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Thailand's Logistics Report 2023

Logistics Development Strategy Division

Office of the National Economic and Social Development Council (NESDC)

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Executive Summary

Thailand's Logistics Costs

Thailand's Logistics Costs

In 2023, Thailand's logistics costs are estimated to amount to 2,527.4 billion baht, accounting for 14.1% of GDP. This represents a 3.7% increase from the previous year. The rise in costs is primarily associated with inventory holding, which has expanded due to an increase in inventory volume and rising interest rates.

Value Added of Logistics Businesses

In 2023, the value added of logistics service businesses is estimated to reach 555.2 billion baht, representing a 5.7% increase from 2022. This growth is attributed to the flourishing domestic economic activities. Furthermore, Thai logistics service providers are increasingly integrating technology and innovation into the industry.

Logistics Cost-to-GDP Estimates for 2024

In 2024, the logistics cost-to-GDP ratio is expected to decrease, with an estimated range of 13.4–13.8% of GDP. This decrease is attributed to economic growth, increased global trade volumes, and falling oil prices. However, it is crucial to assess the potential risks arising from geopolitical tensions, particularly the polarization of major power countries, which could lead to trade barriers and disrupt global supply chains. Furthermore, it is imperative to closely monitor changes in monetary policy in major economies, the slowdown of the Chinese economy, and domestic economic and political factors.

US Logistics Costs & Global Ranking

US Logistics Costs

In 2023, the US logistics costs are approximately 2,374.1 billion USD, representing an 11.2% decrease from 2022, or equivalent to 8.7% of GDP. This decline is attributed to the slowing economic conditions, which have reduced consumer demand and the volume of goods transported.

World Competitiveness Ranking from IMD 2024

In 2024, the World Competitiveness Ranking by the International Institute for Management Development (IMD) reveals that Singapore ranks first among 64 countries. Thailand ranks 25th, marking a 5-spot improvement from 2023 and securing 2nd place in ASEAN. This improvement reflects advancements in economic performance and business efficiency, driven by the recovery of the tourism sector and exports.

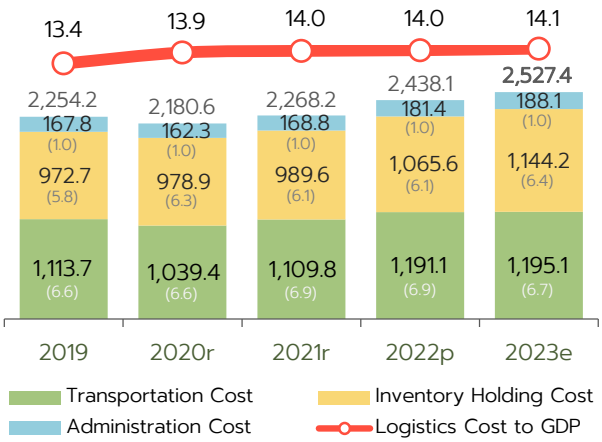
Agility Emerging Markets Logistics Index : AEMLI

The 2024 AEMLI reveals that Thailand ranks 10th out of 50 emerging markets. China maintains the top position due to its technological and digital readiness, along with the growth of e-commerce. Additionally, Malaysia, Indonesia, Vietnam, and Thailand are among the top ten emerging markets, showing promising growth supported by ongoing expansion in domestic consumption and investment.

1 Thailand's Logistics Costs

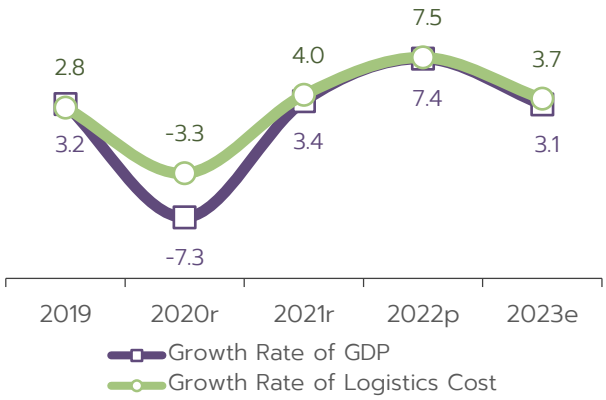
1. Logistics Cost Overview

Figure 1 Thailand's Logistics Cost (Billion Baht)



Source: Logistics Development Strategy Division, NESDC

Figure 2 Trends of Logistics Cost and GDP at Current Prices (%)

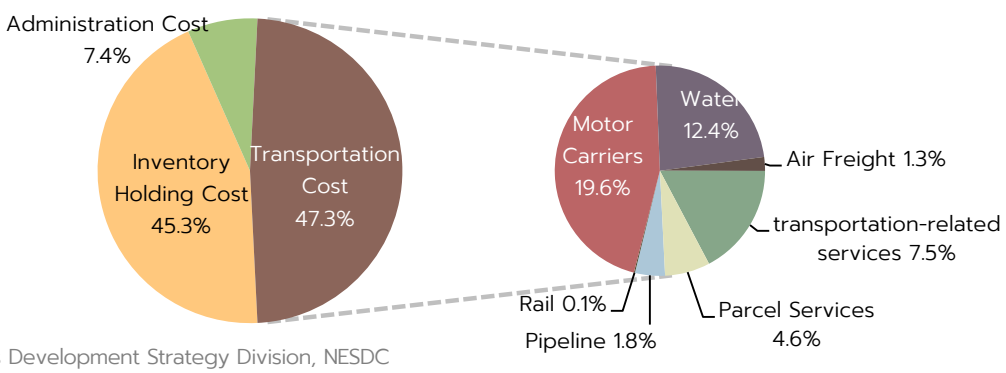


Source: Logistics Development Strategy Division, NESDC

Remark: r (revised) refers to revised data. / p (preliminary) refers to preliminary data / .e (estimated) refers to estimated data.

In 2023, Thailand's logistics costs are estimated to be 2,527.4 billion baht, representing an increase of 3.7% from 2022, **or equivalent to 14.1% of GDP**. The total cost includes 1,195.1 billion baht of transportation costs (6.7% of GDP), 1,144.2 billion baht of inventory holding costs (6.4% of GDP), and 188.1 billion baht of administration costs (1.0% of GDP). The increase in logistics costs is mainly due to higher inventory holding costs, resulting from increased inventory levels due to a decline in exports amid the slowing global economy, and rising interest rates leading to higher financial costs for businesses. Additionally, transportation costs have slightly increased due to the growth of last-mile delivery activities, while freight rates remain high.

Figure 3 Thailand's Logistics Cost Structure in 2023

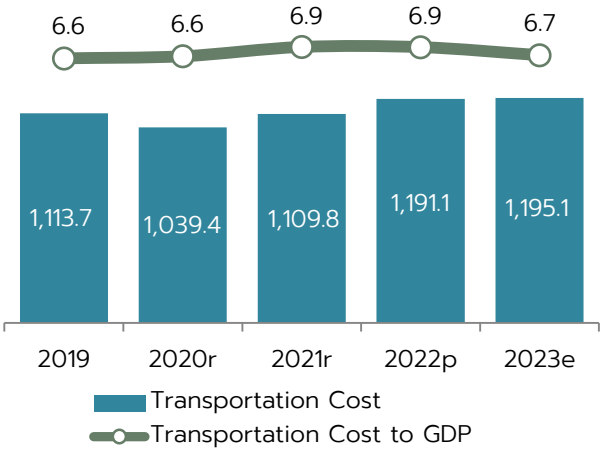


Source: Logistics Development Strategy Division, NESDC

2. Logistics Cost Components

2.1 Transportation Cost

Figure 4 Transportation Cost (Billion Baht)



Source: Logistics Development Strategy Division, NESDC

In 2023, transportation costs account for 6.7% of the GDP, amounting to 1,195.1 billion baht, a slight increase from 1,191.1 billion baht in 2022, representing a 0.3% rise. The increase in transportation costs is primarily due to the growth in parcel service costs, driven by the expansion of last-mile delivery activities in line with the ongoing growth of e-commerce. Additionally, other related transportation cost factors remain high. The details are as follows:

1) Freight Volume Overview

In 2023, the volume of domestic freight transportation fell to 547,082 thousand tons, down from 579,139 thousand tons in 2022, marking a decline of 5.54%. This decrease was observed across nearly all transportation modes. It aligns with a reduction in the value of international trade, which dropped to 9.81 trillion baht from 9.94 trillion baht in 2022—a decrease of 1.3%. Furthermore, industrial production has slowed, as indicated by the Manufacturing Production Index (MPI), which fell to 98.5 from 101.9 in 2022. However, international trade—both in terms of both volume and value of imports and exports—showed improvement from late 2023 through the first half of 2024 compared to the same period in the previous year.

Table 1 Domestic Freight Volumes (Thousand Tons)

Mode	2019	2020	2021	2022	2023
Road/1	483,168	469,639	456,489	460,316	428,426
Growth Rate (%)	*-2.80*	*-2.80*	*-2.80*	*0.84*	*-6.93*
Rail/2	10,262	11,510	11,456	11,367	12,117
Growth Rate (%)	*0.29*	*12.16*	*-0.47*	*-0.78*	*6.60*
Water/3	117,771	103,271	111,852	107,425	106,509
- Inland	55,999	49,248	46,405	38,994	32,916
- Coastal	61,772	54,023	65,447	68,431	73,593
Growth Rate (%)	*0.20*	*-12.31*	*8.31*	*-3.96*	*-0.85*
Air/4	78	32	20	31	30
Growth Rate (%)	*-19.97*	*-58.97*	*-37.50*	*55.00*	*-3.23*
Total	611,279	584,452	579,817	579,139	547,082
Growth Rate (%)	*-0.06*	*-4.39*	*-0.79*	*-0.12*	*-5.54*

Source: Information and Communication Technology Center, Ministry of transport

Remark: /1 Forecast Data from the Ministry of transport's Freight Volume Model
/2 State Railway of Thailand
/3 Marine Department
/4 Department of Airports, Thailand, Civil Aviation Authority of Thailand, and Airports of Thailand (PCL)

Considering the proportion of domestic freight transportation volume, road remains the primary mode, accounting for 78.31%, down from 79.48%. Water transportation follows with a share of 19.47%, up from 18.55%, while rail transportation accounts for 2.21%, an increase from 1.96%. Meanwhile, air transportation remains stable at 0.01%.

Figure 5 Domestic Freight transportation Modes Structure (%)

	Road	Water	Rail	Air
2022	79.48	18.55	1.96	0.01
2023	78.31	19.47	2.21	0.01

Source: Information and Communication Technology Center, Ministry of transportation

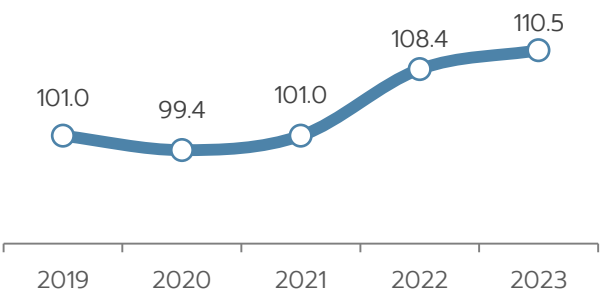
Road Freight transportation is trending downward, partly due to the contraction in international trade. In 2023, export value was 9,809.0 billion baht, down from 9,944.3 billion baht, a decrease of 1.4%. Meanwhile, import value was 10,111.9 billion baht, down from 10,647.0 billion baht, reflecting a 5.0% decline. This has resulted in a decrease in domestic freight transportation volume. Conversely, water transportation is trending upward, driven by domestic coastal freight, falling fuel prices and shipping rates. Rail transportation is also on the rise due to government efforts to improve the efficiency of rail transportation.

2) Factors Affecting Freight Prices

The Road Freight Transportation Index (RFTI) has been continuously increasing, particularly since the COVID-19 pandemic, due to rising costs for operators stemming from fuel prices, labor wages, and inflation. In 2023, the RFTI rose by 1.9%, with increases across all product categories, including agricultural and fishery products, mining products, and industrial products.

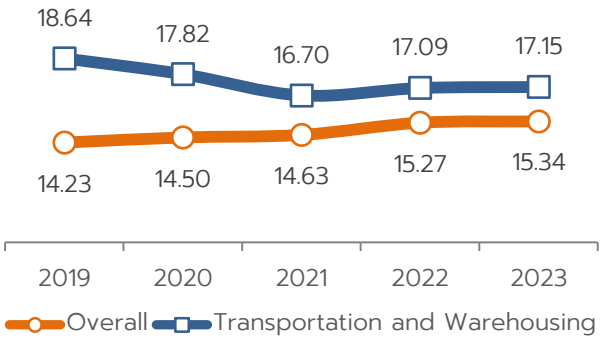
The average wage in the transportation and storage sector has increased. The labor wage rose from 17,089.36 baht per month in 2022 to 17,145.44 baht per month in 2023, representing a 0.3% increase. The labor wage in the transportation and storage sector exceeded the national average, reflecting the specialized skills required for roles such as truck drivers and crane operators.

Figure 6 Road Freight transportation Index (RFTI)



Source: Trade Policy and Strategy Office, Ministry of Commerce

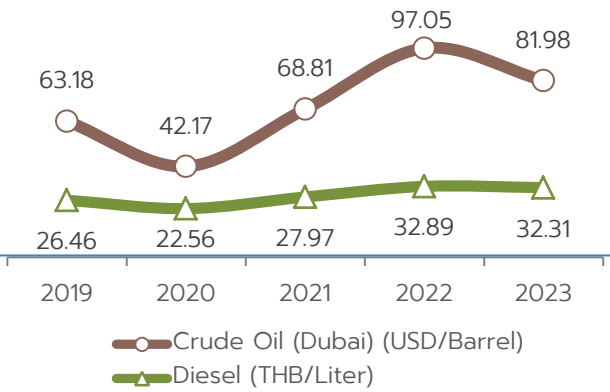
Figure 7 Average Wage (Thousand Baht/Month)



Source: National Statistical Office of Thailand

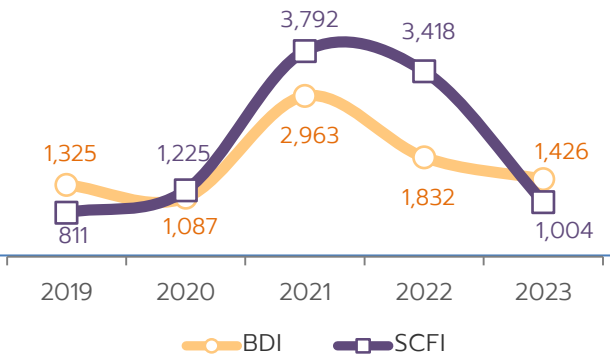
The average retail oil price in 2023 decreased slightly but remained high. The diesel price, which is a primary expense for road freight transportation, reduced marginally due to falling crude oil prices and government measures aimed at alleviating fuel costs. However, compared to the period before the COVID-19 pandemic, domestic fuel prices remain elevated. Meanwhile, the shipping freight index has decreased, with both the Shanghai Containerized Freight Index (SCFI) and the Baltic Dry Index (BDI) reflecting levels close to those of 2019.

Figure 8 Average Retail Fuel Price



Source: Bank of Thailand and World Bank

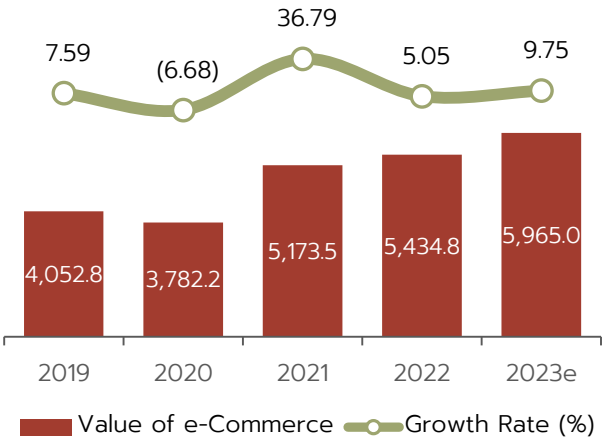
Figure 9 Freight Index



Source: www.tradingeconomics.com and
Shanghai Shipping Exchange (SSE)

Last-mile delivery has been continuously expanding in line with the growth of e-commerce. In 2023, the e-commerce value is estimated at 5,965.0 billion baht, up from 5,434.8 billion baht, representing a growth of 9.75%. This growth is driven by advancements in technology that have transformed business operations and consumer behavior following the COVID-19 pandemic, with more consumers opting for online shopping. As a result, last-mile delivery has become more agile, allowing for faster delivery of goods directly to consumers.

Figure 10 Value of e-commerce in Thailand
(Billion Baht)



Source: Electronic Transactions Development Agency (ETDA)

In Summary

Reducing transportation costs remains a challenge in increasing the share of freight transportation via rail and water, both of which offer lower unit costs and the capacity to handle large volumes. Currently, rail and water transportation account for a relatively low share compared to road transportation, primarily due to insufficient price incentives, duplicate handling costs, and concerns about service timeliness. Additionally, existing laws, regulations, and restrictions create additional barriers to enhancing freight transportation facilitation.

Despite its higher unit costs, road transportation remains vital due to its flexibility in accessing diverse areas and its effectiveness in meeting last-mile delivery requirements. Therefore, future strategies should prioritize leveraging the rail network while simultaneously improving the efficiency of road transportation. This approach can promote modal shifts and facilitate multimodal transportation, ultimately contributing to a reduction in overall transportation costs.

LOGISTICS INSIGHT 1: **EU Launched a Plan for Aviation to Achieve Net-Zero Carbon Emissions.**

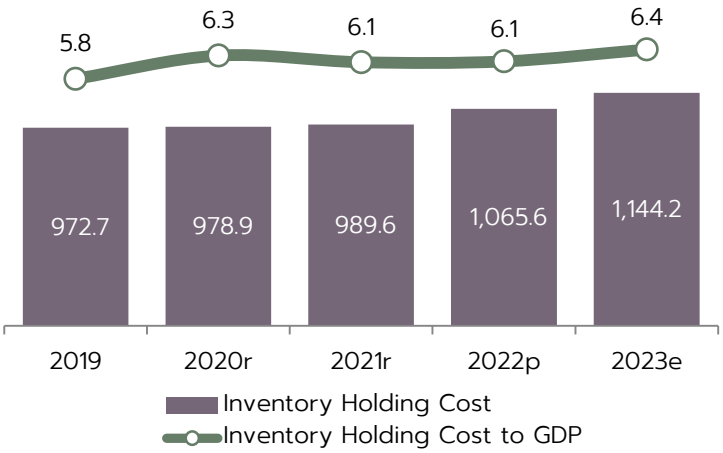
The European Union launched a sustainable aviation plan titled 'Destination 2050: A Route to Net Zero European Aviation,' which aims to achieve net-zero carbon dioxide emissions for both domestic and international flights by 2050.

The plan includes four key measures: (1) improving aircraft and engine technology, (2) utilizing sustainable aviation fuels, (3) implementing economic measures, and (4) enhancing air traffic management and aircraft utilization. In the initial phase, it is anticipated that flights within Europe will be able to reduce emissions by 55% by 2030. Additionally, the plan encourages stakeholders from various sectors to participate in the "EU Pact for Sustainable Aviation" to ensure long-term sustainability in air travel.

Source: Centre for SDG Research and Support: SDG Move

2.2 Inventory Holding Cost

Figure 11 Inventory Holding Cost (Billion Baht)

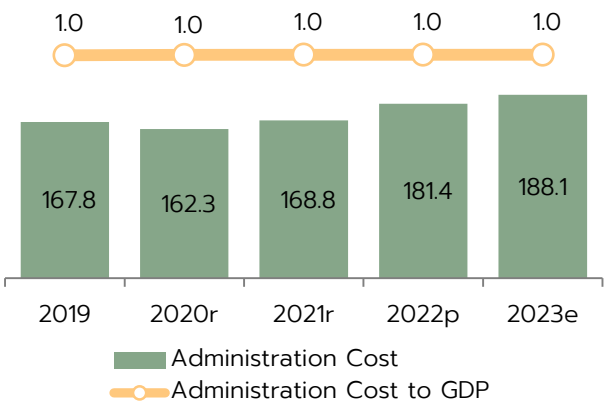


Source: Logistics Development Strategy Division, NESDC

In 2023, inventory holding costs account for 6.4% of GDP, amounting to 1,144.2 billion baht, an increase from 1,065.6 billion baht in 2022, or a 7.4% increase. The costs include: (1) inventory carrying costs amounting to 959.1 billion baht, up from 883.6 billion baht (an 8.5% increase), and (2) warehousing costs of 185.1 billion baht, up from 182.0 billion baht (a 1.7% increase). The inventory ratio index reaches 109.6, up from 102.7 in 2022, while the finished goods inventory index climbs to 104.2, up from 101.1 in 2022. These increases reflect rising inventory levels amid declining exports. Moreover, the Minimum Lending Rate (MLR) rises to an average of 6.83%, up from 5.50%, resulting in higher financial costs and debt burdens for operators, which further escalate inventory holding costs. Given the rapidly changing economic and trade context, logistics operators may find it challenging to adapt. Moving forward, strategies should focus on leveraging technology to modernize warehouses, enhance efficiency, and improve storage management capabilities, ultimately reducing inventory holding costs.

2.3 Logistics Administration Cost

Figure 12 Administration Cost (Billion Baht)



Source: Logistics Development Strategy Division, NESDC

In 2023, logistics administration costs account for 1.0% of GDP, amounting to 188.1 billion baht, an increase from 181.4 billion baht in 2022, or a 3.7% increase. (This calculation is based on assumptions from 2019 NESDC's study on 'The Improvement of Thailand's Logistics Cost Calculation Model.' The survey found that operators had an average logistics management cost of 8.04% of the total transportation cost and inventory holding cost)

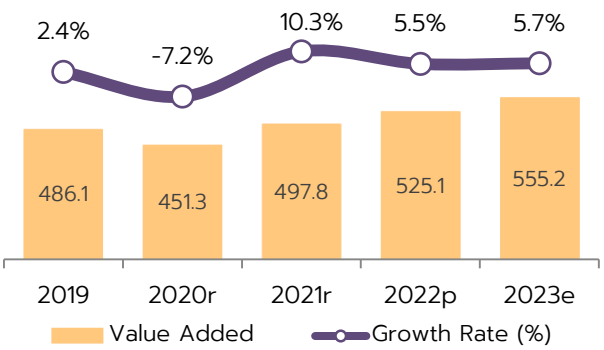
3. Value Added of Thailand's Logistics Businesses

The development of infrastructure and logistics facilities has led to a reduction in logistics costs to some extent. However, there may come a point where further reductions are not feasible. Therefore, it is essential to increase revenue alongside cost reduction by focusing on creating value-added activities related to logistics services that will benefit the overall economy.

Concept/Calculation

VA of Logistics Businesses = Gross Output – Intermediate Costs

Figure 13 Value Added of Logistics Businesses (Billion Baht)



Source: Logistics Development Strategy Division, NESDC

Value Added of Logistics Businesses defines as the economic profit of a business in logistics service industry gained from the exploitation of logistics-related activities incurred within the country

In 2023, the value added of logistics businesses is projected to grow significantly. The value added is 555.2 billion baht, increasing from 525.1 billion baht in 2022, which is equivalent to a 5.7% increase. This growth aligns with the continued expansion of the domestic economy, particularly driven by the growth of the e-commerce sector. Additionally, logistics service providers are increasingly applying technology and innovation in transportation and warehouse management. This trend is expected to contribute to the long-term economic value added of logistics businesses in Thailand.

LOGISTICS INSIGHT 2: Carbon Reduction in Transportation Sector

In an era where people prioritize environmental concerns and sustainability, the use of technology can not only enhance efficiency and reduce transportation costs but also lead to a decrease in environmental impacts. Currently, there are several interesting and noteworthy technologies, such as:

Transportation Management System (TMS): Used for route planning, which helps reduce carbon dioxide and greenhouse gas emissions .

Telematics: Used for real-time tracking of trucks, helping to reduce costs associated with unsafe driving behaviors while also contributing to environmental preservation.

Maintenance Management System (MMS): Used to monitor the condition of vehicles, ensuring that trucks operate at peak efficiency and helping to reduce carbon dioxide emissions into the environment.

Source: NOSTRAS LOGISTICS

4. Logistics Cost-to-GDP Estimates for 2024

Thailand's economy in 2024 is expected to improve slightly due to the growth in domestic consumption, private sector investment, and exports. Additionally, in the second half of the year, there will be supportive factors from increased demand driven by government budget expenditures. Likewise, the logistics cost-to-GDP in 2024 is expected to decrease, with an estimated range of 13.4–13.8% of GDP. This decrease is attributed to economic growth, increased global trade volumes, and the anticipated decline in oil prices. However, these logistics cost estimates are preliminary and must still consider the risks and challenges posed by geopolitical tensions, such as the polarization of major power countries, which could result in trade barriers and disrupt global supply chains. Furthermore, it is imperative to closely monitor changes in monetary policy in major economies, the slowdown of the Chinese economy, and domestic economic and political factors.

Table 2 Thailand's Logistics Cost-to-GDP Estimates

Detail	Actual Data				Projection for 2024
	2022	2023	Q1/2024	Q2/2024	
Thailand's Logistics Cost to GDP at Current Prices/1	14.0 (p)	14.1 (e)	-	-	**13.4-13.8**
GDP Growth (CVM) (%)/2	2.5	1.9	1.6	2.3	2.0-3.0
World Economic Growth (%)/2	3.5	2.8	-	-	2.9
World Trade Volume (%)/2	5.1	2.1	-	-	2.8
Dubai Crude Oil (USD/Barrel)/2	97.1	82.0	81.1	85.1	81.0-91.0
Shanghai Containerized Freight Index (SCFI) (%)/3	-9.9	-70.62	88.4	27.4	-
Manufacturing Production Index (MPI)/4	101.9	98.5	101.7	98.5	-
Shipment Index/4	102.5	99.6	99.1	98.4	-
Finished Goods Inventory Index/4	101.1	104.2	104.9	105.7	-
Road Freight transportation Index (RFTI)/5	108.4	110.5	110.1	112.6	-
Minimum Lending Rate (MLR) /6	5.33-5.67	6.70-6.96	7.05-7.28		-

Source: /1 Logistics Development Strategy Division, NESDC
/2 The Thai Economy in Q2/2024 and the Outlook for 2024 as of 19 August 2024, NESDC
/3 Shanghai Shipping Exchange (SSE)
/4 The Office of Industrial Economics, Ministry of Industry
/5 Trade Policy and Strategy Office, Ministry of Commerce
/6 Bank of Thailand

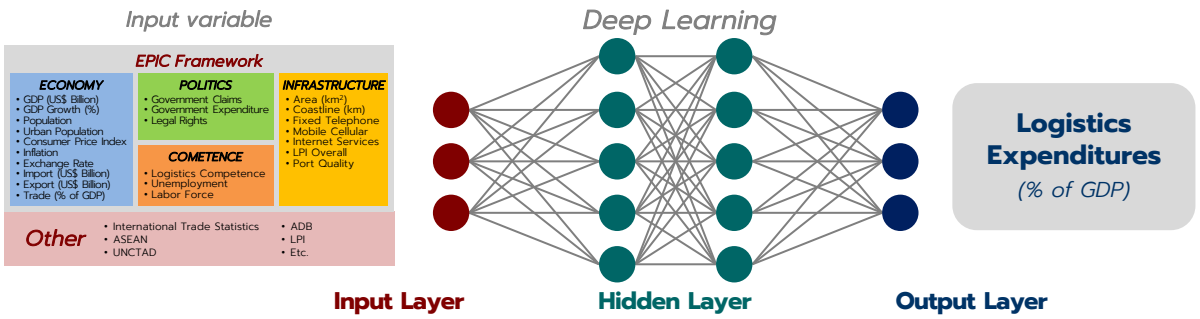
5. The Development of a Predictive Model for Logistics Cost Calculation

In 2023, NESDC partnered with Thammasat University Research and Consultancy Institute and Ample Consultant (Thailand) Co., Ltd. to conduct the project 'Development of a Predictive Model for Logistics Cost Calculation.' This initiative aimed to develop a predictive model that estimates future national logistics costs, providing valuable insights to inform policy planning and decision-making, thereby enhancing the country's logistics system.

Model Concept

The predictive model employs an Artificial Neural Network (ANN) to calculate and estimate logistics costs based on 21 input variables selected from the EPIC Supply Chain Risk Assessment framework and other databases, such as the Logistics Performance Index (LPI). These datasets were utilized to train and test the ANN model, enabling it to learn patterns and achieve accuracy levels that closely match historical data. The goal was to create a statistically predictive model capable of effectively forecasting logistics costs.

Figure 14 Concept of Developing a Predictive Model for Logistics Cost Calculation Using ANN Model

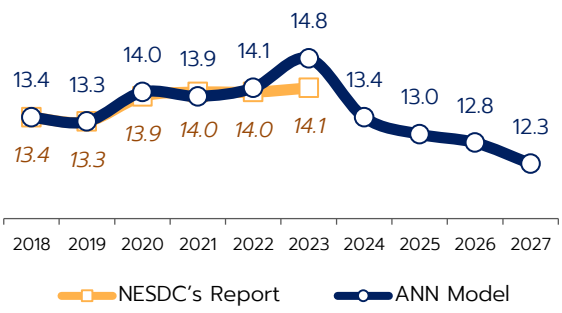


Source: Project for Developing a Predictive Model for Logistics Cost Calculation in Thailand, NESDC

Thailand's Logistics Cost Forecasting

The project utilized the developed ANN model to forecast logistics costs from 2025 to 2027, aligning with the Action Plan on Thailand Logistics Development (2023-2027). In the baseline scenario, where the 21 input variables in the model are expected to grow at normal rates, logistics costs as a percentage of GDP are projected to decline to 12.3% by 2027. To improve the model's precision in forecasting these costs, further refinements are currently being implemented.

Figure 15 Thailand's Logistics Cost-to-GDP Forecasting Using the ANN Model



Source: 'Development of a Predictive Model for Logistics Cost Calculation' project, NESDC

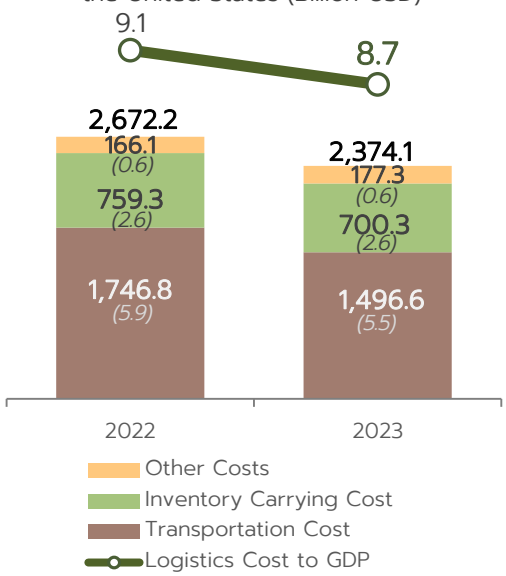
2 US Logistics Cost & Global Ranking

1. US Logistics Costs

The 2024 State of Logistics Report, published by the Council of Supply Chain Management Professionals (CSCMP) and Kearney, reveals that total US logistics costs in 2023 amount to 2,374.1 billion USD (a significant decline of 11.2% from 2022), which accounts for 8.7% of GDP. Key components include:

- **Transportation Costs,** the largest cost component, amount to approximately 1,496.5 billion USD, accounting for 5.5% of GDP.
- **Inventory Carrying Costs** are approximately 700.3 billion USD, accounting for 2.6% of GDP.
- **Other Costs,** including carriers' support activities and shippers' administrative costs, amount to approximately $177.3 billion USD, accounting for 0.6% of GDP.

Figure 16 Logistics Cost to GDP of the United States (Billion USD)



Source: CSCMP's 35th Annual State of Logistics Report 2024

US Logistics costs decreased as a result of the slowing economic conditions. This decline was partly attributed to geopolitical conflicts, which have led to reduced consumer demand and a decrease in cargo transportation, particularly in maritime shipping and intermodal transportation. Additionally, the slowdown in the manufacturing sector resulted in a reduction in inventory levels.

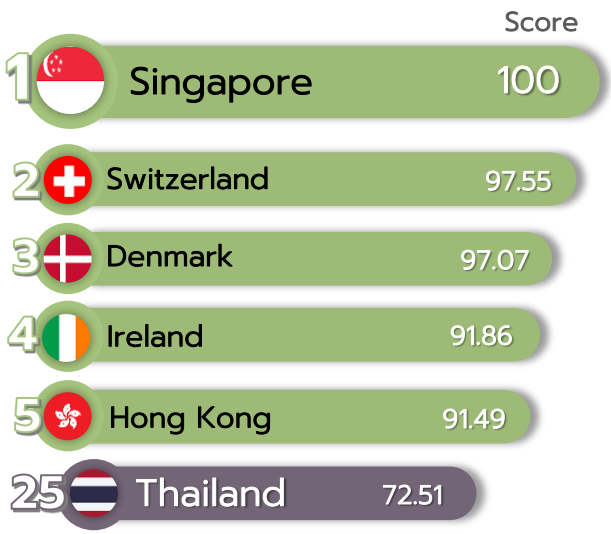
Table 3 Total Logistics Cost of US (Billion USD)

Logistics Costs	2022		2023		YoY (%)
	Value	(%)	Value	%	
Transportation Cost	**1,746.8**	**65.4**	**1,496.6**	**63.0**	**-14.3**
Motor Carriers	1,019.6	38.2	931.7	39.2	-8.6
Parcel	216.7	8.1	215.7	9.1	-0.5
Rail	98.3	3.7	96.6	4.1	-1.7
Air Freight	109.4	4.1	92.6	3.9	-15.4
Water	233.5	8.7	83.7	3.5	-64.2
Pipeline	69.3	2.6	76.3	3.2	10.1
Inventory Carrying Cost	**759.3**	**28.4**	**700.3**	**29.5**	**-7.8**
Other Costs	**166.1**	**6.2**	**177.3**	**7.5**	**6.7**
Total	**2,672.2**	**100.0**	**2,374.2**	**100.0**	**-11.2**

Source: CSCMP's 35th Annual State of Logistics Report 2024

2. World Competitiveness Ranking from IMD

Figure 17 World Competitiveness Ranking 2024



Source: IMD World Competitiveness Yearbook 2024

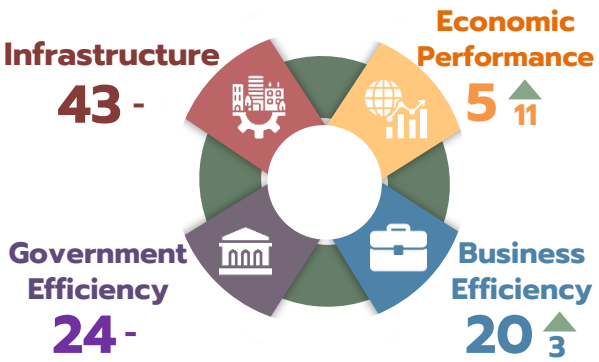
In 2024, the International Institute for Management Development (IMD) conducted a world competitiveness ranking, evaluating 67 countries across four dimensions:

(1) Economic Performance
(2) Government Efficiency
(3) Business Efficiency
(4) Infrastructure.

According to the report, the top five countries with the highest competitiveness rankings are Singapore, Switzerland, Denmark, Ireland, and Hong Kong, in that order.

The results of ASEAN competitiveness ranking show that Singapore is ranked 1st in the region and globally, followed by Thailand (25th), Indonesia (27th), and Malaysia (34th). Notably, Indonesia has improved its ranking by seven places, primarily due to recent economic growth and the rapid development of technological and innovative capabilities.

Figure 18 Thailand's Competitiveness Ranking 2024



Source: IMD World Competitiveness Yearbook 2024

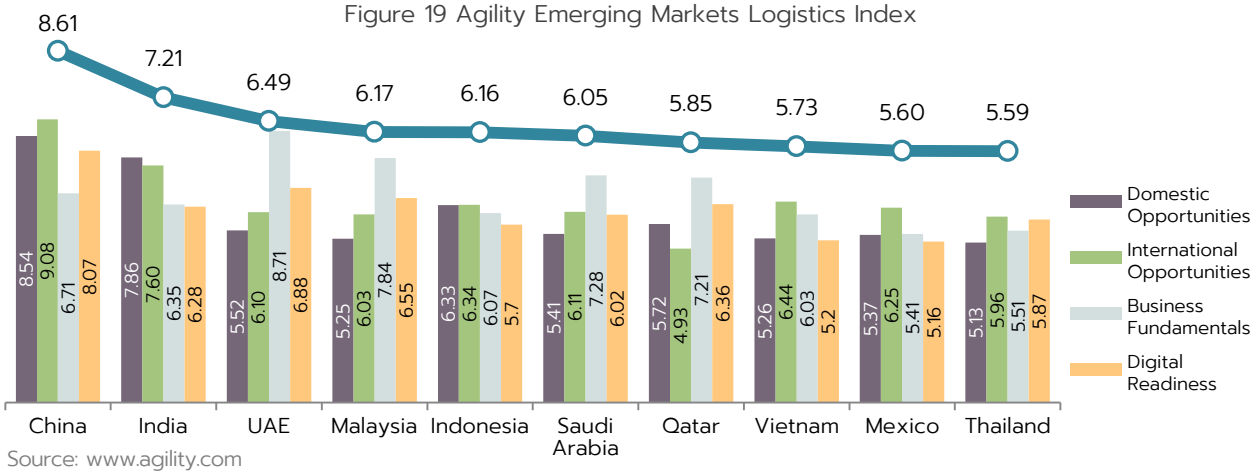
Thailand has improved its competitiveness ranking to 25th place, which is five positions higher than in 2023, marking the country's best ranking since the report was first published. The country has shown improvements in economic performance, now ranked 5th (up 11 positions), and business efficiency, now ranked 20th (up 3 positions), driven by growth in both the tourism and export sectors. However, the rankings for government efficiency and infrastructure remain unchanged at 24th and 43rd, respectively.

3. Agility Emerging Markets Logistics Index

The 2024 Agility Emerging Markets Logistics Index (AEMLI) shows that China retains its top position, consistent with its ranking in 2023. This is attributed to China's readiness in digital technology, along with the growth of e-commerce businesses, which gives China a competitive edge with lower shipping costs than its rivals. However, the survey indicates that 37.4% of logistics operators plan to reduce their investments in China and relocate their production bases to neighboring countries such as India, Europe, and North America to mitigate risks associated with trade conflicts with the United States and a slowing economy.

In Southeast Asia, Malaysia and Indonesia maintain their positions at 4th and 5th, respectively, while Vietnam has improved to 8th place, moving up two positions. Thailand has dropped to 10th place, falling two spots. All four countries are recognized as emerging markets, with economic growth driven by consumption and domestic investment. This trend reflects the increasing purchasing power within ASEAN countries, creating opportunities to attract investors to the region.

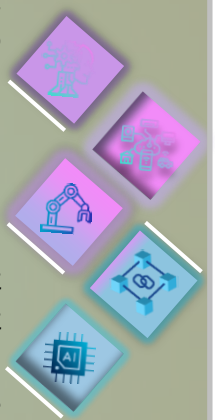
Figure 19 Agility Emerging Markets Logistics Index



Source: www.agility.com

LOGISTICS INSIGHT 3: TradeTech: A Stimulus to Digital Economy

TradeTech refers to a group of technologies and innovations that facilitate trade and transportation in the digital age. According to McKinsey & Company, if these technologies are utilized to manage documentation electronically, they can reduce errors and processing time, potentially saving the private sector up to $6.5 billion. However, the implementation of TradeTech still faces challenges, including funding for technology development, international trade regulations, and a shortage of skilled labor. Therefore, the government needs to enhance the infrastructure and trade ecosystem to support technology usage, while the private sector should embrace TradeTech and develop workforce skills to improve competitiveness and drive sustainable economic growth.



Source: Trade Policy and Strategy Office, Ministry of Commerce

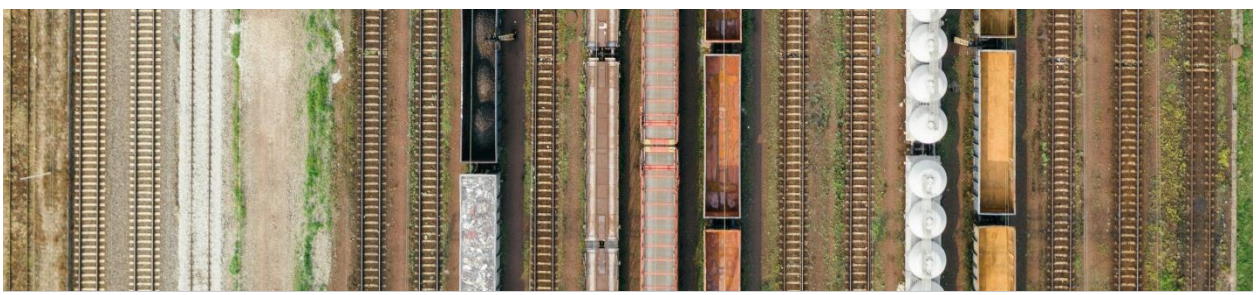
3 Recommendations & Way Forward

1 Enhance Logistics Management and Inventory Storage

In response to changing economic and trade dynamics, along with the rapid growth of e-commerce sector, businesses must prioritize warehouse management to meet customer demands for speed and accuracy. To facilitate this transition, support should be provided for moving from traditional warehouses to automated systems. Implementing modern technologies and software in inventory management is crucial for reducing costs and time associated with storage and sorting, while also minimizing errors in order preparation and delivery. Additionally, the government should offer financial assistance to alleviate the investment burden on businesses, enabling them to adopt these essential innovations more readily.

2 Enhance the Efficiency of Sustainable Goods Transportation

Rail freight transportation currently accounts for a small share of total freight volume compared to other modes, largely due to insufficient price incentives and concerns about service timeliness. To address this, there should be a concerted effort to position the rail network as the backbone of the country's freight transportation system. The government should actively encourage private sector participation in rail management, both as service providers and in establishing competitive service rates to boost the share of rail freight. Additionally, road networks should be promoted as supporting infrastructure (feeders) that connect agricultural areas, industrial zones, and transportation gateways, facilitating seamless mode shifts and multimodal logistics. Furthermore, the adoption of clean energy vehicles for last-mile delivery should be encouraged to achieve net-zero emissions and effectively reduce freight transportation costs.



3 Recommendations & Way Forward

3 Enhance Value-Added Activities & Supply Chain Management

Enhancing the efficiency of supply chain management—from sourcing raw materials to delivering products to consumers—is crucial for increasing economic value-added in logistics development. This can be achieved through the following approaches: ***(1) Upstream:*** Promote research and development in agriculture and industry to create product differentiation and added value. Establish a key entity to manage the supply chain, ensuring integrated operations aligned with development goals. ***(2) Midstream:*** Support the adoption of technology and innovation to enhance quality control and elevate product standards. Emphasize brand development to further enhance product value. ***(3) Downstream***: Encourage the formation of business partnerships to establish networks for efficient transportation and distribution to international markets.

4 Reduce Legal and Regulatory Constraints to Enhance LSP Capabilities

Logistics service providers (LSPs) still face legal and regulatory constraints that hinder their capabilities. To address these challenges, the government should prioritize creating a supportive environment for business operations by improving and amending laws and regulations related to goods transportation and logistics services. This includes revising rules governing cross-border transportation and transshipment activities, as well as enabling private sector participation in rail freight services. Additionally, raising awareness among operators about compliance with government regulations is crucial for establishing a standardized operational framework.

Appendix 1: Thailand's Logistics Cost and Logistics Cost to GDP from 2014-2023e

by Logistics Information Development Working Group

Unit: Billion Baht

Logistics Cost	2014	2015	2016	2017	2018	2019	2020r	2021r	2022p	2023e
Transportation Cost	**994.9**	**1,016.3**	**1,078.3**	**1,049.5**	**1,104.6**	**1,113.7**	**1,039.4**	**1,109.8**	**1,191.1**	**1,195.1**
Pipeline	49.6	43.6	51.9	62.4	68.2	61.1	53.2	60.2	49.6	46.1
Rail	1.8	1.8	2.1	2.1	2.1	2.0	1.9	1.8	1.9	2.1
Road	577.1	590.9	631.0	559.0	567.6	564.5	517.8	502.0	523.7	493.8
Water	205.0	220.4	224.3	233.2	243.0	238.6	233.6	272.6	304.5	313.5
Air	39.5	36.4	39.7	42.4	46.1	42.5	13.8	14.1	32.5	34.0
Transport-Related Services	97.9	99.8	103.9	113.7	126.0	147.3	152.6	169.9	190.0	188.7
Parcel Services	24.0	23.4	25.4	36.7	51.8	57.7	66.5	89.2	88.8	117.0
Inventory Holding Costs	**711.2**	**724.1**	**743.1**	**880.4**	**924.1**	**972.7**	**978.9**	**989.6**	**1,065.6**	**1,144.2**
Inventory Carrying Cost	696.8	709.2	730.1	689.0	732.3	779.4	783.1	822.6	883.7	959.1
Warehousing Cost	14.4	14.9	13.0	191.4	191.8	193.4	195.8	167.0	182.0	185.1
Logistics Administration Cost	**170.6**	**174.0**	**182.1**	**155.2**	**163.1**	**167.8**	**162.3**	**168.8**	**181.4**	**188.1**
Total Logistics Cost	**1,876.7**	**1,914.4**	**2,003.5**	**2,085.1**	**2,191.8**	**2,254.2**	**2,180.6**	**2,268.2**	**2,438.1**	**2,527.4**
มูล Gross Domestic Product (GDP)	**13,230.3**	**13,743.5**	**14,554.6**	**15,488.7**	**16,373.3**	**16,889.2**	**15,649.6**	**16,187.2**	**17,382.5**	**17,925.1**

Unit: Percent to GDP

Proportion of Logistics Costs to GDP	2557	2558	2559	2560	2561	2562	2563r	2564r	2565p	2566e
Transportation Cost to GDP	**7.5**	**7.4**	**7.4**	**6.7**	**6.8**	**6.6**	**6.6**	**6.9**	**6.9**	**6.7**
Inventory Holding Cost to GDP	**5.4**	**5.2**	**5.1**	**5.7**	**5.6**	**5.8**	**6.3**	**6.1**	**6.1**	**6.4**
Logistics Administration Cost to GDP	**1.3**	**1.3**	**1.3**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
Logistics Costs to GDP	**14.2**	**13.9**	**13.8**	**13.4**	**13.4**	**13.4**	**13.9**	**14.0**	**14.0**	**14.1**

Source: NESDC

Remark : r refers to revised data

p refers to preliminary data

e refers to estimated data.

Besides, 2017-2021 logistics costs are based on the revised cost assumptions from The Improvement of Thailand's Logistics Cost Calculation Model in fiscal year 2018.

Appendix 2: Transportation Cost to GDP by Components from 2014-2023e

by Logistics Information Development Working Group

Unit: Percent to GDP

Logistics Cost	2014	2015	2016	2017	2018	2019	2020r	2021r	2022p	2023e
Transportation Cost	**7.5**	**7.4**	**7.4**	**6.7**	**6.8**	**6.6**	**6.6**	**6.9**	**6.9**	**6.7**
Pipeline	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.3
Rail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Road	4.4	4.3	4.3	3.6	3.5	3.3	3.3	3.1	3.0	2.8
Water	1.5	1.6	1.5	1.5	1.5	1.4	1.5	1.7	1.8	1.7
Air	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.2	0.2
Transport-related Services	0.7	0.7	0.7	0.7	0.8	0.9	1.0	1.0	1.1	1.1
Parcel Services	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.6	0.5	0.6

Source: NESDC

Remark : r refers to revised data

p refers to preliminary data

e refers to estimated data.

Besides, 2017-2021 logistics costs are based on the revised cost assumptions from The Improvement of Thailand's Logistics Cost Calculation Model in fiscal year 2018.

Appendix 3: Trends of Logistics Costs Growth and GDP between 2014-2023e

by Logistics Information Development Working Group

Unit: Percent

Logistics Cost	2014	2015	2016	2017	2018	2019	2020r	2021r	2022p	2023e
Transportation Cost	**4.4**	**2.1**	**6.1**	**-2.7**	**5.3**	**0.8**	**-6.7**	**6.8**	**7.3**	**0.3**
Pipeline	39.3	-12.2	19.1	20.4	9.1	-10.4	-12.9	13.2	-17.6	-7.2
Rail	-14.3	3.0	13.3	0.7	-3.0	-4.1	-6.5	-1.5	2.4	14.3
Road	2.6	2.4	6.8	-11.4	1.5	-0.5	-8.3	-3.1	4.3	-5.7
Water	0.7	7.5	1.8	3.9	4.2	-1.8	-2.1	16.7	11.7	2.9
Air	-3.9	-7.9	9.1	6.8	8.7	-7.7	-67.7	2.8	130.1	4.4
Transport-related Services	12.4	1.9	4.1	9.4	10.8	16.9	3.6	11.3	11.8	-0.7
Parcel Services	11.1	-2.5	8.5	44.1	41.2	11.4	15.3	34.1	-0.4	31.7
Inventory Holding Costs	**-0.4**	**1.8**	**2.6**	**18.5**	**5.0**	**5.3**	**0.6**	**1.1**	**7.7**	**7.4**
Inventory Carrying Cost	0.1	1.8	2.9	-5.6	6.3	6.4	0.5	5.0	7.4	8.5
Warehousing Costs	-18.6	3.5	-12.8	1,371.2	0.2	0.8	1.2	-14.7	9.0	1.7
Logistics Administration Cost	**2.3**	**2.0**	**4.6**	**-14.8**	**5.1**	**2.8**	**-3.3**	**4.0**	**7.5**	**3.7**
Total Logistics Cost	**2.3**	**2.0**	**4.7**	**4.1**	**5.1**	**2.8**	**-3.3**	**4.0**	**7.5**	**3.7**
Gross Domestic Product (GDP)	**2.4**	**3.9**	**5.9**	**6.4**	**5.7**	**3.2**	**-7.3**	**3.4**	**7.4**	**3.1**

Source: NESDC

Remark : r refers to revised data

p refers to preliminary data

e refers to estimated data.

Besides, 2017-2021 logistics costs are based on the revised cost assumptions from The Improvement of Thailand's Logistics Cost Calculation Model in fiscal year 2018.

Appendix 4: Thailand's Economics Value Added from Logistics activities from 2014-2023e

by Logistics Development Strategy Division NESDC

Unit: Billion Baht

Economic Value Added	2014	2015	2016	2017	2018	2019	2020r	2021r	2022p	2023e
Pipeline	36.1	31.4	52.5	48.3	52.1	46.8	40.5	46.4	39.9	35.9
Rail	0.6	0.4	0.8	0.8	1.2	1.0	1.0	0.6	1.1	1.3
Road	119.0	135.9	139.4	146.6	149.0	152.9	142.7	144.8	151.0	158.0
Water	98.9	105.5	107.8	111.3	115.7	115.4	109.2	111.8	126.5	125.5
Air	28.7	30.2	35.9	39.9	43.0	39.8	15.5	14.9	23.6	27.8
Transport-related Services	55.6	56.6	59.2	64.8	74.9	84.4	86.7	102.9	104.9	104.6
Parcel Services	14.8	15.7	19.7	24.9	30.5	37.2	47.2	69.0	69.9	93.3
Warehousing	8.8	9.1	8.4	8.5	8.5	8.6	8.7	7.4	8.1	8.8
Total Economics Value Added	**362.5**	**384.8**	**423.7**	**445.1**	**474.9**	**486.1**	**451.3**	**497.8**	**525.1**	**555.2**
Gross Domestic Product (GDP)	**13,230.3**	**13,743.5**	**14,554.6**	**15,488.7**	**16,373.3**	**16,889.2**	**15,649.6**	**16,187.2**	**17,382.5**	**17,925.1**

Source: NESDC

Remark : r refers to revised data

p refers to preliminary data

e refers to estimated data.

Appendix 5: Trends of Economics Value Added from Logistics Activities between 2014-2023e
by Logistics Information Development Working Group

Unit: Percent

Economic Value Added	2014	2015	2016	2017	2018	2019	2020r	2021r	2022p	2023e
Pipeline	42.0	-13.0	67.2	-8.1	7.9	-10.2	-13.5	14.7	-14.1	-10.0
Rail	131.5	-30.5	97.2	9.7	51.1	-18.2	-2.7	-39.2	93.4	15.3
Road	0.8	14.2	2.6	0.7	1.6	2.6	-6.7	1.5	4.3	4.6
Water	1.4	6.7	2.2	3.2	4.0	-0.3	-5.4	2.4	13.1	-0.8
Air	-1.2	4.9	18.9	11.3	7.7	-7.4	-61.1	-3.6	58.4	17.6
Transport-related Services	12.2	1.8	4.6	9.4	15.6	12.8	2.7	18.7	1.9	-0.3
Parcel Services	8.5	6.2	25.2	26.7	22.3	22.0	26.8	46.2	1.4	33.4
Warehousing	-18.9	3.6	-7.6	1.0	0.3	0.4	1.3	-15.2	10.4	9.0
Total Economics Value Added	**5.3**	**6.1**	**10.1**	**3.5**	**6.7**	**2.4**	**-7.1**	**10.3**	**5.5**	**5.7**
Gross Domestic Product (GDP)	**2.4**	**3.9**	**5.9**	**6.4**	**5.7**	**3.2**	**-7.3**	**3.4**	**7.4**	**3.1**

Source: NESDC

Remark : r refers to revised data
p refers to preliminary data
e refers to estimated data.

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MORE INFORMATION

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