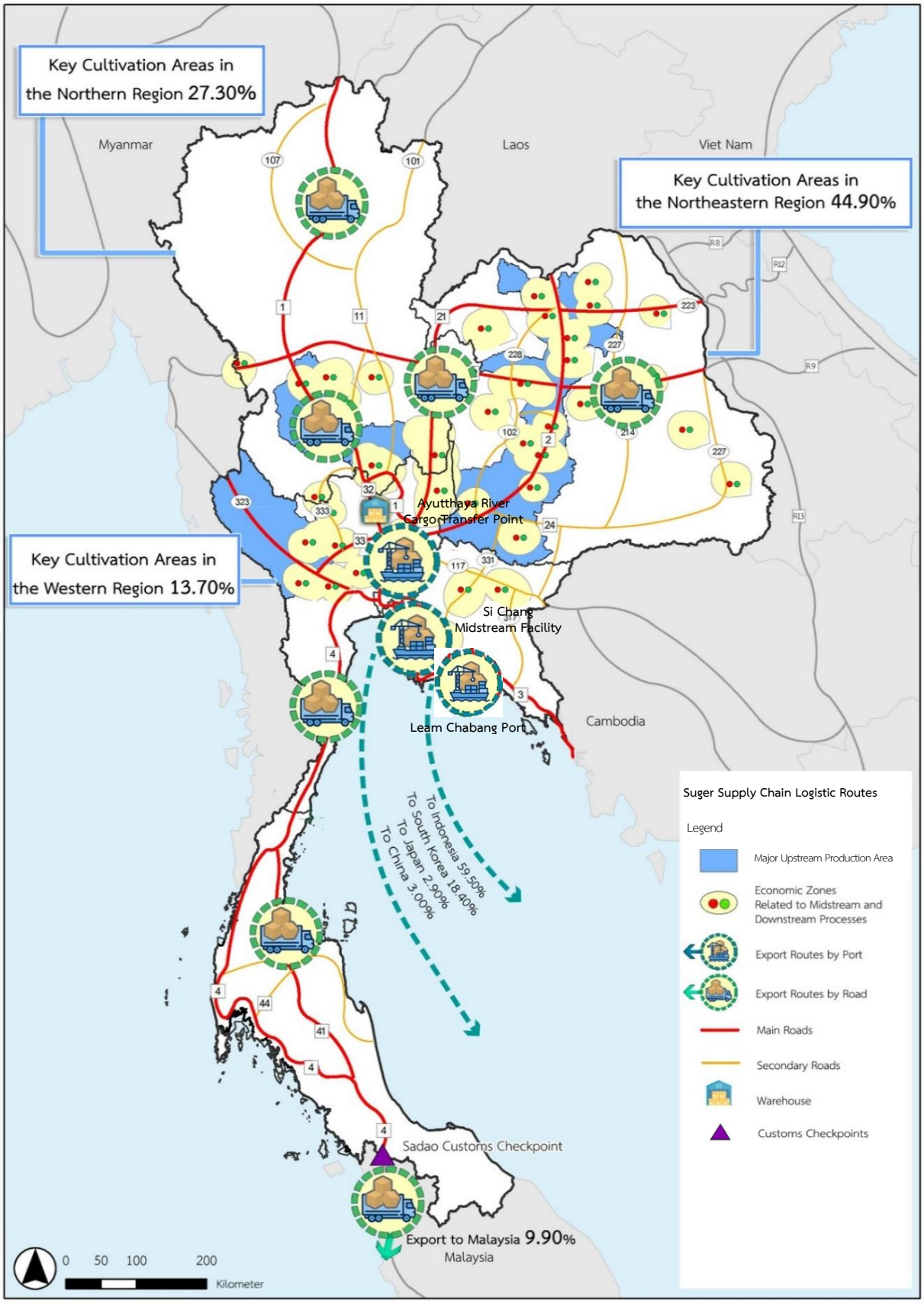


Figure 10 A Map of Origin Points and Major Export Gateways for Raw Sugar

Source: Compiled and processed by the consultants

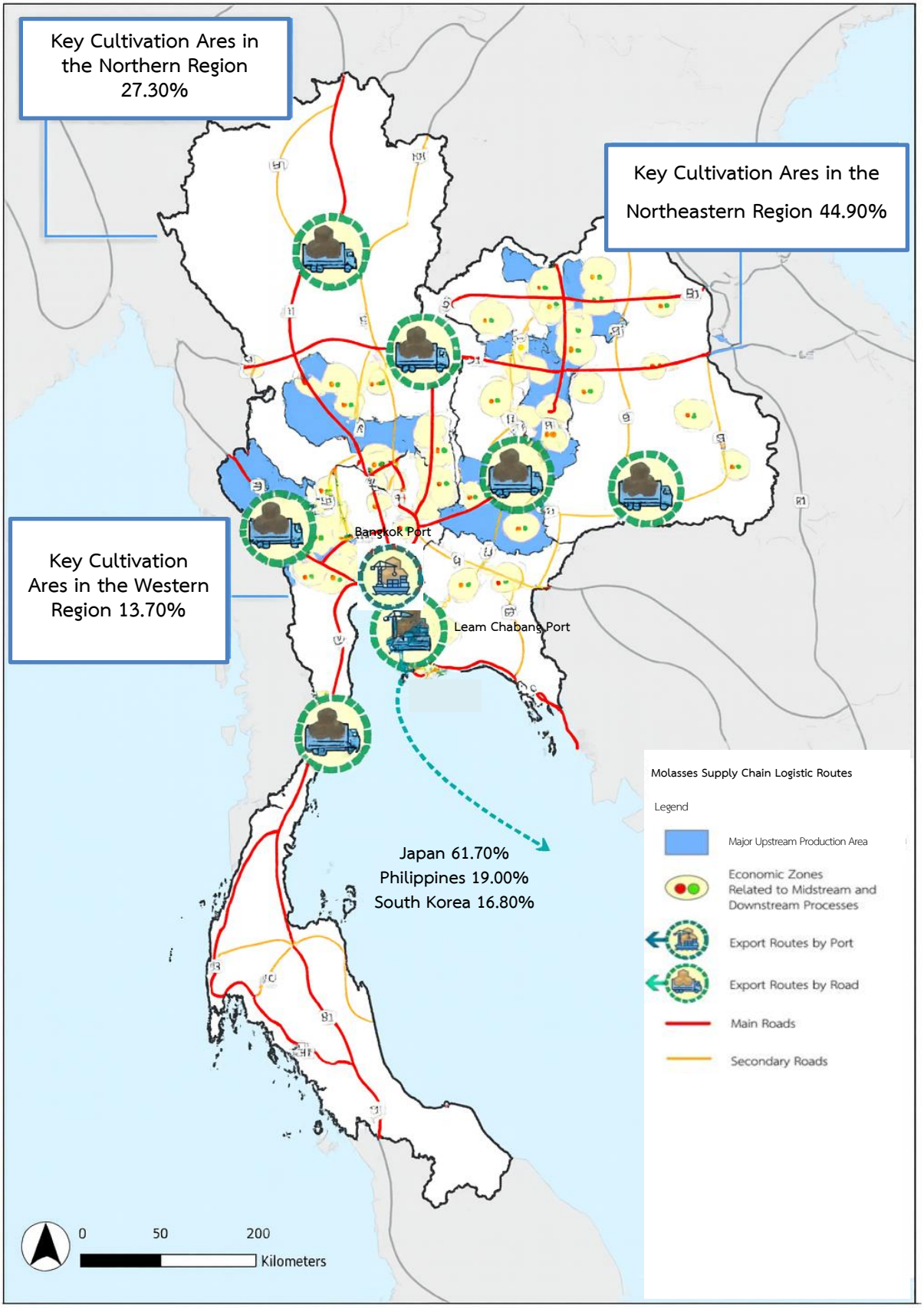


Figure 11 A Map of Origin Points and Major Export Gateways for Molasses

Source: Compiled and processed by the consultants

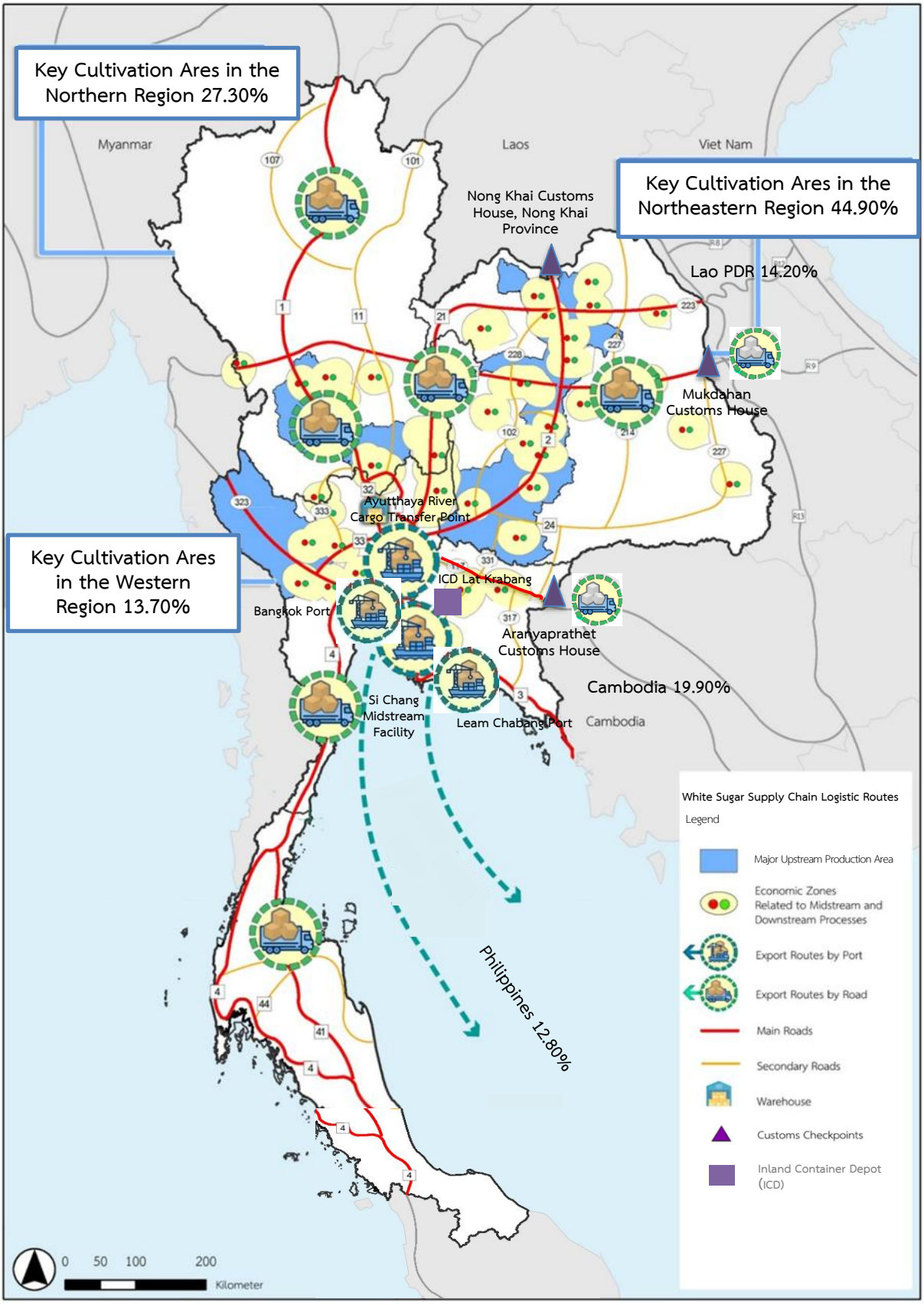


Figure 12 A Map of Origin Points and Major Export Gateways for White Sugar

Source: Compiled and processed by the consultants

4) Recommendations for Enhancing Supply Chain Efficiency

Table 2 Soft Measures to Enhance the Sugar and Molasses Supply Chain

Improvement Measure	Lead Agency	Benefits to the Sugar Supply Chain	Implementation Timeline	
			Short Term (1–2 years)	Medium Term (3–5 years)
Promote the elimination of sugarcane burning and discourage mills to purchase burnt cane but only sugarcane that meets CCS (Commercial Cane Sugar) quality standards This will systematically upgrade Thailand's sugar supply chain, reduce environmentally driven trade barriers, and mitigate PM2.5 pollution.	OCSB / Department of Industrial Promotion / Department of Agriculture	Enhance environmental sustainability and adjust production to comply with regulations	✓	
Encourage sugar mills to shift from road transport to rail transport, particularly for raw sugar, which is a low-value commodity that requires bulk shipment. Incentives should be provided to encourage sugar mills, particularly those along double-track railway corridors, to use rail transport to Laem Chabang Port.	State Railway of Thailand / Department of Rail Transport	Reduce transportation costs	✓	

2.2.4 Supply Chain of Passenger Cars and Pickup Trucks

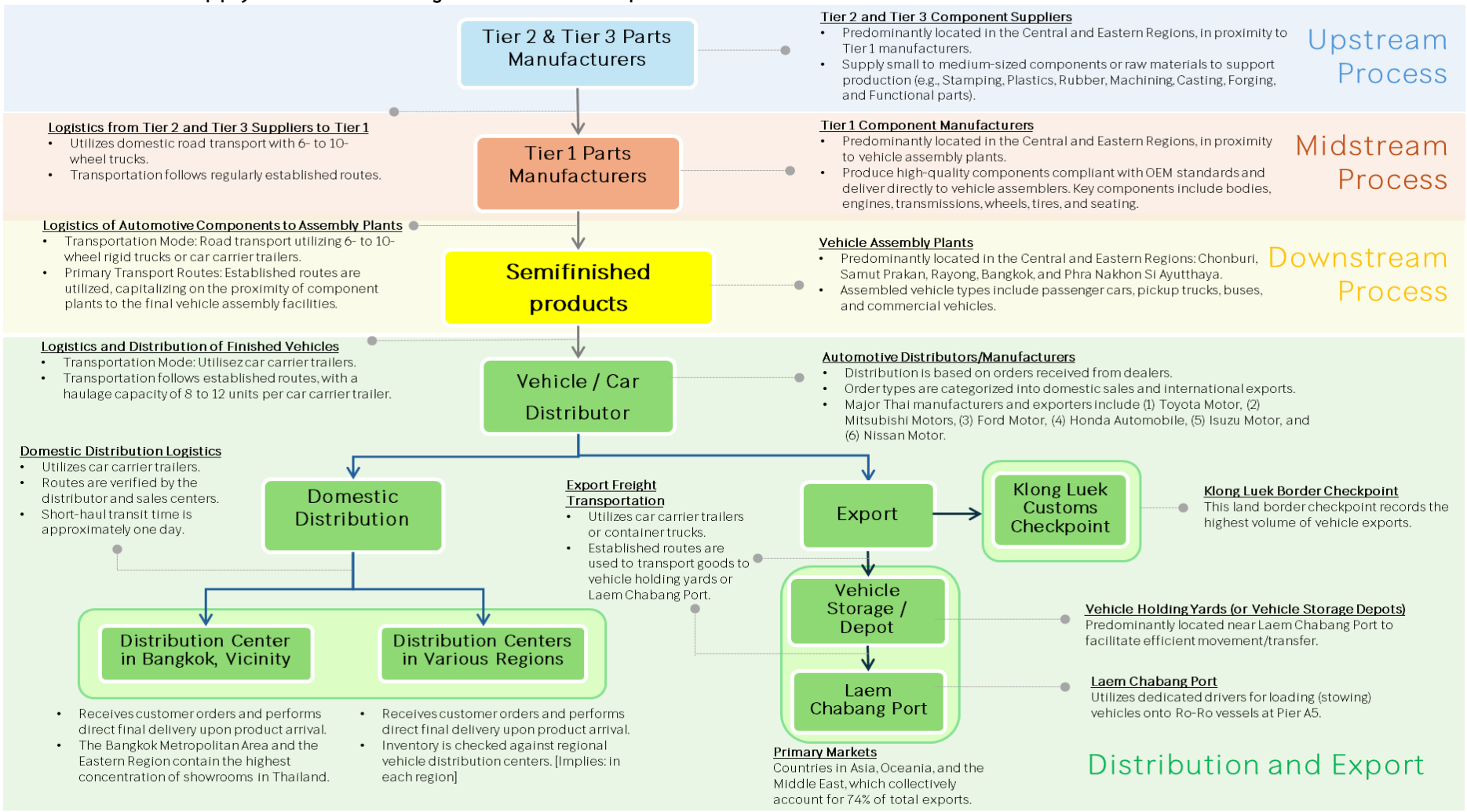


Figure 13 Supply Chain of the Passenger Cars and Pickup Trucks

Source: Compiled and processed by the consultants

1) Overview and Key Facts of Passenger Cars and Pickup Trucks Supply Chain

Source: Trade map. List of importing markets for a product exported by Thailand Product 8702 Motor vehicles for the transport of >= 10 persons, 8703 Motor cars and other motor vehicles principally designed for the transport of passenger and 8704 Motor cars and other motor vehicles principally designed for the transport of goods.

Export performance from 2020–2024, the export trend was continuously increasing but with some fluctuations, showing a slight decline in 2022 compared to 2021. For 2023 and 2024, the export value was expected to increase, with the export value in 2024 projected at 20,826 million USD, with major export markets in Oceania and the Middle East.

Despite this positive trend, Thailand's automotive industry faces various challenges:

- The transition of manufacturing technology from internal combustion engine (ICE) vehicles to electric vehicles (EVs), which requires adaptation by domestic suppliers.
- Increasing competition between local automakers and imported EVs.
- The need for ensuring the safe transportation of vehicles to markets such as preventing battery fires in EV during transportation by ocean going vessel to foreign markets.
- Preventing contamination of exported vehicles by grass seeds, soil, or dust during transport to overseas markets that have strict phytosanitary measures, such as Australia

2) Transport Connectivity in Passenger Cars and Pickup Trucks Supply Chain

The passenger cars and pickup trucks supply chain can be divided into four main stages**:**

2.1) Upstream Stage

This stage consists of Tier 2 and Tier 3 suppliers**,** most of them are Thai SMEs producing subcomponents such as foam sheets, seats, brake parts, plastic components, and auxiliary accessories.

This group of firms often face limitations in:

- Technology capability
- Quality standards
- Direct market access

Which prevents them from supplying parts directly to automobile assembly plants and must sell through Tier 1 suppliers to enter the automotive production chain**.**

Transportation of upstream components generally relies on small- and medium-sized trucks, using road networks within urban areas and industrial estates.

2.2) Midstream Stage

This comprises Tier 1 suppliers, who possess higher technological capability and strong manufacturing standards. They produce major and complex automotive components such as engines, transmissions, electrical and electronic systems, chassis systems, and body structures.

Tier 1 suppliers are typically located near assembly plants in Bangkok, Samut Prakan, Chonburi, and Rayong to enable:

- Fast delivery
- Reduced logistics costs
- Support for Just-in-Time (JIT) production

Transportation between Tier 1 suppliers and assembly plants uses medium and large trucks on primary highways, motorways, and internal industrial roads, all of which must be well-maintained and effectively managed for safety and traffic flow.

2.3) Downstream Stage

Passenger cars and pickup trucks assembly plants located mainly in Central and Eastern region receive parts from domestic manufacturers as well as imported components to assemble into completed vehicle according to the standards of parent company.

In addition to road networks, downstream operations rely heavily on:

- Laem Chabang Port
- Lat Krabang Inland Container Depot (ICD)

These facilities are used to handle the import of parts and the export of finished vehicles. Efficient connectivity between assembly plants, ports, and logistics hubs is crucial for managing downstream automotive supply chain.

2.4) Distribution Stage

Domestic Distribution

Finished vehicles are transported to dealers nationwide using major highways, ring roads, and regional distribution centers.

Export Distribution

Most vehicles exported from Thailand use Laem Chabang Port**,** which handles 96.75% of total automotive exports via Ro/Ro vessels**.**

Additional export routes include:

- Aranyaprathet Customs House: approx. 2.04%
- Nong Khai Customs House: approx. 0.32%

These are used for exports to neighboring ASEAN countries.

Infrastructure supporting downstream logistics includes deep-sea ports, Motorway No. 7, and border checkpoints that must accommodate high volumes of vehicle carriers and transport trucks.

3) Supply Chain Governance in the Passenger Cars and Pickup Trucks

The automotive supply chain in Thailand operates efficiently under the strong coordination and control of automotive manufacturers. Production planning among Tier 1 suppliers and assembly plants is well integrated, and logistics scheduling is synchronized across upstream and downstream operations.

While the overall logistics infrastructure supporting vehicle distribution and export functions effectively, Thai exporters face several challenges:

Trade Barriers

Countries such as Australia impose strict non-tariff barriers**,** especially phytosanitary measures. These measures prohibit contamination of vehicles with:

- Local grasses and seeds
- Soil
- Dust.

This issue is particularly problematic in Thailand's Eastern region (Chonburi and Rayong), where grass flowers are often found along the roadside. This results in exporters, transporters, and ports must work closely to manage the risk of grass flowers and dust contamination. In the past, internationally adopted practices to prevent contamination of vehicles prior to entry into foreign markets have included thorough exterior cleaning, applying double-sided tape to vehicle surfaces (which Ro-Ro shipping operators remove prior to import clearance), and seeking cooperation from the Australian government for Approved Pre-Border Treatment, among other measures.

In addition, the shift in automobile manufacturing technology from internal combustion vehicles to electric vehicles means that, in the future, Thai manufacturers producing cars for export may need to increasingly transition from producing internal combustion vehicles to electric vehicles. This requires personnel involved at all stages—producers, storage staff, transporters, and cargo handlers—to place greater emphasis on hazardous goods management, especially the batteries of electric vehicles, which are classified as Class 9 hazardous materials (miscellaneous dangerous substances and articles). These batteries carry a risk of catching fire when heated, particularly when vehicles are parked for long periods in outdoor lots or during prolonged sea transport. Consequently, the management of hazardous goods needs to be enhanced, equipment installed, and personnel prepared to respond in case of emergencies, ensuring safety throughout the supply chain.

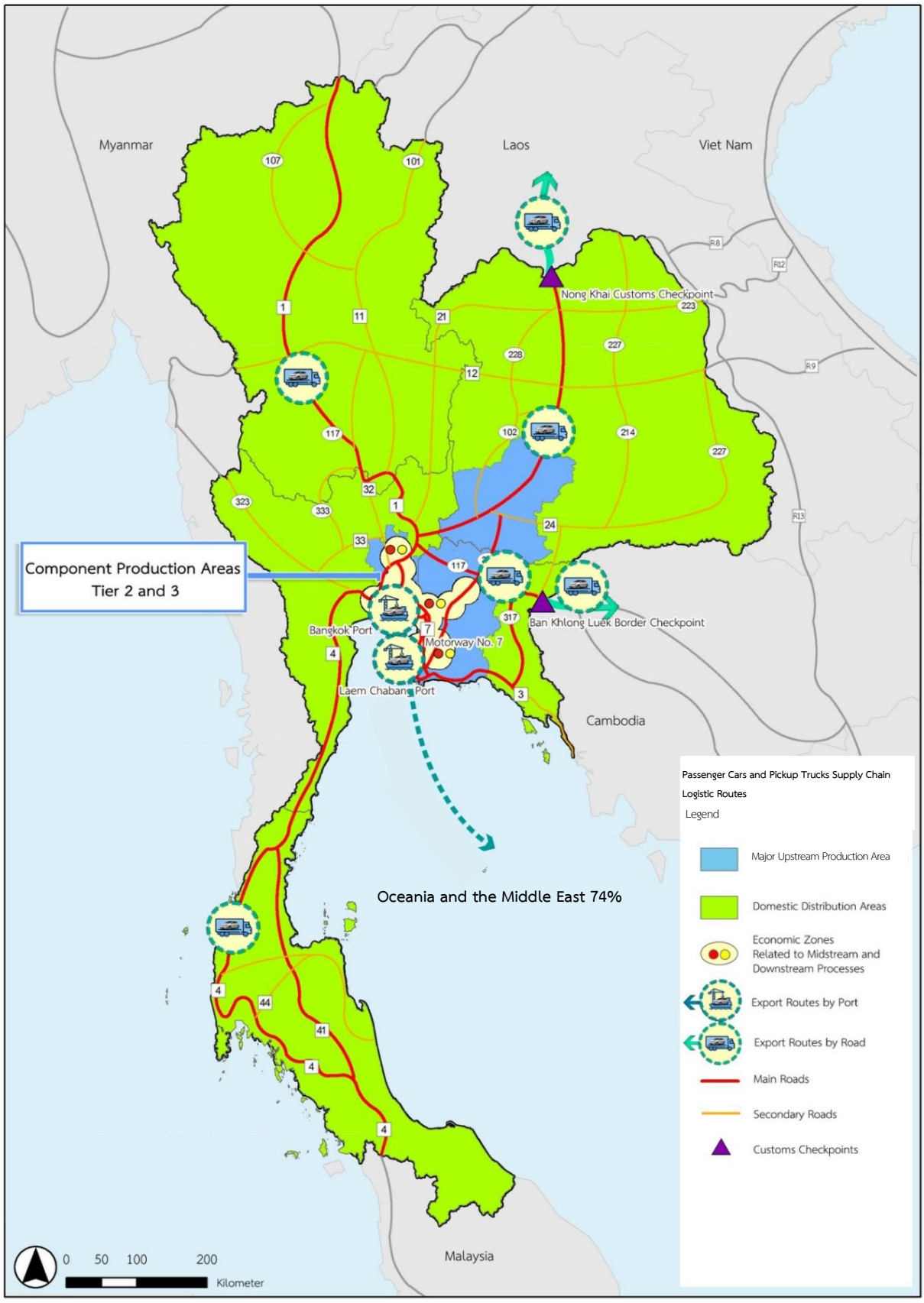


Figure 14 A Map of Origin Points and Major Export for Exporting Passenger Cars and Pickup Trucks

Source: Compiled and processed by the consultants

4) Recommendations for Enhancing Supply Chain Efficiency

Table 3 Soft Measures to Enhance the Passenger Cars and Pickup Trucks Supply Chain

Improvement Measure	Lead Agency	Benefits to the Automotive Supply Chain	Implementation Timeline	
			Short Term (1–2 years)	Medium Term (3–5 years)
Discuss with importing countries that impose strict regulations regarding the prohibition of grass flowers and dust contamination on imported vehicles—such as Australia—aim to increase vehicle export volumes and reduce the risk of import rejection by destination countries. This involves considering Australian government-approved Pre Border Treatment before the vehicles are loaded onto Ro/Ro vessels, ensuring that Thai-exported vehicles comply with phytosanitary requirements. Additional measures may include providing external inspection services, cleaning vehicles at the port, or applying double-sided adhesive tape around the vehicle for removal by the Ro/Ro operator before import inspection.	Ministry of Agriculture and Cooperatives (Department of Agriculture / National Bureau of Agricultural Commodity and Food Standards)	Increase export volumes and reduce the risk of import rejection	✓	
Enhance hazardous goods management, install necessary equipment, and prepare personnel to handle emergency situations to ensure safety within the EV manufacturing and logistics supply chain as well as to prepare for the future context of change in automotive production technology	Department of Industrial Works / Department of Land Transport / Marine Department	Improve safety in the EV production and delivery supply chain		✓

2.2.5 Supply Chain of Air Conditioners

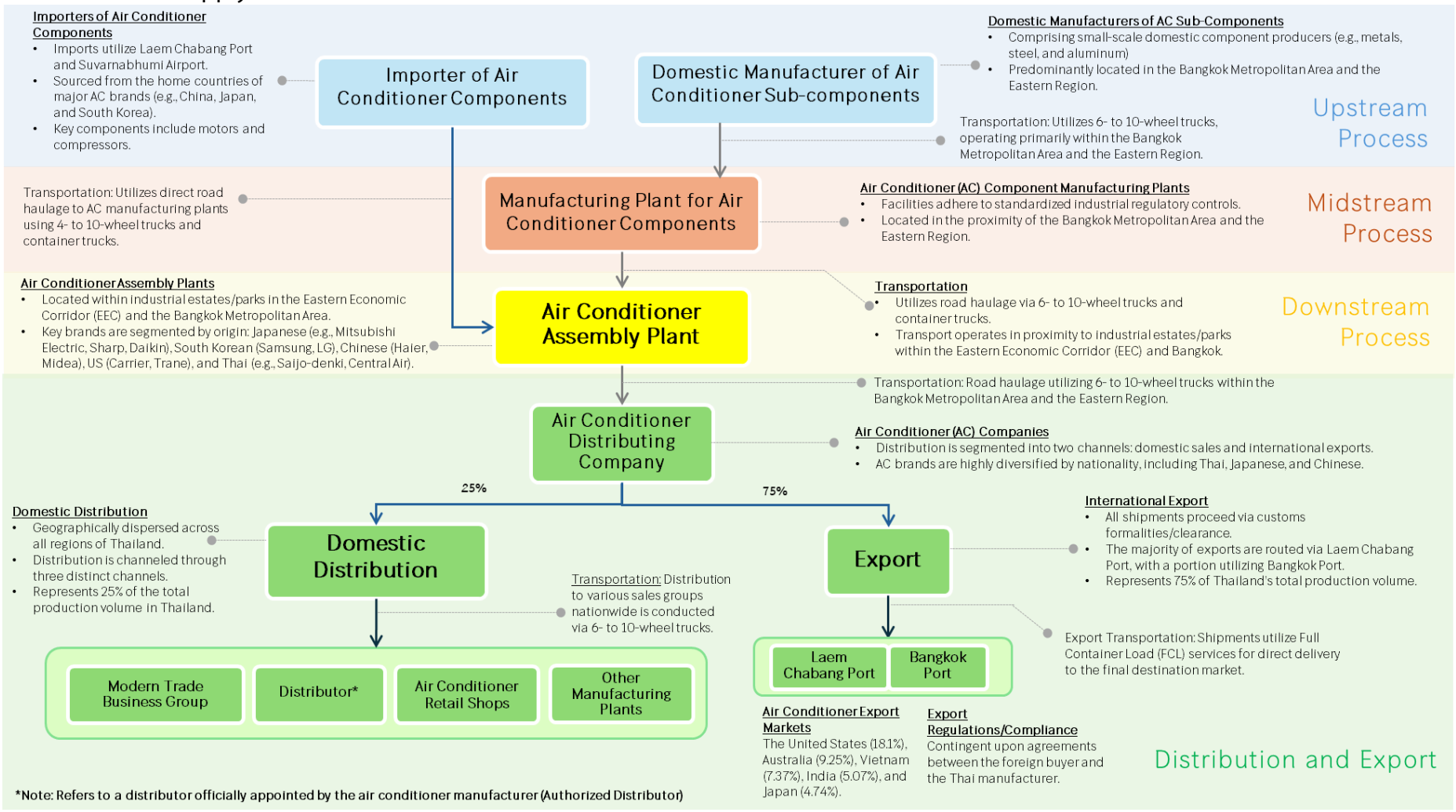


Figure 15 Supply Chain of Air Conditioners

Source: Compiled and processed by the consultants

1) Overview and Key Facts of the Air Conditioner Supply Chain

Source: Trade map. List of importing markets for a product exported by Thailand Product 8415 Air conditioning machines comprising a motor-driven fan and elements for changing the temperature.

Export performance from 2020–2024, the overall trend in export exhibited a continuous increase in export value, despite slight fluctuations in some years. In 2023, the value slightly decreased compared to 2022. However, in 2024, export value rebounded again to 6,877 million USD, with main export countries including the United States, Australia, Vietnam, India, and Japan.

Key challenges facing Thailand's air-conditioner industry include:

1.1) Increasing demand for sustainable and environmentally friendly technologies

1.2) Stricter energy efficiency standards and technological requirements

1.3) Adoption of IoT, AI, and robotics for production control and maintenance

1.4) The evolving role of air conditioners as air purification devices due to growing concerns over air pollution

1.5) Shortages of skilled labor**,** requiring enhanced workforce training and collaboration with educational institutions

2) Transport Connectivity in the Air Conditioner Supply Chain

The air-conditioner supply chain can be divided into four main stages**:**

2.1) Upstream Stage

This stage involves sourcing raw materials and core components for air conditioners, such as:

- Motors
- Compressors
- Coils
- Copper tubing
- Valves
- Electronic control components

Many essential components still need to be imported from countries such as China, Japan, Malaysia, and South Korea**.** Domestic production mainly covers basic materials like steel, aluminum, and plastics.

Component manufacturers are typically located in Bangkok, surrounding provinces, and the Eastern region, enabling efficient transportation to assembly plants in major industrial estates.

Upstream logistics depend heavily on:

- Major seaports for importing parts
- Primary highways
- Motorways
- Manufacturing access roads connecting factories, warehouses, and ports

2.2) Midstream Stage

This includes manufacturers of subassemblies and component modules such as:

- Condensing units
- Indoor units
- Fans and duct systems
- Valves and coils
- Other structural parts

Most of these manufacturers are Thai-owned businesses and are typically located close to the assembly plants to support **Just-in-Time (JIT)** production.

Efficient midstream operations require:

- Well-developed road infrastructure within and between industrial estates
- Logistics centers and warehouses capable of handling storage and distribution of components

2.3) Downstream Stage

Air-condition assembly plants are primarily located in key industrial zones, including:

- Lat Krabang (Bangkok)
- Bangkadi Industrial Park (Pathum Thani)
- Eastern Seaboard Industrial Estate (Rayong)
- Amata City (Chonburi)

These facilities assemble components from both domestic and international suppliers into finished products, under in-house brands or OEM arrangements for foreign brands. Downstream logistics rely on connectivity between:

- Assembly plants
- Laem Chabang Port
- Bangkok Port
- Distribution centers
- Free trade zones at Suvarnabhumi Airport

This network is crucial for managing raw materials, inventory, and finished goods.

2.4) Distribution Stage

Domestic Distribution

Finished air conditioners are distributed to:

- Authorized dealers
- Department stores
- Retail outlets
- Online platforms
- Project clients (e.g., commercial buildings, factories, residential developments)

Domestic distribution depends on:

- Well-located distribution centers
- Warehouses near major highways and ring-road systems
- Efficient connectivity to regional markets

Export Distribution

Exports primarily use Laem Chabang Port, which handles 96.87% of total air-conditioner export volume, transported to the port using container trucks along Motorway No. 7 and other major highways.

Other export channels include:

- Bangkok Port (1.58%)
- Air freight via Suvarnabhumi Airport Free Zone for urgent shipments (0.09%)

3) Supply Chain Management in the Air Conditioner Industry

The management of the air-conditioner supply chain varies by segment:

- **Inbound Supply Chain (components and raw materials):** Largely supervised and controlled by air conditioner manufacturers to ensure timely delivery and quality standards.
- **Outbound Supply Chain (exports):** Dependent on agreements between overseas buyers and Thai manufacturers. Because most air-conditioner producers in Thailand are **foreign-owned multinational corporations**, export supply chains are often governed by offshore parent companies.

Key challenges affecting supply chain efficiency include:

- **A shortage of skilled labor**, which affects production capability
- **Environmental concerns**, such as the use of environmentally unfriendly refrigerants, and **intense competition in energy efficiency and technological standards** across global markets.
- The necessity to develop and deploy advanced **IoT and AI solutions** to improve manufacturing and maintenance efficiency.

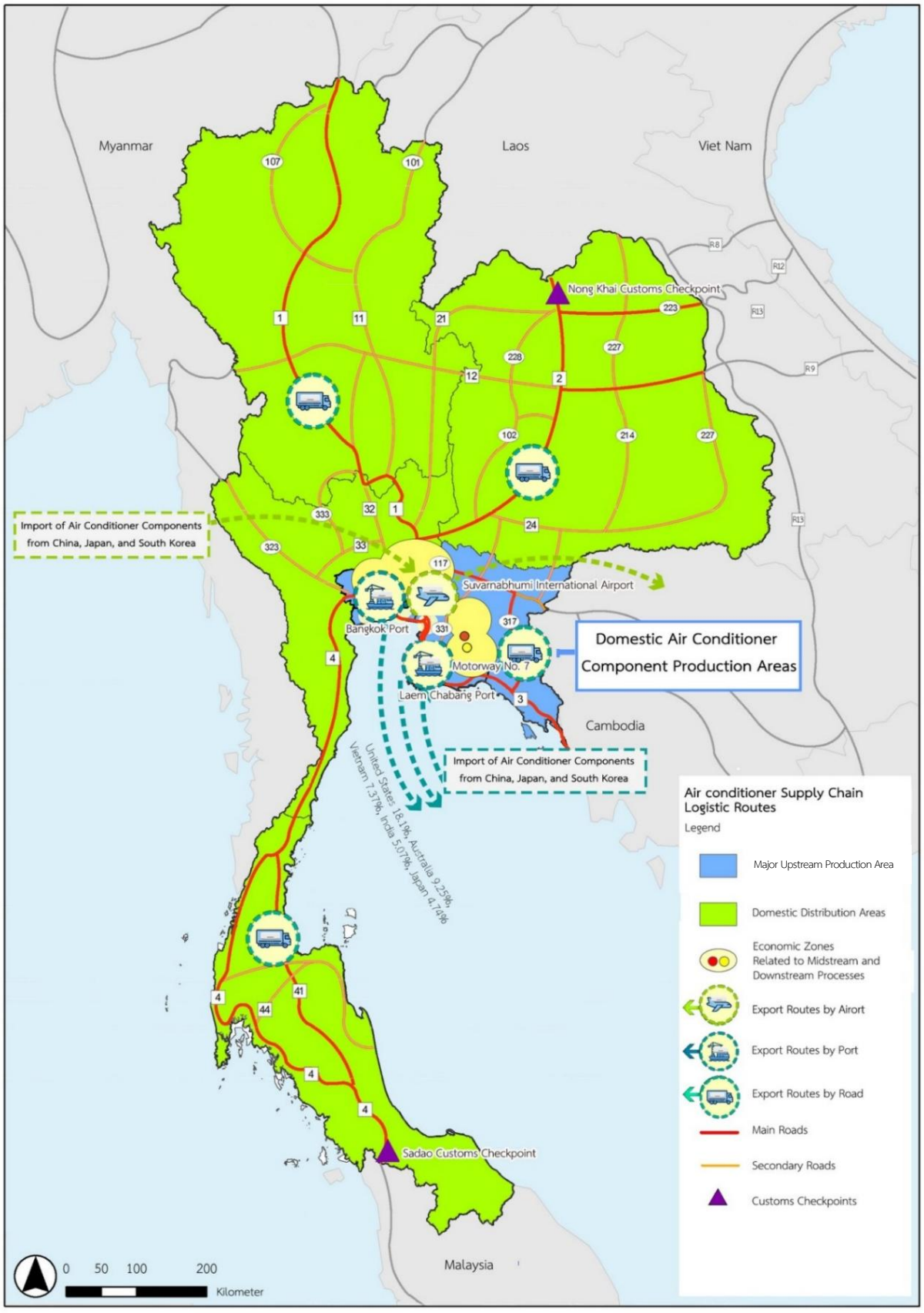


Figure 16 A Map of Origin Points and Major Export Gateways for Air Conditioner

Source: Compiled and processed by the consultants

2.2.6 Supply Chain of Durian

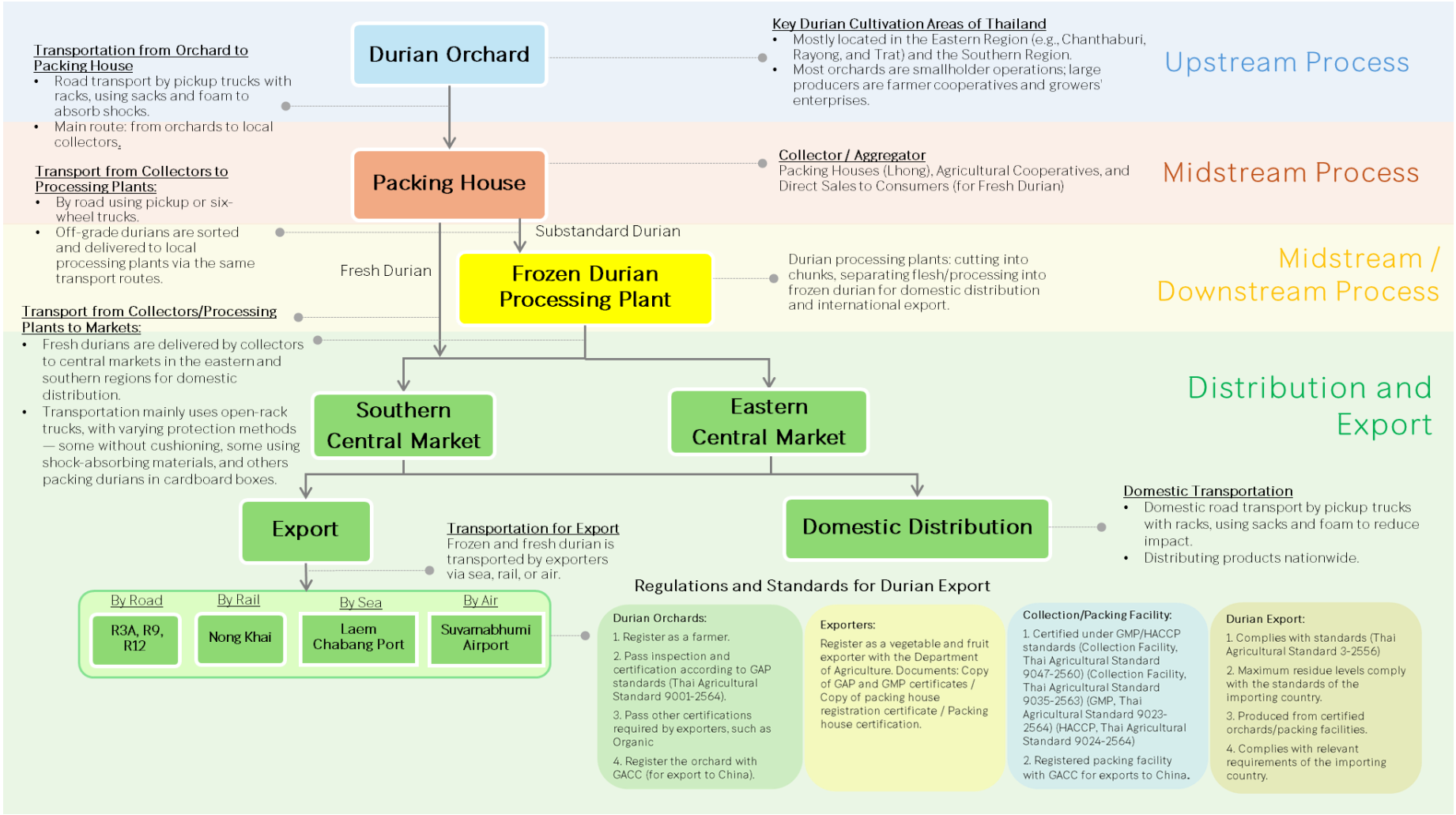


Figure 17 Supply Chain of Durian

Source: Compiled and processed by the consultants

1) Overview and Key Facts of the Durian Supply Chain

Source: Trade map. List of importing markets for a product exported by Thailand Product 0810 Fresh fruits.

Export performance from 2020 to 2024 shows that the overall export trend fluctuated but still grew overall. In 2022, export value decreased but in 2023, it recovered again and increased to 4,629 million USD before slightly declining in 2024. The main export markets remained China and Vietnam.

For future trends, emerging markets such as India and the Middle East are starting to show growing demand. Nevertheless, Thailand faces increasing competition from neighboring countries such as Vietnam, Malaysia, and the Philippines, which are beginning to penetrate into Chinese market aggressively, along with stricter quality standards such as GAP and GMP and rising production costs.

2) Transport Connectivity in the Durian Supply Chain

Thailand's durian supply chain can be divided into four main stages:

2.1) Upstream Stage

This stage involves durian growers primarily located in the Eastern region such as Chanthaburi, Rayong, and Trat, and in the Southern region such as Chumphon, Nakhon Si Thammarat, and Surat Thani, etc. Growers must manage their orchards to meet GAP standards, in terms of fertilizer use, pest and disease control, and harvest timing to ensure that the product meets market demands in terms of variety, ripeness, and fruit size. Durian products harvested from the orchards are transported via local roads connected to secondary and major highways toward collection points such as packing houses (long), cooperatives, and private collectors.

2.2) Midstream Stage

Key actors include packing houses, agricultural cooperatives, and direct-selling channels. Packing houses play a central role in purchasing large volumes from growers or small aggregators, sorting by size, quality, and ripeness, and conducting quality inspections to meet importing countries' requirements. Packed products are then prepared for domestic distribution or export. Durian products that do not meet the standards or downgraded durians will be sent to processing plants to minimize losses and increase value in form of various processed products. Key infrastructure during this period includes certified packing facilities, collection centers, warehouses, and road transport system linking the orchards, packing houses, and border checkpoints.

2.3) Midstream/Downstream Stage – Processing Plants

This process focuses on converting off-grade or surplus durians from the fresh market into value-added products such as frozen durian, dried durian, durian paste, and crispy fried durian to extend shelf life. These products can also be exported to foreign markets such as China, Vietnam, Japan, South Korea, and Europe. This stage relies heavily on cold storage facilities, cold-chain logistics, and temperature-controlled transport to maintain product quality and comply with food safety standards.

2.4) Distribution Stage

Domestic Market

Durian is distributed through wholesale markets, retail outlets, supermarkets, and online platforms. Road transport—four-wheel and six-wheel trucks—is primarily used.

Export Market

Thailand exports both fresh and processed durian using refrigerated containers (reefer containers) via:

- Laem Chabang Port – 47.49%
- Suvarnabhumi Airport – 3.47% (mainly high-value or urgent shipments)
- Key border checkpoints
  - Nong Khai Customs House – 0.50%
  - Nakhon Phanom Customs House – 15.20%
  - Chiang Khong Customs House – 32.62%

Fresh durian exports rely on robust cold-chain facilities to maintain freshness from packing houses to foreign markets.

3) Supply Chain Management

The durian supply chain is almost entirely controlled by Chinese operators, from collecting durians from orchards, sorting and packaging, exporting to importing and distributing the products to markets and consumer in China. Chinese packing house operators and exporters in Thailand often have commercial connections with durian importers in China, either through family ties or business partnerships, allowing operators in Thailand to keep up to date with the fluctuations of durian prices in the Chinese market. This helps them adjust the collection and export of fresh durians in accordance with the price situation. Moreover, the influence of Chinese entrepreneurs also extends to transport and logistics service providers for moving durians to China, most of them are typically owned or partly owned by Chinese businessmen.

Key Supply Chain Challenges include

3.1) Packing and Quality Control

- Packing houses must comply with the strict GAP/GMP standards of importing countries, especially China.
- Congestion at Chinese border checkpoints, causing delays and spoilage.

3.2) Transport-Related Challenges

Road Transport:

- Thai trucks cannot transport goods crossing directly into Laos–Vietnam or Laos–China borders, causing delays in container handling for changing truck heads.

Sea Transport:

- Shortage of refrigerated container (reefer) during peak export seasons
- Long transit times (12–13 days to China) making it hard to control the ripeness of durians.

Rail Transport (China–Laos Railway):

- Limited capacity.
- High freight rates.
- Multiple cargo transfer.
- Inability to adjust container temperature during transit.

Government infrastructure currently lacks adequate cold-chain support, especially at key land border checkpoints such as Chiang Khong, Nakhon Phanom, and Mukdahan. Nonetheless, The Department of Land Transport plans to expand reefer charging points at border facilities. Additionally, Thailand's double-track rail network is expanding. Regulatory updates now allow both the State Railway of Thailand and private operators to provide freight rail services. This creates growing potential to transport durian by rail from the Eastern and Southern regions to the Nong Khai border, connecting with the Laos–China Railway.

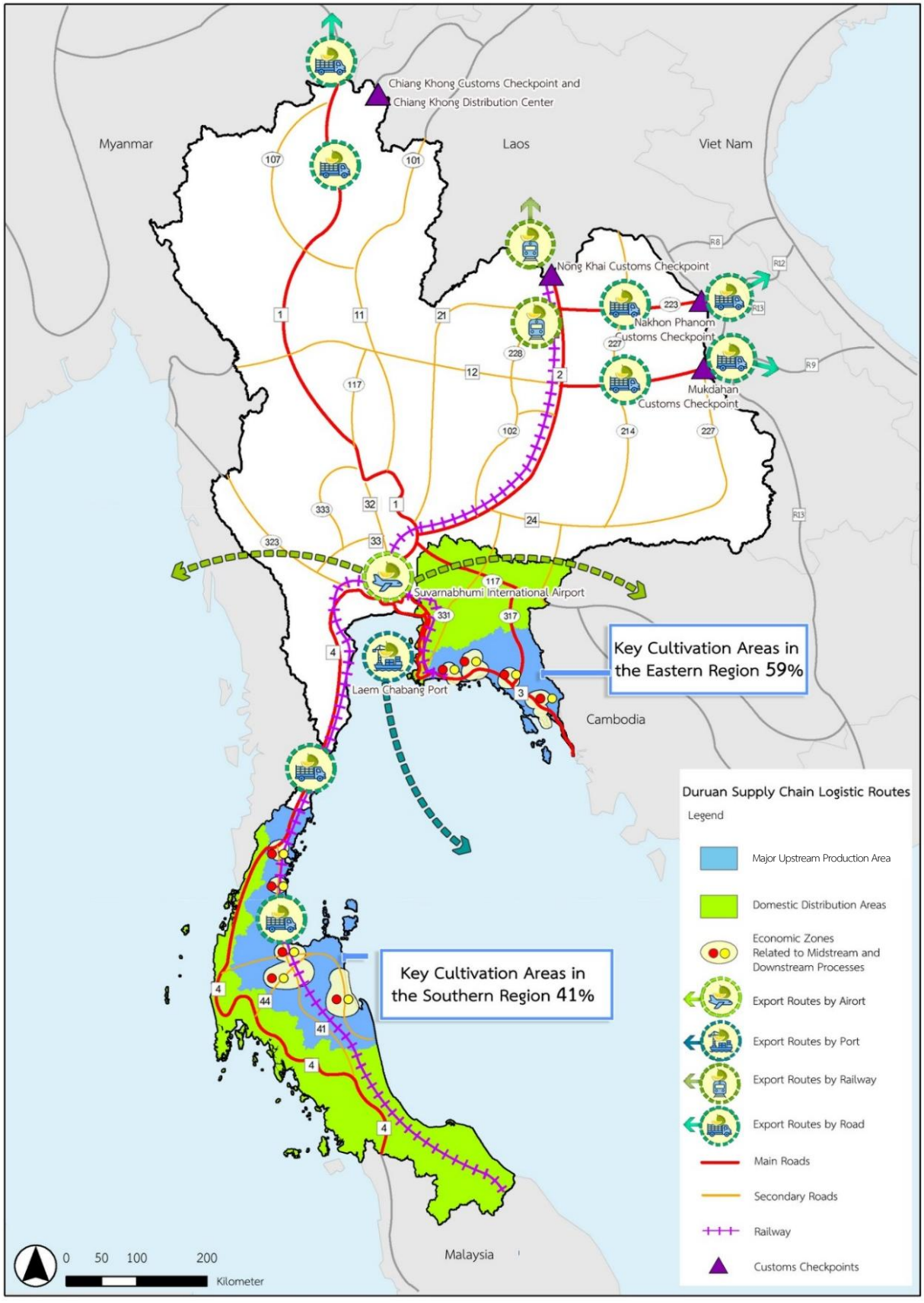


Figure 18 A Map of Origin Points and Major Export Gateways for Durian

Source: Compiled and processed by the consultants

4) Recommendations for Enhancing Supply Chain Efficiency

Table 4 Soft Measures to Enhance the Durian Supply Chain

Improvement Measure	Lead Agency	Benefits to the Durian Supply Chain	Implementation Timeline	
			Short Term (1–2 years)	Medium Term (3–5 years)
Negotiate with the Lao PDR government to allow Thai trucks and containers carrying durian to transit onward to Vietnam and southern China under the Thailand–Lao PDR Road Transport Agreement.	Ministry of Transport	Reduce transport cost and transit time	✓	
Negotiate with China to obtain official recognition of Thailand's durian inspection standards to minimize intensive inspection procedures at Chinese border checkpoints.	Ministry of Agriculture and Cooperatives	Reduce transport cost and transit time	✓	
Negotiate with the Vientiane Logistics Park (VLP) in Lao PDR to reduce transshipment charges and cross-border customs handling fees to lower transport costs for durian shipped from Thailand to China via international rail.	Ministry of Transport / Ministry of Foreign Affairs	Lower transport costs	✓	
Promote and encourage exporters to shift from road transport to rail transport—especially durian shipments from provinces with double-track railway development (e.g., Chumphon, the southern durian hub). Rail transport offers economies of scale for large-volume shipments and enables connection with China Railway freight services departing from Vientiane South Station in Lao PDR.	State Railway of Thailand (SRT) / Department of Rail Transport	Reduce transport cost	✓	✓
Support the expansion of train services, rolling stock, and rail wagons equipped with power supply systems for refrigerated containers to increase rail capacity for cold-chain transport.	State Railway of Thailand (SRT)	Lower transport costs	✓	✓

3. Recommendations for Enhancing Thailand's Logistics and Supply Chain System Through Modal Shift

Based on the supply chain analysis of the selected agricultural and manufacturing products within the study scope, groups of products with potential to promote modal shift can be identified. Such a shift would improve logistics efficiency through reduced transportation costs and increased competitiveness of operators as follows:

3.1 Products with Potential for Modal Shift from Road to Rail Transport

3.1.1 Automotive Tires

Natural rubber and block rubber, as key raw materials for tire manufacturing, are well suited for modal shift promotion. Most natural/block rubber processing plants are located in the Northeastern and Southern regions, while tire manufacturing plants are concentrated in the Eastern Economic Corridor (EEC). Rail transport can serve as a more cost-efficient alternative for long-haul movements between these regions.

3.1.2 Raw Sugar

Raw sugar produced in Upper Northeastern and Lower Northern Thailand, where factories are located near State Railway of Thailand (SRT) container yards (CYs), such as in Uttaradit, can be shifted from road to rail transport to Laem Chabang Port for export.

3.1.3 Durian

Fresh and frozen durian from collection centers in the Southern region (e.g., Chumphon) can be transported by rail to Nong Khai and onward to Vientiane South Station for connection with the Lao–China Railway for distribution in China. SRT has already upgraded single-track sections to double track. As a result, this increases rail capacity. Going forward, the Department of Rail Transport and the Ministry of Transport plan to allow private rail freight operators to run services on SRT tracks. This would enable private operators to provide additional freight services that complement SRT's rail cargo capacity.

3.2 Products with Potential for Modal Shift from Road to Water Transport

Raw Sugar

Raw sugar from factories in Lower Northeastern and Central regions can shift from road to inland waterway transport. Goods can be moved to inland waterway cargo transfer points in Phra Nakhon Si Ayutthaya Province, then transported via barges to be loaded onto ocean-going vessels anchored offshore at Ko Si Chang (Chonburi). This multimodal transport option significantly reduces logistics costs compared with road transport.

3.3 Conclusion: Importance of Developing a Connected Logistics Network

Promoting modal shift as a strategy for enhancing Thailand's logistics and supply chain systems requires strong emphasis on the development and integration of logistics infrastructure and facilities. A modern logistics system functions as a network, with:

- Links (transport routes)
- Nodes (intermodal terminals, ports, railway yards, distribution centers).

These must be seamlessly connected to support multimodal/intermodal transport**.**

In particular, shifting from road to rail and road to water, and ensuring connectivity between sea–road–rail–air transport modes, is critical for:

- Reducing logistics costs
- Shortening transport times
- Improving service efficiency
- Strengthening Thailand's long-term economic competitiveness.

A well-integrated multimodal logistics network will elevate the entire supply chain system for Thai products and support sustainable national growth.

4. Enhancement of Key Logistics Infrastructure and Facilities: 17 Priority Projects

Based on the analysis of selected agricultural and manufacturing product supply chains, a set of logistics-related infrastructures and facilities that are essential to promote Thailand's major supply chains were identified. The selection process resulted in **17 priority projects**, categorized into two groups:

(1) Logistics Infrastructure (7 Projects) These include:

- Laem Chabang Port
- Motorway No. 7 (M7)
- Bangkok Port
- Free Zone and Warehouses at Suvarnabhumi Airport
- Ladkrabang Inland Container Depot (ICD)
- Single Rail Transfer Operator (SRTO) development project
- Double-track railway connecting ICD and Laem Chabang Port

(2) Logistics Facilities (10 Projects) These include:

- Koh Si Chang Midstream Transfer Facility
- Inland Water Cargo Transfer Point in Phra Nakhon Si Ayutthaya
- Nong Khai Customs House
- Mukdahan Customs House
- Sadao Customs House
- Mae Sot Customs House
- Nakhon Phanom Customs House
- Chiang Khong Customs House
- Chiang Khong Multimodal Transport Center
- Aranyaprathet Customs House

Assessment Methodology for the 17 Projects

The study team conducted a utilization assessment for all 17 infrastructure and facility projects, beginning with a systematic fact-finding process based on:

- Collection of operational data,
- Primary data gathering through interviews, focus group discussions, and stakeholder surveys, and
- Secondary data from reliable sources.

The collected data were evaluated under the OECD/DAC evaluation framework, adapted to the Thai logistics context as follows:

Evaluation Framework for Logistics Infrastructure (7 Projects)

An adapted 7-dimension framework (expanded from the original 6 OECD/DAC criteria) was applied to ensure comprehensive coverage:

(1) Relevance**:** The extent to which the infrastructure aligns with national strategies and meets user needs.

(2) Efficiency**:** Achievement of project objectives compared with predefined targets.

(3) Effectiveness**:** Actual utilization compared with investment/operational costs, including user satisfaction regarding logistics cost reduction and time savings.

(4) Impact**:** Positive or negative effects beyond the stated objectives (e.g., employment, traffic conditions).

(5) Sustainability**:** Capability for proper operation and maintenance, and sufficiency of operating budgets.

(6) Coherence**:** Consistency and operational linkage with related agencies or projects.

(7) Value for Money (Additional Criterion)**:** Financial returns and cost-effectiveness of the infrastructure investment.

Evaluation Framework for Logistics Facilities (10 Projects)

Logistics facilities were assessed using 4 OECD/DAC-based criteria, comprising:

(1) Relevance

(2) Effectiveness

(3) Impact

(4) Coherence

These criteria were selected because logistics facilities operate primarily as public services. Revenue generation is not considered as an indicator of project performance. There are no prior feasibility studies to benchmark against actual performance, and continuity of operations is not a major concern.

The results of the utilization assessment for the 7 key infrastructure projects and 10 key logistics facility projects are presented in Table 5.

Table 5 Summary of Evaluation of Utilization of Logistics Infrastructure and Facilities (17 Projects)

Infrastructure / Facility	Relevance	Effectiveness	Impact	Coherence	Efficiency	Sustainability	Value for Money	Total Score (Satisfaction Level)
Infrastructure (The maximum score is 35 points)								
Laem Chabang Port	5	4	4	5	5	5	5	33 (Highly satisfactory)
Motorway No.7 (M7)	5	4	3	5	3	5	3	28 (Satisfactory)
Bangkok Port	4	3	3	4	5	5	5	29 (Satisfactory)
Free Zone – Suvarnabhumi Airport	4	3	5	5	2	5	5	29 (Satisfactory)
Inland Container Depot (ICD) Lat Krabang	5	2	2	5	2	4	5	25 (Satisfactory)
Single Rail Transfer Operator (SRTO)	5	2	4	5	3	4	3	26 (Satisfactory)
Double-track Railway ICD–LCB	5	2	2	5	3	2	2	21 (Fair)
Facilities (The maximum score is 20 points)								
Si Chang Midstream Facility	5	5	2	5	Due to data limitations on the facilities, the evaluation could only assess four criteria: (1) Relevance (2) Effectiveness (3) Impact (4) Coherence			17 (Satisfactory)
Ayutthaya River Cargo Transfer Point	5	4	3	3				15 (Satisfactory)
Nong Khai Customs House	5	4	4	4				17 (Satisfactory)
Mukdahan Customs House	5	4	2	4				15 (Satisfactory)
Sadao Customs House	5	4	3	2				14 (Fair)
Mae Sot Customs House	5	4	4	4				17 (Satisfactory)
Nakhon Phanom Customs House	5	4	2	4				15 (Satisfactory)
Chiang Khong Customs House	5	4	2	4				15 (Satisfactory)
Chiang Khong Multimodal Transport Center	5	No operation – insufficient data	2	1				8 (Unsatisfactory)
Aranyaprathet Customs House	5	4	4	4				17 (Satisfactory)

4.1 Gap Analysis and Logistics Infrastructure Development Guidelines

The evaluation results reveal key findings that serve as inputs to the Gap Analysis to identify the discrepancies between intended targets and the actual utilization of infrastructure and service systems. Based on the identified gaps, appropriate gap-bridging measures will be formulated, taking into consideration their impacts on logistics operations and the time required to achieve results.

The strategies/measures to address the identified gaps are categorized according to key factors relevant to the development of logistics infrastructure and facilities, with the objective of improving efficiency and effectiveness in their utilization. These measures are divided into three phases: short-term (1–2 years), medium-term (3–5 years), and long-term (6–10 years). The key principles are summarized as follows:

4.1.1 Laem Chabang Port, Chonburi Province

Gap Identified	Bridging Gap Guidelines/Measures				
	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
The Truck Queue system at Laem Chabang Port operates below its intended performance level, contributing to persistent traffic congestion within the port and in surrounding areas. This reflects limited integration and coordination among key stakeholders, including terminal operators, Port Authority of Thailand, the Customs Department, transport operators, and traffic management authorities. As a result, truck queuing and vehicle flows at port access points are inefficiently managed. In addition, the insufficient provision of designated parking areas for large trucks within the port forces vehicles to queue or park outside the port or along public roads, further intensifying congestion and elevating safety risks.	✓			● Regulate and improve traffic management in coordination with transport operators.	Port Authority of Thailand
	✓			● Establish lead agency responsible for managing entry and exit of land and maritime transport as well as enhance capacity and compliance among truck operators regarding the use of the Truck Queue system.	
	✓			● Designate dedicated waiting areas within the port to accommodate trucks, together with supporting facilities for drivers awaiting container loading and unloading operations.	
		✓		● Implement a fully integrated Truck Queue system and develop a mobile dashboard application	

Gap Identified	Bridging Gap Guidelines/Measures				
	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
The volume of containers transported by rail and coastal shipping connected to Laem Chabang Port remains below target.	✓			● Promote coastal transport services connecting river ports with Laem Chabang Port	Port Authority of Thailand/Marine Department
	✓	✓		● Increase quantity and quality of cargo handling personnel and terminal equipment operators	Department of Skill Development/Thailand Professional Qualification Institute (Public Organization) and related vocational education institutions.
		✓		● Increase frequency of rail services on route between ICD Lat Krabang and Laem Chabang port as well as routes linking Laem Chabang Port and Northeast and Southern regions	State Railway of Thailand
		✓		● Improve service efficiency of SRTO	Port Authority of Thailand
		✓		● Expand service capacity of X-Ray Machine to support growing rail freight container demand	The Customs Department
	✓			● Enhance public outreach to raise awareness and encourage pilot usage of rail freight container services	Department of Rail Transport/State Railway of Thailand

Gap Identified	Bridging Gap Guidelines/Measures				
	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Existing regulations do not support cargo transshipment; especially many ministries are requiring a license of transshipped cargo as being treated as imported cargo. This makes the process complicated and time-consuming, which prevents an overall increase in transshipped cargo volume.		✓	✓	● Amend laws and regulations creating obstacles to cargo transshipment, including, the Customs Act B.E. 2560 the Export and Import of Goods Act B.E. 2552 the Plant Quarantine Act B.E. 2507 the Plant Variety Act B.E. 2518 the Animal Diseases and Toxins Act B.E. 2558 and various related announcements	National Logistics Committee/ The Customs Department/ Ministry of Commerce/Ministry of Public Health/ Ministry of Industry/ Ministry of Agriculture and Cooperatives

4.1.2 Motorway No.7 (M7)

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
The number of toll booths for trucks is insufficient to meet service demand, causing bottlenecks at major toll plazas (e.g., Lat Krabang, Nong Kham). This results in traffic congestion at toll gates and affects delivery punctuality.		✓		● Increase the number of toll booths for trucks.	Department of Highway

4.1.3 Bangkok Port

Bridging Gap Guidelines/Measures					
Gap Identified	**Short-term (1–2 yrs)**	**Medium-term (3–5 yrs)**	**Long-term (6–10 yrs)**	**Proposed Measures**	**Lead Agency**
Uncertainty in the policy direction for Bangkok Port undermines user confidence and long-term port utilization, particularly due to the lack of clarity regarding service capacity and future development plans.		✓		● Formulate master plan for Bangkok Port and support coastal shipping operations to enhance connectivity between river ports and Laem Chabang Port	Ministry of Transport/ Port Authority of Thailand
Low user satisfaction is driven by multiple operational issues, including delays in receiving/delivering containers, shallow navigation channels affecting vessel movement, and traffic congestion around the port.		✓		● Enhance dredging operations in the navigation channel adjacent to the berths	Port Authority of Thailand

4.1.4 Free Zone – Suvarnabhumi Airport

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Air cargo warehouses operated by airline handling agents face congestion in storage space, workflow processes, and inspection procedures. Cargo remains in storage longer than necessary, reducing warehouse capacity and affecting the efficiency of sorting, locating, and cargo movement operations.	✓			● Expedite the management and clearance of abandoned cargo in air cargo terminals.	The Customs Department
	✓			● Conduct a feasibility study on the establishment of a dedicated warehouse for abandoned cargo and goods.	Airports of Thailand (AOT)
Management of the Free Zone lacks a central coordinating authority to integrate operations among warehouse operators, airlines, government agencies, and logistics service providers, resulting in delayed systemic problem resolution.	✓			● Improve Free Zone governance and CIQ service capacity	The Customs Department/Airports of Thailand (AOT)/ Food and Drug Administration/ Department of Agriculture/ Department of Livestock Development/ Department of Fisheries
		✓		● Expand operational space for government officers conducting inspections	Airports of Thailand (AOT)

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Existing regulations treat transshipped cargo as imported goods, requiring import licenses from multiple agencies (including the Ministry of Commerce, Ministry of Public Health, Ministry of Industry, and Ministry of Agriculture and Cooperatives), resulting in complex, time-consuming procedures that restrict transshipment volumes.		✓	✓	● Amend laws and regulations that hinder cargo transshipment, including the Customs Act B.E. 2560 the Export and Import of Goods Act B.E. 2552 the Plant Quarantine Act B.E. 2507 the Plant Variety Act B.E. 2518 the Animal Diseases and Toxins Act B.E. 2558 and various related announcements.	National Logistics Committee/The Customs Department/ Ministry of Commerce/ Ministry of Public Health/ Ministry of Industry/ Ministry of Agriculture and Cooperatives

4.1.5 Inland Container Depot (ICD) Lat Krabang

Bridging Gap Guidelines/Measures					
Gap Identified	**Short-term (1–2 yrs)**	**Medium-term (3–5 yrs)**	**Long-term (6–10 yrs)**	**Proposed Measures**	**Lead Agency**
Significant concessionaire uncertainty exists because the State Railway of Thailand (SRT) has not secured a new private concessionaire since the previous concession expired in 2011. As a result, the management model and investment framework remain unclear, impacting service continuity and user confidence.	✓			● Accelerate the process of awarding new private operator investing in PPP project.	Ministry of Transport/ State Railway of Thailand
Rail freight volume between ICD and Laem Chabang Port remains below target.	✓			● Establish joint KPIs between SRT and PAT, particularly for rail container volumes.	State Railway of Thailand/Port Authority of Thailand
		✓		● Amend Train Operation Regulations and Orders, B.E. 2549 (2006) of SRT.	State Railway of Thailand
		✓		● Promote investment in locomotives and rolling stock for ICD–SRTO services	State Railway of Thailand

4.1.6 Single Rail Transfer Operator (SRTO) Development Project

Bridging Gap Guidelines/Measures					
Gap Identified	**Short-term (1–2 yrs)**	**Medium-term (3–5 yrs)**	**Long-term (6–10 yrs)**	**Proposed Measures**	**Lead Agency**
Rail freight volume between ICD and Laem Chabang Port remains below target.	✓			● Establish joint KPIs between SRT and PAT, particularly for rail container volumes.	State Railway of Thailand/Port Authority of Thailand
		✓		● Amend Train Operation Regulations and Orders, B.E. 2549 (2006) of SRT.	State Railway of Thailand
	✓			● Promote investment in locomotives and rolling stock for ICD–SRTO services	State Railway of Thailand
Rail-based container handling services are constrained by insufficient numbers and limited operational readiness of Rail-Mounted Gantry (RMG) cranes. Aging equipment, together with delays in procurement and maintenance, prevents full-capacity utilization, resulting in handling bottlenecks, lower container turnover efficiency, and reduced user confidence.	✓			● Improve procurement and maintenance procedures by: (1) Expediting procurement and critical handling equipment in accordance with the approved implementation schedule, or (2) Leasing equipment ensuring full operational availability throughout the lease period, thereby minimizing service disruptions and procurement-related maintenance delays.	Port Authority of Thailand

4.1.7 Double-Track Railway: ICD – Laem Chabang Port

Bridging Gap Guidelines/Measures					
Gap Identified	**Short-term (1–2 yrs)**	**Medium-term (3–5 yrs)**	**Long-term (6–10 yrs)**	**Proposed Measures**	**Lead Agency**
Rail freight volume between the double-track railway (ICD–Laem Chabang) and the port remains below target.	✓			● Establish joint KPIs between SRT and PAT, particularly for rail container volumes.	State Railway of Thailand/Port Authority of Thailand
		✓		● Amend Train Operation Regulations and Orders, B.E. 2549 (2006) of SRT	State Railway of Thailand
Significant shortages of essential operational resources, including locomotives and rolling stock that must be shared with other train services, limit full operational capacity.	✓			● Promote investment in locomotives and rolling stock for ICD–SRTO services	State Railway of Thailand
A shortage of train drivers constrains freight service scheduling in response to actual transport demand, thereby weakening operator confidence and hindering the shift of freight transport from road to rail.	✓	✓		● Enhance human resource capacity for sustainable rail freight operations	State Railway of Thailand

4.2 Gap Analysis and Logistics Facility Development Guidelines

4.2.1 Si Chang Midstream Facility

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
The mismatch between waste management capacity and waste generation has caused persistent environmental pressure on coastal communities and marine ecosystems, particularly around Si Chang Island.. The island serves both as a waste-receiving area and as a community exposed to pollution from cargo vessels.		✓		● Allocate additional budget for Si Chang Island Subdistrict Municipality	Si Chang Municipality
			✓	● Consider accession to IMO MARPOL Annex V to prevent pollution from ship-generated waste	Marine Department/ Pollution Control Department

4.2.2 Ayutthaya River Cargo Transfer Point

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Navigation on the Pa Sak River continues to face major physical and environmental constraints. During the dry season, insufficient water depth makes safe navigation impossible, preventing year-round operations. This undermines the reliability of the waterway and forces operators to rely primarily on road transport, contrary to the national goal of promoting water transport to reduce logistics costs and environmental impacts.	✓			● Improve vessel berthing and mooring regulations to enhance operational efficiency	Marine Department
		✓		● Expedite riverbank protection construction and dredging to ensure year-round navigability	Marine Department
	✓			● Control and manage water level to ensure the navigability throughout the year	Royal Irrigation Department

4.2.3 Nong Khai Customs House, Nong Khai Province

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Significant bottlenecks persist in the customs clearance process, particularly for cargo requiring stringent scanning and inspection prior to transfer to the Lao PDR–China Railway. Existing X-ray inspection equipment is limited in both quantity and processing capacity, making it unable to accommodate the growing volume of containers in a timely manner. As a result, clearance procedures are prolonged, queues accumulate, and delays occur, adversely affecting the timeliness and reliability of cross-border multimodal transport operations.	✓			● Consider the construction of X-Ray inspection tunnel or the acquisition of inspection device with appropriate capacity to conduct fast inspection along with developing Natha Transshipment yard	The Customs Department/State Railway of Thailand

4.2.4 Mukdahan Customs House, Mukdahan Province

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
The inability to implement Single Stop Inspection (SSI) within the Common Control Area (CCA) prevents the reduction of customs clearance and inspection time for cross-border cargo and trucks between Thailand and Lao PDR. This also hinders effective alignment with the GMS Cross-Border Transport Agreement (CBTA).	✓	✓		● Expedite and determine the One-Stop Service (SSI) process in the Common Control Area (CCA) at Mukdahan border crossing. This should particularly include the appropriate designation of areas for joint inspection of goods by Thai and Lao PDR officials, without disrupting national security. Address discrepancies in legal provisions on controlled and permitted import/export goods between the two countries to determine accountability in case of operational issues. Consider the feasibility of designating other potential land border crossings in Thailand as CCA to ensure the efficient use of investment in infrastructure and facilities at customs checkpoints.	The Customs Department/ Ministry of Transport

4.2.5 Sadao Customs House, Songkhla Province

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
The new Sadao Customs House was developed without integrated cross-border design coordination with Malaysia's Bukit Kayu Hitam checkpoint. Misalignment in layout planning and entry–exit traffic direction has resulted in incompatible gate positioning and traffic circulation patterns, undermining the efficiency of cross-border movements.	✓	✓		● Enhance operational integration between Thai and Malaysian customs authorities to jointly design and align cross-border entry and exit lanes prior to infrastructure investment. Concurrently, pursue cooperation with neighboring countries to establish additional cross-border access points linked to the Sadao Customs House to ease congestion at existing border crossings and improve trade facilitation.	Ministry of Foreign Affairs/ The Customs Department

4.2.6 Mae Sot Customs House, Tak Province

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Construction delays at the new Mae Sot Customs House prevent the relocation or redistribution of operational workloads from the existing checkpoint.	✓	✓		• Expedite the construction and the opening of new Mae Sot Customs House.	The Customs Department
Cross-border trade regulations remain restrictive, and do not adequately facilitate the smooth flow of international goods. Existing transit trade procedures involve overlapping requirements and lengthy processing times, resulting in certain goods being held at border checkpoints for extended periods. This, in turn, increases the burden on government agencies in managing, safeguarding, and storing abandoned or detained goods.		✓		• Improve the capacity for managing abandoned and seized cargo collected by customs officials.	The Customs Department
		✓	✓	• Amend related laws and regulations that impede the transit of goods, namely the Customs Act B.E. 2560 the Export and Import of Goods Act B.E. 2552 the Plant Quarantine Act B.E. 2507 the Plant Variety Act B.E. 2518 the Animal Diseases and Toxins Act B.E. 2558 and associated notifications.	National Logistics Committee/The Customs Department/Ministry of Commerce/Ministry of Public Health/Ministry of Industry /Ministry of Agriculture and Cooperatives

4.2.7 Nakhon Phanom Customs House, Nakhon Phanom Province

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Insufficient X-ray machines relative to daily container inspection volume results in long queues, extended clearance time, and delays across the logistics and supply chain.	✓			● Procure additional X-ray machines or utilize X-Ray machines that are capable to perform fast scanning	The Customs Department

4.2.8 Chiang Khong Customs House, Chiang Rai Province

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
Insufficient X-ray machines relative to daily container inspection volume results in long queues, extended clearance time, and delays across the logistics and supply chain.	✓			● Procure additional X-ray machines or utilize X-Ray machines that are capable to perform fast scanning	The Customs Department

4.2.9 Chiang Khong Multimodal Transport Center Project

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
CIQ agencies (Customs, Plant Quarantine, Animal Quarantine) have not relocated to the new center due to existing investments in systems and infrastructure at the old checkpoint. Consequently, clearance and inspection services remain concentrated at the old site, while the newly developed logistics center—intended to distribute economic and logistics activities—faces the risk of becoming underutilized.	✓			● Integrate operations among relevant agencies, especially CIQ and the Department of Land Transport, to prevent underutilization of the logistics center and maximize investment value.	Department of Land Transport/Office of Transport and Traffic Policy and Planning/ The Customs Department/State Railway of Thailand/ Department of Livestock Development/Department of Agricultural Extension

4.2.10 Aranyaprathet Customs House, Sa Kaeo Province

Bridging Gap Guidelines/Measures					
Gap Identified	Short-term (1–2 yrs)	Medium-term (3–5 yrs)	Long-term (6–10 yrs)	Proposed Measures	Lead Agency
The newly constructed Aranyaprathet Customs House (Pa Rai) remains underutilized because Cambodia's policy directs freight traffic to the Nong Ian–Stueng Bot route rather than connect to Thailand's new facility. Consequently, cross-border traffic continues to concentrate at the Khlong Luek checkpoint (the old one) while the newly built Pa Rai border facility is not used to its full potential.		✓		● Conduct a study to determine appropriate service models aligned with cross-border trade, investment, and logistics.	The Customs Department/

4.3 Policy Recommendations for the Development of Logistics Infrastructure and Facilities in Thailand

Building on the proposed guidelines/measures to reduce the development gap in logistics infrastructure and facilities previously explained, combined with (1) the assessment of the current and emerging context based on PESTEL analysis (Part 1), and (2) findings from international best practices (Part 2), the study identifies key success factors for logistics infrastructure and facilities development. These factors were prioritized using the Analytic Hierarchy Process (AHP), based on expert scoring, to determine the relative importance of each factor. The results provide the basis for formulating policy recommendations to improve the effectiveness and performance of Thailand's logistics and supply chain systems.

Six success factors were identified in this assessment. The evaluation results indicate their relative importance in contributing to successful infrastructure development, as summarized in Table 6.

Table 6 The assessment identified six success factors, with their relative importance summarized

	Success Factors	Score	Ranking
T1	Infrastructure and Facility Design Supporting Logistics Operations	23%	2
T2	Regulatory Framework Supporting the Operation of Logistics Infrastructure	27%	1
T3	Enhancing Government Workforce Capacity	9%	5
T4	Domestic Inter-Agency Integration	19%	3
T5	Cross-Border Government Cooperation	13%	4
T6	Environmental and Stakeholder Management	9%	5

The analysis reveals that Thailand's most critical logistics development constraints arise not from deficiencies in physical infrastructure (hardware), but primarily from regulatory and institutional barriers (software) that limit the effective utilization of existing infrastructure. Accordingly, policy recommendations for future development are organized in accordance with the importance ranking derived from the AHP analysis, as follows:

4.3.1 Regulatory Framework Supporting the Operation of Logistics Infrastructure (Most Important Factor – 27%)

At present, regulatory and institutional rigidities constitute as the primary bottleneck in Thailand's logistics system. —for example, limitations that restrict the increase of transshipment and transit cargo. Major gateways such as Suvarnabhumi Free Zone and Laem Chabang Port cannot expand these cargo categories due to restrictive regulations imposed by several ministries, including the Ministry of Commerce, the Ministry of Public Health, the Ministry of Industry,

and the Ministry of Agriculture and Cooperatives. Accordingly, transshipment and transit cargo are treated as imports for regulatory purposes, which triggers licensing requirements despite the absence of domestic consumption. **The Customs Act B.E. 2560 (2017), Section 102**, which mandates that transit/transshipment cargo must complete their movements within **30 days**, a timeframe inconsistent with international standards and practices in global logistics hubs.

Policy Recommendations – Regulatory Reform

- **Integrate cross-agency regulatory amendments**: Since relevant regulations span multiple ministries (Commerce, Agriculture, Public Health, etc.), a central coordinating body (e.g., NESDC as secretariat of the national logistics committee) should oversee legislative harmonization and liaise with Parliament to amend obstructive laws.
- **Amend regulations within the authority of individual agencies**
  - Exempt transshipment and transit cargo not intended for domestic consumption from import and transit permit requirements, while aligning the regulatory framework with international best practices.
  - Amend outdated regulations such as the State Railway of Thailand's Operating Rules (2006) to increase flexibility in train formation, enabling operations without full wagon loads and higher service frequency.
- **Adopt international best practices** by benchmarking and adapting regulatory frameworks from leading global logistics hubs, such as Singapore, Hong Kong, and the European Union, in alignment with Thailand's obligations under relevant international agreements.

4.3.2 Infrastructure and Facility Design Supporting Logistics Operations (Second Most Important Factor – 23%)

Some infrastructure projects are inadequately designed or insufficiently adapted to actual operational requirements resulting in underutilization or reduced logistical efficiency.

Examples include:

1) Mismatched Design

Fully constructed infrastructure with limited or no actual operational use due to weak demand assessment, limited stakeholder consultation, and poor inter-agency coordination —for example:

- Ayutthaya Inland Water Freight Terminal (Sala Loi)
- Chiang Khong Multimodal Transport Center

2) Mismatched Capacity

Operational infrastructure inadequately designed for future demand to accommodate increasing cargo volumes, causing congestion and transport bottlenecks—for example:

- Laem Chabang Port (continues to experience severe traffic congestion due to insufficient internal traffic management and the absence of necessary investments in power supply and utility system design required for its transition into a Smart Port.)
- Motorway No.7 (M7) (lack of separate truck access linked to ICD Lat Krabang)
- SRT's inability to supply sufficient locomotives and rolling stock on high-density freight corridors
- Insufficient X-ray equipment at high-volume border checkpoints.

Policy Recommendations – Infrastructure Design & Development

- **Require comprehensive feasibility studies** including risk management, institutional responsibilities**,** business models, stakeholder requirements, and confirmation from relevant agencies (particularly CIQ, and neighboring countries) prior to project approval.
- **Ensure that projects are demand-driven,** not politically motivated.
- **Adopt phased or modular development** to expand capacity gradually based on actual demand.
- **Promote mixed-use logistics infrastructure,** such as integrated public logistics parks that co-locate customs, free zones, warehouses, and truck staging areas.

4.3.3 Domestic Inter-Agency Integration (Third Priority – 19%)

Many infrastructure projects require multiple government agencies to operate within the same location. However, silo-based working arrangements persist, reducing the efficiency of public investment.

Examples of limited inter-agency integration include:

- Chiang Khong Center: the Department of Land Transport was unable to achieve operational integration with CIQ agencies (e.g., Customs and Plant Quarantine) because CIQ agencies had already established operations at the existing border crossing.
- ICD–SRTO Rail Link: SRT and Port Authority of Thailand lacked shared performance targets, while limited rail X-ray inspection capacity installed by the Customs Department (36 trains/day) further contributes to a potential operational bottleneck.

Policy Recommendations – Domestic Integration

- **Require formal inter-agency commitments as a prerequisite for project approval.** Project-owning agencies, during the feasibility study and budget approval process, must obtain formal agreements or letters of commitment from all stakeholders, particularly confirmed cooperation from central and local government agencies.
- **Establish joint working committees** with shared KPIs, clear workflows, and transparent ownership of problem-solving responsibilities.

4.3.4 Cross-Border Government Cooperation (Fourth Priority – 13%)

Border-area infrastructure investments are frequently developed without operational alignment with counterpart facilities and procedures in neighboring countries, which in turn reduces investment efficiency and impact.

Examples:

- Sadao: New Thai border facility misaligned with Malaysia's Bukit Kayu Hitam crossing, yielding no improvement in traffic conditions.
- Aranyaprathet–Pa Rai: New Thai facility remains unused due to Cambodia's traffic diversion to Stung Bot.
- Chiang Khong: Lao PDR restricts Thai trucks, requiring transloading at Lao dry port.

Policy Recommendations – Cross-Border Integration

- **Require formal confirmation from neighboring countries** prior to budget approval for border-related projects.
- **Establish bilateral working groups** using existing platforms such as GMS, IMT-GT, and ASEAN transport committees to ensure mutually beneficial infrastructure and facilities development.

4.3.5 Enhancing Government Workforce Capacity (Fifth Priority – 9%)

Key workforce challenges include:

- **Shortages of quarantine officers** at major hubs (Suvarnabhumi Free Zone, key border points), particularly officers from the Ministry of Agriculture and Cooperatives and the Ministry of Public Health, result in clearance delays and increased time burdens for users.
- **Ineffective management of abandoned cargo**, especially e-commerce goods (e.g., cosmetics) in Suvarnabhumi warehouse. While the law mandates disposal by the Customs Department within the statutory 30-day custody period through auction, destruction, or donation, weak enforcement in practice has led to higher cost burdens and uncompensated storage space losses for private warehouse operators.
- **Inadequate security for abandoned goods at Bangkok Port and Mae Sot** due to staffing shortages that limit the ability to safeguard such goods, leading to cargo loss or damage.

Policy Recommendations – Human Resource Development

- **Increase the number of frontline officers,** especially quarantine and inspection personnel.
- **Expedite the removal of abandoned goods** from bonded warehouses, particularly at Suvarnabhumi, following the expiry of the statutory customs custody period (30 days), through coordinated inventory, inspection, and disposal by Customs and warehouse operators.

- **Assess the feasibility of establishing a dedicated abandoned cargo warehouse** at Suvarnabhumi Airport for goods exceeding the statutory 30-day customs custody period to reduce storage pressure on private operators and improve utilization of main warehouse space.

4.3.6 Environmental and Stakeholder Management (Fifth Priority – 9%)

Some infrastructure developments have created environmental impacts while providing limited economic benefits to local communities.

Examples of environmental issues include:

- Marine pollution around Si Chang anchorage
- Air pollution around ICD Lat Krabang

Examples of limited local economic spillovers from infrastructure investments, particularly in employment and local procurement, include:

- The Chiang Khong multimodal transport center
- Intercity motorways
- Double-track railway systems.

Policy Recommendations – Environment & Community

- **Foster local-level institutional integration** among provincial administrations, local governments, and communities to ensure effective policy implementation.
- **Increase budget allocations and waste management capacity**, especially for Si Chang Sub-district Municipality, affected by waste from cargo vessels.
- **Consider accession to relevant international conventions**, including Thailand's potential accession to MARPOL Annex V under the International Maritime Organization (IMO) to strengthen marine pollution control.

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