Cold Chain in Thailand

Emerging Markets Program Assessment

July 2022

World Food Logistics Organization
WFLO
The Refrigeration Research & Education Foundation

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Target Commodity: Perishable Commodities
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LIST OF ABBREVIATIONS

APHIS	Animal and Plant Health Inspection Service
ASEAN	Association of Southeast Asian Nations
ASRS	Automated Storage and Retrieval Systems
BICO	Bulk, Intermediate & Consumer Oriented goods
BITEC	Bangkok International Trade & Exhibition Centre
BOI	Board of Investment
CLM	Cambodia, Laos, and Myanmar
CPI	Consumer price index
EAEU	Eurasian Economic Union
EEC	Eastern Economic Corridor
EFTA	European Free Trade Association
EMP	Emerging Markets Program
ETDA	Electronic Transactions Development Agency
EU	European Union
FAS	Foreign Agricultural Service
FDA	Food and Drug Administration
FDI	Foreign direct investment
FTA	Free Trade Agreement
GCCA	Global Cold Chain Alliance
GDP	Gross Domestic Product
HACCP	Hazard analysis and critical control points
HCI	Human Capital Index
HRI	Hotel, restaurant, and institutional food service
IARW	International Association of Refrigerated Warehouses
ICD	Inland Container Depots
IIAR	International Institute of Ammonia Refrigeration
IMF	International Monetary Fund
KM	Kilometer
LED	Light-emitting diode
LTL	Less than Truckload
MFN	Most Favored Nation
MRL	Maximum residue level standards
(M)MT	(Million) Metric Tons
NESDC	National Economic and Social Development Council
3PL	Third Party Logistics
PPP	Purchasing Power Parity

QSR	Quick Service Restaurant
RCEP	Regional Comprehensive Economic Partnership
SE	Southeast (Asia)
SKU	Stock keeping unit
SME	Small Medium Enterprise
SWOT	Strengths, Weaknesses, Opportunities and Threats
TCL	Temperature-controlled logistics
TE	Trading Economics
TEU	Twenty-foot equivalent unit
TFFA	Thai Frozen Food Association
THB	Thai Baht
UK	United Kingdom
US	United States
USD	United States Dollar
USDA	United States Department of Agriculture
WEF	World Economic Forum
WFH	Work from home
WFLO	World Food Logistics Organization
WSCSA	Warehouse, Silo, and Cold Storage Association

EXECUTIVE SUMMARY

The World Food Logistics Organization (WFLO), the technical assistance, training and education arm of the Global Cold Chain Alliance (GCCA), was allocated a grant under the Foreign Agricultural Service's (FAS) Emerging Markets Program (EMP) Agreement #2019-15 to assess Thailand's cold chain infrastructure, to identify the characteristics, constraints, and gaps in the existing cold chain system that are unique to Thailand in Bangkok and surrounding areas.

The assessment took place in March/April 2022 with in-country travel from March 27 through April 1. The team studied the movement of imported fresh fruit, dairy products (e.g., cheese), and frozen meat and potato products inland from ports to importers, distributors, retailers and consumers and from points of domestic production. Key observations, conclusions, opportunities, and recommendations are summarized in the table below. The concrete recommendations are centered on resource development and training.

The cold chain in Thailand faces some challenges at most stages, but especially at the retail level after leaving distribution centers. From the sea and airports, temperature-controlled products are generally handled well. However, some issues remain including the lack of security or adequate management control to prevent pilferage. The first major break in the cold chain for imports tend to occur after arrival and storage at private or third-party logistic provider warehouses. While the newer storage facilities are modern and well designed, the more common smaller and older facilities face some infrastructure challenges and management and operations inefficiencies where best practices are not followed, either due to lack of knowledge or lack of concern about the impact on product quality and integrity. There are associations for cold chain and warehousing providers, however, it appears those organizations could be more influential in driving change and improvement in the industry. There is a lot of interest in learning and making improvements in the cold chain system according to key informants.

Observations	Conclusions & Opportunities	Recommendations
Food & Agricultural Market		
Roughly 50 percent of food is purchased by consumers from traditional open-air markets. Compared to most other Southeast Asian countries including Cambodia, Vietnam, Indonesia and the Philippines, a much higher percent of food is purchased from Thailand's modern retail markets. Thailand produces and exports shrimp, seafood, poultry, and processed food to other Asian markets as well as other markets around the world.	Middle to upper income consumers, tourists, expatriates, and food service sectors are demanding safer, premium, and imported processed food products. Countries importing Thailand produced seafood, shrimp, poultry and processed products demand that strict quality and food safety standards are followed.	Conduct training and education on the importance of adopting science and risk-based food safety policies, laws, and regulations. This would be well received by government and consumers alike and would facilitate improvement in the quality of perishable food products in both the traditional and modern retail sectors as well as facilitate exports of Thai produced seafood, poultry, and processed foods.
Most imported food enters the country via seaports. There are	Due to limited demand in CLM for high volumes of imported food,	Identify importers and distributors in Thailand, Vietnam, and Singapore that

three ports in the greater Bangkok area. Thailand serves as the initial port of entry for many imported products that are then trucked or sent by river, to the neighboring countries of Cambodia, Laos, and Myanmar (CLM).	most perishable products will continue to be transshipped through Thailand, Vietnam and Singapore in the near term, so it is important for US suppliers to identify and work with importers and distributors in those countries who service CLM via Less than Truckloads (LTLs) and small trucks.	service CLM and share their information more widely with buyers (distributors, retailers, and end-users) of perishable products in CLM. Encourage Thai buyers to explore how they can source containers of multiple products and/or share containers with other buyers.
US sourced products have a strong reputation for quality and safety; however, US prices are relatively high compared to locally produced products (e.g., poultry) or imports from countries with FTA's (Free Trade Agreements – including Australia, New Zealand and China) which have zero import duties compared to duties as high as 30 to 50 percent. Freight costs are higher from the US compared to China and Oceania and take longer to ship, leading to shorter shelf life.	The demand for high quality and safe food will continue to grow so there will be increased opportunities to supply a greater volume of temperature-controlled products.	Target and train modern retailers (convenience stores, supermarkets and hypermarkets), hotels, restaurants and their distributors and suppliers on proper handling, storage and transportation of meat, dairy, fresh fruit and frozen potato products.
Food Processing		
There is considerable food manufacturing in Thailand by both large multi-national companies and some very large Thai conglomerates, such as Charoen Pokphand which is both vertically and horizontally integrated in the food business.	There is potential for food processing to grow especially as the middle class and per capita incomes grow in the less developed neighboring countries of CLM. Standards and practices are already good since many processed products are exported and must meet international standards.	Conducting training for the food processing sector is not a high priority, especially when compared to the needs and opportunities for training at the retail level.
Transport		
There are several multimodal connections to the national highway, rail, and barge waterways systems and 710 reported reefer plugs in the reefer area of the port. There are no cold storages near the Laem Chabang port.	While the overall transportation systems and infrastructure at the major ports and primary distribution centers/hubs appear to be operating efficiently, opportunities exist to enhance efficiencies in handling of products from distribution centers to retailers and training of staff at retail stores, hotels and restaurants. There do remain some challenges with pilferage at both sea and airports.	Conduct targeted training on accountability and handling of perishable products, especially meat, dairy, fresh fruit and frozen potato products, should be developed and delivered. Adopting surveillance methods to secure and protect products from being taken from containers and pallets at the ports would be beneficial.
There is a shortage of refrigerated trucks and reefer transport companies. Driver and maintenance capacity are low.	Small (4- and 6-wheel trucks 2-5 MT) are most frequently used due to 24/7 access to the major metropolitan areas.	Conduct training in proper refrigerated transport as companies increase the number of reefer trucks existing in-country.

Large trucks (10-wheel – 20 MT) may only travel into the city of Bangkok during specific hours of the day due to imposed restrictions to limit road congestion.	Importers/distributors use both company-owned trucks, leased trucks, and third-party companies who specialize in refrigerated transportation.	Consider training for drivers to improve truck and reefer unit maintenance.
Cold Storage Design Build and Construction		
There are two major locations that concentrate cold storage capacity near Bangkok. The first are smaller and older facilities owned by local importers and distributors near the Talaad Thai Wholesale Market. Most run under freon (R22) and small chambers built inside dry warehouses. Another area of concentration is near the Bangkok International Airport (Suvarnabhumi) where 3PL providers have built several larger modern installations. Cold storage design tends to focus on basic box within a box. Few that have loading/unloading ramps adjustable to different truck bed heights.	Some design choices result in inefficiencies, including higher cost of energy and breaks in the cold chain at docking areas. There is a lack of understanding of the importance of designing and constructing loading and unloading anterooms with the ability to lower the temperature below outside ambient temperature.	Consult with local cold chain associations to promote the design and building of new or upgraded facilities that included temperature-controlled anterooms, adjustable ramps for loading and unloading trucks of various sizes, and alternative refrigerant and refrigeration systems, as well as consider consultations with cold storage design-build experts who can advise on new developments.
Cold Storage Warehouse Operations		
There is no cold storage capacity at the main container port in Thailand (Laem Chabang). The large 3PL providers (many from Japan) in Thailand have modern and sophisticated facilities and follow good warehouse practices. Many smaller facilities owned and operated by food importers, wholesalers, and distributors lack training and resources on best practices, or do not respect them.	Some frozen storage chambers had excessive ice build-up due to keeping doors open and/or other sub-optimal practices, including opened and/or non-refrigerated docking areas.	Conduct training for management and staff on best practices for cold storage operations, e.g., optimal temperature for ante (loading/unloading docking area) and keeping doors closed between frozen storage chambers and the hallway access areas to prevent condensation and ice build-up in frozen chambers and reduce energy usage and costs.
Retail/Last Mile		
Cold storage space at the retail level is typically small and does not have multiple compartments for storage of products at different temperatures.	Retail store managers and staff lack knowledge or understanding of best handling and storage practices for perishable products. Relatedly, there are few repercussions for retailers who do not respect necessary temperature-control. Instead, distributors are considered at fault and face consequences (fines or cost for pickup and destruction as well as lost profit).	Develop and implement commodity handling best practices training for retail managers and staff.

Modern retail convenience stores, supermarkets, and hypermarkets are abundant in Bangkok and consumers are demanding more quality and safe food. Half of consumers – and an even higher percentage outside the large cities and urban areas – still purchase much of their perishable food from traditional open-air markets.	Quality is generally good in the most modern, up-scale supermarkets but culturally, consumers like to handle products (including fresh fruits, vegetables, and poultry products) which some supermarkets display in large, uncovered bins that are exposed to ambient temperatures. Cold room storage at the retail level is minimal and often poorly managed.	Train retailers on product handling, food safety, and importance of proper sanitary and chilled display areas. Conduct training on maintaining refrigerated (for chilled and frozen products) display cases at the correct temperatures during the night and when stores are closed. Training should be provided frequently as retailers experience a high turnover rate.
Association Development		
There is a general lack of knowledge about existing cold chain and warehousing associations in Thailand.	Many companies are unaware of the national cold chain and warehousing association and/or what they can do to assist the industry in improving the Thai cold chain system or increasing profitability.	Engage with existing warehousing and cold chain associations in Thailand (e.g., Warehouse, Silo and Cold Association and the Thai Frozen Food Association). Thai associations are not as strong as those in the Philippines and Indonesia and may benefit from discussions with WFLO staff and members.
Government Regulations		
Government regulations limit when large trucks can travel in the larger metropolitan and urban areas.	Most delivery trucks are the smaller 4- and 6-wheel size, most under two metric ton capacity.	See “Transport” above, for recommendations regarding training. Consider working group session with the relevant associations on advocacy.
Government regulations prohibit building new cold storage facilities in the city of Bangkok, but existing facilities may be expanded.	There is probably a need for more cold storage warehousing in the Bangkok area as the demand for more temperature-controlled products is expected to grow with increasing incomes and opening of more modern retail stores. The greatest need is at or near major ports and in rural areas as packing and storage hubs for fresh produce.	Consult cold storage investors for their appetite to invest in Bangkok and include “Government Regulations” as a key discussion point at planned cold chain events and/or strategic roundtables.

INTRODUCTION

OBJECTIVES

The World Food Logistics Organization (WFLO), the technical assistance, training and education arm of the Global Cold Chain Alliance (GCCA), was allocated a grant under the Foreign Agricultural Service's (FAS) Emerging Markets Program (EMP) Agreement #2019-15 to conduct a cold chain assessment and follow-on technical assistance activities in Thailand. This baseline assessment examines the existing cold chain practices in Thailand, with specific focus on identifying gaps and constraints as temperature-controlled products arrive at ports and are then distributed for retail. This study focused on Bangkok and the surrounding area and targeted fresh fruit, meat, dairy products, and frozen potatoes as the key commodities. Upon approval of the assessment, WFLO will return to Thailand and the region for additional technical training and strategy workshops.

METHODOLOGY

The assessment was conducted in three phases:

- **Literature Review**. Led by the WFLO home office, this included research on all available public information for the food and agriculture industry focused on temperature-controlled food and the development of cold chain systems in Thailand.
- **In-country Assessment**. The team visited retailers, importers, distribution/logistics centers, wholesalers and wholesale markets, government officials, cold storage owners, logistics providers, shipping companies and cargo/freight services in and around Bangkok involved with temperature-control enterprises.
- **Analysis and Evaluation**. The team compared existing practices to international standards and market requirements for temperature-controlled food products to identify the specific needs for strengthening the cold chain in Thailand. The team utilized a Strategic Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis for this assessment.

ASSESSMENT TEAM & QUALIFICATIONS

The assessment team consisted of:

Madison Jaco is the Manager of International Projects at the Global Cold Chain Alliance (GCCA). Her previous international experience includes temperature-controlled logistics (TCL) projects in Egypt, Fiji, Bangladesh, the Dominican Republic, and Central and Southeast Asia, environmental research in Argentina, Benin, Croatia, and India, and non-profit coordination with local teams in Rwanda and Tanzania.

Manuel Cabrera-Kabana has worked for over 30 years in the perishable logistics sector and previously with the banking industry on project and export financing. Manuel is General Manager & Director of Friopuerto Investment, Cold Storage Division, Operations Partner and co-founder of Ifria Cold Chain Development Co and President of CK Associates Consulting, SL, a cold chain logistics consultancy specialized in perishables cold storage, port and airport TCL operations and strategic development for the cold chain industry. He holds various Board positions in national and international industry organizations and is currently Chairman of the International Association of Refrigerated Warehouses (IARW) within the Global Cold Chain Alliance (GCCA).

Kent Sisson is a retired USDA Foreign Agricultural Specialist with a background in the marketing of agricultural products. For 40 years, Mr. Sisson has participated in USDA programs designed to increase US exports of agricultural products, maintaining close contact with a variety of cooperator groups, including those supporting this assessment. He has conducted similar assessments in Pakistan, China, Indonesia, Philippines, Cambodia, Vietnam, and Angola and served as the Marketing Specialist.

The team was supported in-country by **Ms. Theeravee (TV) Ungkuvorakul** and **Ms. Apiradee (Tulip) Phanuroote** of **AT Success Marketing Co., Ltd.** with additional technical support and guidance from GCCA's Senior Director of International Projects, **Amanda Brondy**.

ASSESSMENT ROADMAP

The premise of this study is that a lack of sufficient cold chain capacity hinders the export of US temperature-controlled products. In other words, lack of sufficient cold chain is a barrier to the trade of US perishable products. For this reason, this report contains a food and agriculture market assessment and a cold chain assessment. The food/ag market assessment provides the specific information listed in the FAS Assessment Guidance including food and rural business systems, sources of competition, historical value and volume of trade data, and trade barriers. The cold chain trade barrier is assessed in its own section.

The market and cold chain assessments are followed by a Strategic SWOT Analysis, market opportunities, and recommendations.

GENERAL ECONOMIC OVERVIEW

SUMMARY

Historical Economic Development:[1] Over the last four decades, Thailand has made remarkable progress in social and economic development, moving from a low-income to an upper middle-income country in less than a generation. As such, Thailand has been a widely cited development success story, with sustained strong growth and impressive poverty reduction. Thailand's economy grew at an average annual rate of 7.5 percent in the boom years of 1960-1996 and 5 percent during 1999-2005 following the Asian Financial Crisis.[2] This growth created millions of jobs that helped pull millions of people out of poverty. Gains along multiple dimensions of welfare have been impressive: more children are getting more years of education, and virtually everyone is now covered by health insurance while other forms of social security have expanded.

However, the growth prospects from the export-led model that not long ago powered so much of Thailand's economic growth seem to have diminished significantly, owing to a stagnation in productivity. Private investment declined from more than 40 percent in 1997 to 16.9 percent of GDP in 2019, while foreign direct investment flows and participation in global value chains have shown signs of stagnation.[3] Structural transformation is unlikely to continue moving resources from agriculture to industry, as it once did. Manufacturing shows modest forward linkages but remains dependent on foreign inputs and faces increasing competition from regional neighbors. Travel and tourism, the country's mainstay in services, present relatively fewer linkages and diversification prospects when compared to other service subsectors.

Thailand's progress in poverty reduction has slowed from 2015 onwards, mirroring a slowing economy and stagnating farm, business, and wage incomes. Poverty is estimated to stagnate in 2021 amid slow labor market recovery and gradual phasing out of the government's relief measures. A rapid phone survey by the World Bank implemented from April to June 2021 estimated that more than 70 percent of households experienced a decline in their income since March 2020, with vulnerable groups being hit hardest.[4]

According to the Thailand Economic Monitor, the COVID-19 pandemic shock saw the Thai economy contract by 6.2 percent in 2020 due to a decline in external demand affecting trade and tourism, supply chain disruptions, and weakening domestic consumption. After suffering its worst contraction since the Asian financial crisis in 2020, the economy expanded by 1.6 percent in 2021 amid four waves of the pandemic and is not expected to recover to pre-COVID-19 levels until 2023. The COVID-19 pandemic also has created several additional challenges in the labor market.

[1] The World Bank. (2022*). The World Bank in Thailand*. World Bank Group
[2] Poggi et al. (2016). *Thailand – Systemic Country Diagnostic: Getting Back on Track – Reviving Growth and Securing Prosperity for All.* World Bank Group
[3] Frias et al. (2022). *Creating Markets in Thailand: Rebooting Productivity for Resilient Growth*. World Bank Group
[4] The World Bank. (2019). *Impact of COVID-19 on Thailand's Households*. World Bank Group.

The primary impact has been a spike in the unemployment rate. By the first quarter of 2021, there were 710,000 fewer jobs compared to the previous year.[5]

Current Economy:[6] Thailand, the second largest economy in ASEAN after Indonesia, is an upper middle-income country with an open economy, a gross domestic product (GDP) of US$503.5 billion, and a negative 6.1 percent annual growth in 2020.[7]

Thailand is the 25th largest export destination for the United States. Two-way trade of goods in 2020 was $48.8 billion, with $37.6 billion in Thai exports to the United States and $11.2 billion in US exports to Thailand. US exports to Thailand decreased by 16 percent, while US imports from Thailand increased by 12 percent in 2020.

An export-dependent economy, Thailand exported a total of $226.7 billion worth of goods in 2020. The United States was Thailand's top export market (15 percent), followed by China (13 percent) and Japan (10 percent). The top export items in terms of value are motor cars, parts and accessories (9 percent), electronic goods and computers (8 percent), precious stones and jewelry (8 percent), rubber products (5 percent), and plastics (3 percent).[8]

According to Thailand's National Economic and Social Development Council (NESDC), the Thai economy declined by 6.1 percent in 2020, compared with a growth of two percent in 2019. Exports of goods, private consumption expenditure, and total investments contracted by seven percent, one percent, and five percent, respectively. The headline inflation was at negative one percent and the current account registered a surplus of three percent of GDP.[7]

As of August 2021, the Thai economy was projected to grow by one to two percent in 2021 as the negative impact of a surge of COVID-19 in Thailand offset the positive effects of the recovery of the world economy and global trade volumes, and government stimulus measures.

To promote infrastructure development, in 2018, Thailand enacted the Eastern Economic Corridor (EEC) Act to support EEC development of integrated infrastructure and utilities to connect land, sea, and air through high-speed rail links, ports, and airports. The Thai government is promoting the EEC industrial development projects with support from Thailand's Board of Investment (BOI). The EEC scheme covers 30 existing and new industrial zones, with expected investment of $55 billion in three eastern provinces — Chachoengsao, Chon Buri, and Rayong. The EEC's targeted industries include next-generation cars, smart electronics, medical services, wellness tourism, agriculture and biotechnology, food, robotics, aviation, biofuels, defense, and digital technologies.[6]

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[5] The World Bank. (2022). *Thailand Economic Monitor: Living with Covid in a Digital World*. World Bank Group.
[6] International Trade Administration. (2021). *Thailand – Country Commercial Guide*. US Department of Commerce.
[7] The Office of the National Economic and Social Development Council. (2021). *Thai Economic Performance in Q4 and 2020 and the Outlook for 2021*. NESDC.
[8] International Trade Administration. (2021). *Thailand – Country Commercial Guide*. US Department of Commerce.

The following graphs and tables provide a recent overview of the macroeconomic situation in Thailand.

THAILAND GDP ANNUAL GROWTH RATE[9]

GDP Annual Growth Rate in Thailand averaged 3.26 percent from 1994 until 2021, reaching an all-time high of 15.50 percent in the 4th quarter of 2012 and a record low of -12.50 percent in the 2nd quarter of 1998.

Thailand's gross domestic product advanced by 1.9 percent year-over-year in Q4 of 2021, recovering from a downwardly revised 0.2 percent drop in Q3, faster than market expectations of a 0.7 percent growth, amid easing COVID-19 lockdown restrictions. Private consumption rebounded, (0.3 percent vs -3.2 percent in Q3), while government spending grew faster (8.1 percent vs 1.5 percent) and net external demand contributed positively to GDP growth as exports rose by 17.7 percent, while imports grew at a softer 16.6 percent. In addition, fixed investment contracted less (-0.2 percent vs -0.4 percent). On the production side, output recovered mostly for manufacturing (3.8 percent vs -0.9 percent), electricity, gas, steam, and air conditioning supply (2.1 percent vs -2.4 percent), transportation & storage (3.2 percent vs -1.4 percent), while real estate activities rose more (1.3 percent vs 0.7 percent). In the meantime, output of accommodation & food service activities shrank less (-4.9 percent vs -19.0 percent). For 2021 full year, the GDP grew 1.6 percent, rebounding sharply from a 6.2 percent fall in 2020.

GDP Annual Growth Rate in Thailand is expected to be 3.00 percent by the end of the third quarter of 2022, according to Trading Economics global macro models and analysts' expectations. In the long-term, the Thailand GDP Annual Growth Rate is projected to trend around 4.10 percent in 2023 and 4.00 percent in 2024, according to their econometric models.

[9] Trading Economics. (2022). *Thailand GDP Annual Growth Rate*. NESDB

Figure 1: Thailand GDP Annual Economic Growth

Source: Tradingeconomics.com, Thailand GDP Growth Rate as reported by the National Institute of Statistics of Thailand

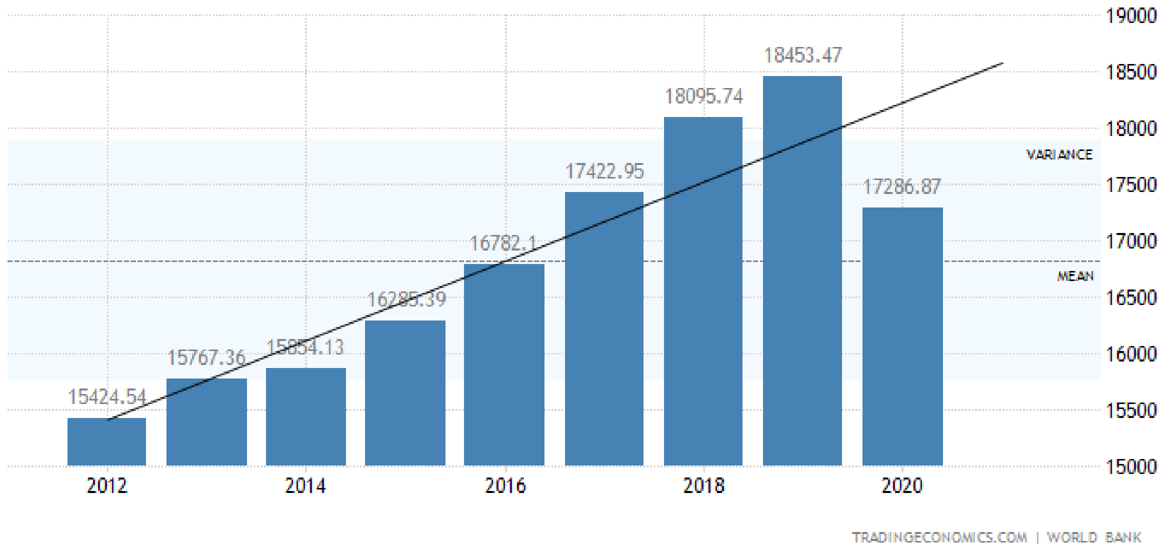
THAILAND ANNUAL GDP PER CAPITA ON A PPP BASIS

GDP per capita on a Purchasing Power Parity (PPP) basis in Thailand averaged 12,571 USD from 1990 until 2020, reaching an all-time high of 18,453 USD in 2019 and a record low of 7,102 USD in 1990.

The Gross Domestic Product per capita in Thailand was last recorded at 17,287 US dollars in 2020, when adjusted by PPP. This is equivalent to 97 percent of the world's average.

GDP per capita PPP in Thailand is expected to reach 18,100 USD by the end of 2021, according to Trading Economics global macro models and analysts' expectations. In the long-term, the Thailand GDP per capita PPP is projected to trend around 18,900 USD in 2022.

Figure 2: Annual Per Capita GDP (PPP basis)



Source: Tradingeconomics.com, Thailand Per Capita GDP (PPP) as reported by the World Bank

Within Southeast Asia, Thailand ranks fourth in terms of GDP per capita on a PPP basis according to IMF 2022 data and is US$ 6,000 above the average GDP per capita for Southeast Asia.

Table 1: Southeast Asian Population and GDP Data by Country

Rank	Country	Population in million	GDP Nominal Billions of USD	GDP (PPP) Billions of USD	GDP Nominal per capita USD	GDP (PPP) per capita USD
1	Singapore	5.33	424	702	79,580	131,580
2	Brunei	0.45	36	33	79,820	74,950
3	Malaysia	33.11	439	1,090	13,270	32,900
4	**Thailand**	**70.08**	**522**	**1,480**	**7,450**	**21,060**
—	SE Asia	673.53	3,650	10,140	5,420	15,050
5	Indonesia	274.86	1,290	4,000	4,690	14,530
6	Vietnam	99.22	409	1,280	4,120	12,880
7	Philippines	111.74	412	1,140	3,690	10,240
8	Laos	7.48	17	69	2,320	9,180
9	Cambodia	15.99	28	88	1,750	5,490
10	Myanmar	53.89	69	257	1,290	4,780

Source: International Monetary Fund, 2022

THAILAND INFLATION RATE

The annual inflation rate in Thailand rose to 5.73 percent in March 2022 from 5.28 percent in the previous month, surpassing market expectations of 5.6 percent and representing the highest reading since September 2008. Food prices gained 4.56 percent, the most since April 2014, after a 4.51 percent increase in February, boosted by meats and seasonings. Also, transport inflation accelerated (11.29 percent vs 9.42 percent), mainly led by vehicles and vehicle operation, while there was a faster rise in housing cost (5.71 percent vs 5.69 percent). Thailand's headline consumer price index (CPI) for this year is projected to rise between 4 to 5 percent, compared with 1.23 percent in 2021. Core consumer prices rose by 2 percent year-over-year in March, the most since April 2012 and compared with February's reading and forecasts of 1.8 percent. On a monthly basis, consumer prices increased by 0.66 percent in March, the least in three months and slowing from a 1.06 percent gain in February.

In the long-term, the Thailand inflation rate is projected to trend around 2.80 percent in 2023 and 3.00 percent in 2024, according to National Institute of Statistics of Thailand and as reported below.

Figure 3: Thailand Inflation Rate

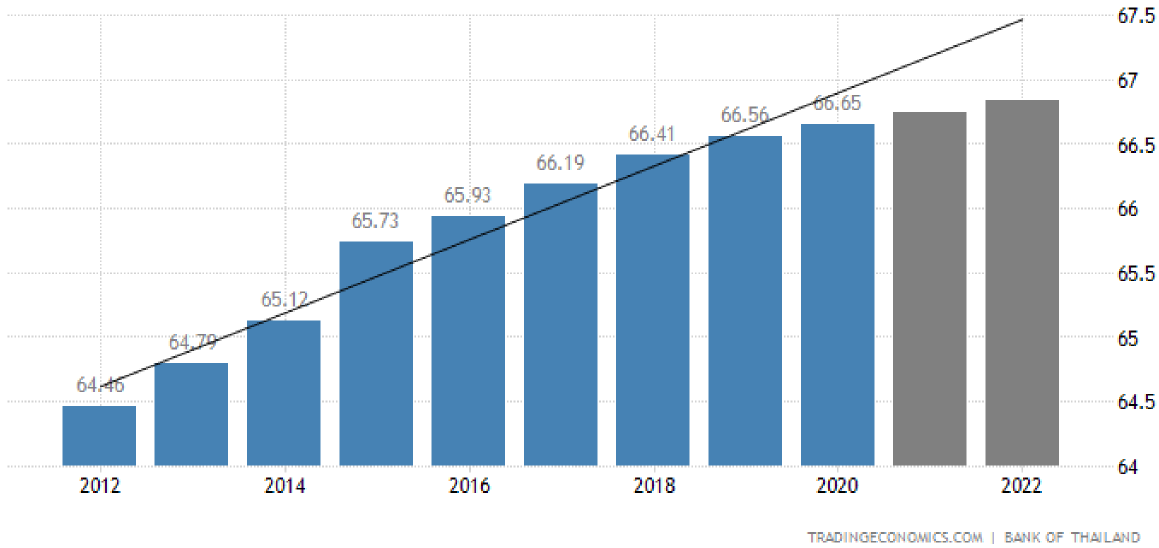
Source: Tradingeconomics.com, Thailand Inflation Rate as reported by the National Institute of Statistics of Thailand

POPULATION

In 1960, Thailand had a population of 27.4 million people. In 60 years, the population has increased by nearly two and a half times to an estimated 66.7 million people in 2020, according to the latest census figures and projections from Trading Economics (TE). Population in Thailand is expected to reach 66.8 million by the end of 2021, according to TE global macro models and analysts' expectations. In the long-term, the Thai population is projected to trend around 66.93

million in 2022 and 67.03 million in 2023, according to TE. However, the International Monetary Fund estimates the current Thai population at just over 70 million in 2022.

Figure 4: Population Growth



Source: Tradingeconomics.com, Thailand Population, as reported by the Bank of Thailand

EXCHANGE RATE

Historically, the Thai Baht reached an all-time high of 56.50 in January of 1998 compared to the US dollar. Over the past 10 years, the Baht has remained in a range of between 28 and 37 Baht per dollar. From 2021 to 2022 it has fluctuated between 30 and 34 Baht per dollar.

The Thai Baht is expected to trade at 34.45 by the end of the second quarter of 2022 based on Trading Economics global macro models and analysts' expectations. Looking forward, they estimate it will weaken slightly to 35 Baht in 12-months' time.

Figure 5: Exchange Rate Between US Dollar and Thai Baht

Source: Tradingeconomics.com, US Dollar Thailand Baht Exchange Rate

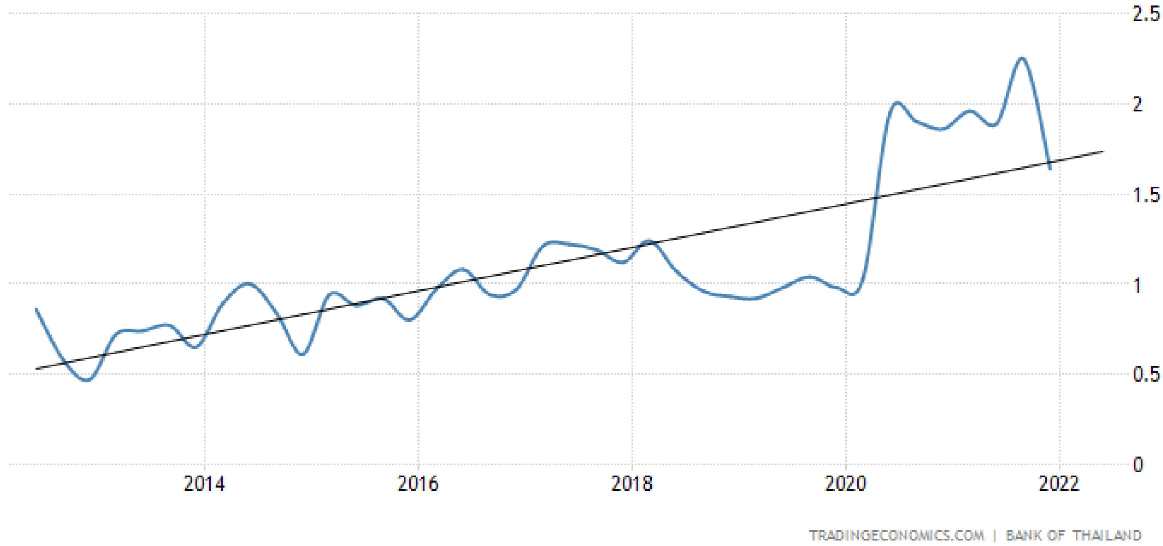
UNEMPLOYMENT RATE

Historically, the Thai unemployment rate averaged 2.23 percent from 1977 until 2021, reaching an all-time high of 7.75 percent in the first quarter of 1986 and a record low of 0.47 percent in the fourth quarter of 2012.

In 2021, it decreased to 1.64 percent in the fourth quarter from 2.25 percent in the third quarter, following an easing of Covid-19 restrictions. The jobless rate was the lowest since the pandemic and there were about 630,000 workers without jobs in the December 2021 quarter.

The unemployment rate is expected to be 1.70 percent by the end of the 2nd quarter of 2022, according to Trading Economics global macro models and analysts’ expectations. In the long-term, the rate is projected to trend around 2.20 percent in 2023.

Figure 6: Thailand Unemployment Rate



Source: Tradingeconomics.com, Trading Economics Thailand Unemployment Rate as reported by the Bank of Thailand

WORKFORCE

In 2020, the World Bank give Thailand a Human Capital Index (HCI) score of 0.61. This means that a child born in Thailand in 2020 will be 61 percent as productive when they grow up as they could be if they enjoyed complete education and full health. This is higher than the average for the East Asia & Pacific region and Upper Middle-Income countries and ranks 65th out of 157 countries in the world. Between 2010 and 2020, the HCI value for Thailand increased from 0.58 to 0.61. For comparison purposes, the United States has an HCI of 76 percent and ranks 24 in the world. Singapore is the top ranked country in the world with an HCI of .88 or 88 percent followed by South Korea, Japan and Hong Kong. Chad is ranked at the bottom of the list at 29 percent.

INVESTING

Thailand ranks very high with an overall score of 80.1 in 2020 in terms of the ease of doing business in the country. In fact, it ranks much higher than all other Southeast Asian markets except for Singapore (see Table 2, below). Furthermore, for three of the ten categories important for investing in cold storage, it ranks higher than the United States for Starting a Business, Getting Electricity, and Protecting Minority Investors.

Table 2: Ease of Doing Business World Bank Rankings for Thailand with Comparisons
(Among 190 World Economies)

Category	Thai	Viet	Indo	Philip	Cam	US	Sing
Ease of Doing Business	21	70	73	95	144	6	2
Starting a Business	47	115	140	171	187	55	4
Dealing with Construction Permits	34	25	110	85	178	24	5
Getting Electricity	6	27	33	32	146	64	19
Registering Property	67	64	106	120	129	39	21
Getting Credit	48	25	48	132	25	4	37
Protecting Minority Investors	3	97	37	72	128	36	3
Paying Taxes	68	109	81	95	138	25	7
Trading Across Borders	62	104	116	113	118	39	47
Enforcing Contracts	37	68	139	152	182	17	1
Resolving Insolvency	24	122	38	65	82	2	27

Source: The World Bank, Ease of Doing Business Rankings, 2020.

According to the World Bank, Thailand is one of the most open countries to foreign investment in the East Asia and the Pacific region. The country has allowed foreign investment and ownership in most industries, with a few exceptions in port and airport operation, and the electricity transmission industry.

TRADE AGREEMENTS

Thailand currently has free trade agreements with the Association of Southeast Asian Nation countries (ASEAN), Australia-New Zealand, China, India, Japan, Peru, South Korea, and Chile. On November 15, 2020, Thailand and the other nine ASEAN nations officially signed the Regional Comprehensive Economic Partnership (RCEP) agreement with five other countries in the Asia Pacific region, consisting of Australia, China, Japan, New Zealand, and South Korea. According to data by the World Bank, the agreement will cover 2.3 billion people or 30 percent of the world's population, contribute US$25.8 trillion about 30 percent of global GDP, and account for US$12.7 trillion, over a quarter of global trade in goods and services, and 31 percent of global FDI (Foreign Direct Investment) inflows.[10] This would make it the largest trade block in history. RCEP is the first free trade agreement among the largest economies in Asia including China, Indonesia, Japan, and South Korea. The pact is anticipated to promote regional cooperation through harmonization of trade and investment policies and lower tariffs on industrial and agricultural goods in the long run. The free trade agreement went into effect in January 2022 for the first 10 ratifying countries.

Thailand has been in negotiations for bilateral free trade arrangements with the European Union, Pakistan, Sri Lanka, and Turkey and plans to accelerate negotiations on free trade agreements with several other potential partners, including the United Kingdom (UK), the Eurasian Economic Union (EAEU), and the European Free Trade Association (EFTA) to boost trade recovery in the medium term.

[10] Association of Southeast Asian Nations. (2022). *RCEP Agreement Enters into Force.* ASEAN.

FOOD & AGRICULTURE MARKET ASSESSMENT

This section summarizes the food and agriculture production, distribution and consumption, trade, and competition in Thailand with emphasis on the temperature-controlled products of greatest interest to the US for this study namely, beef, dairy products, fresh fruit, frozen potato products, poultry, and seafood.

MARKET OVERVIEW[11]

Thailand, with a population of nearly 70 million, is Southeast Asia's second largest economy (after Indonesia) with a GDP of $502 billion in 2020. The National Food Institute reported that the value of Thai food exports was $34.6 billion in 2021, an increase of 11.8 percent from 2020.[12] Thailand remains a strong agricultural competitor as the world's leading exporter of natural rubber, frozen shrimp, canned tuna, canned pineapples, cooked poultry, and cassava. It is also a major exporter of sugar and rice. According to the National Economic and Social Development Council (NESDC), the Thai economy in 2021 is expected to increase by 1.2 percent, a gradual recovery from a 6.1 percent decrease in 2020. The Thai economy in 2022 is expected to expand between 3.5 to 4.5 percent. This is supported by the recovery in domestic demand and manufacturing production due to an improved pandemic circumstance, tourism recovery due to the easing of international travel policy, exports and manufacturing expansion following the world economy and trade recovery, and the government's budget disbursement and economic stimulus measures.

Thailand was the 18th largest export market for US agricultural products in 2021. In 2020, US consumer oriented agri-food exports to Thailand were valued at $466 million, while total US imports of these products from Thailand were $2 billion.

Table 3: US-Thai Trade of Consumer-Oriented Agricultural Products (million US$)

Calendar Year	2016	2017	2018	2019	2020
US Imports from Thailand	1,623	1,633	1,731	1,789	2,004
US Exports to Thailand	396	393	428	483	466
Trade Balance	-1,227	-1,240	-1,303	-1,306	-1,538

Source: Trade Data Monitor and USDA Foreign Agricultural Service – Bangkok, Thailand

[11] United States Department of Agriculture Foreign Agricultural Service. (2021). *Exporter Guide*. USDA.
[12] United States Department of Agriculture Foreign Agricultural Service. (2022). *Food Processing Ingredients*. USDA.

Table 4: Change in Thai Food Import Mix from the United States (million US$)

Calendar Year	2016	2017	2018	2019	2020
Bulk and Intermediate	**1,337**	**1,430**	**1,860**	**1,557**	**1,267**
Share of Imports	69%	69%	73%	70%	71%
Consumer Oriented	**396**	**393**	**428**	**483**	**466**
Share of Imports	20%	19%	17%	22%	21%
Edible Fishery	**204**	**242**	**261**	**187**	**178**
Share if Imports	11%	12%	10%	8%	8%
Total	**1,937**	**2,065**	**2,549**	**2,227**	**1,911**

Source: Trade Data Monitor and USDA Foreign Agricultural Service – Bangkok, Thailand

Thailand remains a strong agricultural competitor as it is the world's leading exporter of natural rubber, frozen shrimp, canned tuna, canned pineapples, cooked poultry, and cassava. It is also a major exporter of sugar and rice. Thailand is the 14th largest export market for US agricultural products, while the United States is the largest supplier of agricultural products to Thailand, with 13 percent of total import market share.

Thailand is currently the 4th largest export market for US agricultural products in Southeast Asia. In 2020, US exports of agricultural products decreased 3 percent to US$1.7 billion. Of that amount, 22.4 percent or US$398.4 million were of the consumer-oriented variety. That represented a drop of 3 percent over that of 2019. Thailand is also the 6th largest importer of US processed foods in the region, totaling US$407.7 million in 2020, and a decline of 3 percent. Top US processed food exports to Thailand in 2020 included:

- Food Preparations & Ingredients
- Processed/Prepared Dairy Products
- Prepared/Preserved Seafood
- Non-Alcoholic Beverages
- Chocolate & Confectionery
- Syrups & Sweeteners
- Processed Vegetables and Pulses
- Dog & Cat Food

PRODUCTION OF FOOD AND AGRICULTURE PRODUCTS[13]

Agriculture is a very competitive and diverse subsector in Thailand. Since agriculture has been a major part in Thailand's development, the sector has presented many job opportunities for the Thai population, along with the services sector. However, its importance has declined as the services sector has grown. In 2020, the agriculture sector accounted for 31.4 percent of the workforce compared to 38.2 percent in 2010. In terms of the sector's impact on Thailand's economic growth, the share of GDP from the agricultural sector was the smallest compared to other sectors. It was 8.6 percent in 2020 declining from 10.5 percent in 2010. There has been growth in the

[13] Manakitsomboon, H. (2022). *Agriculture in Thailand – Statistics & Facts*. Statista

recent years, however, it has been relatively slow. Despite some economic downturns, Thailand has been a successful agricultural society due to the country's well-endowed natural resources, from diverse crops to farming and fisheries.

Major crops in Thailand

With approximately 127 million acres of land, around 52 percent is suitable for agriculture. Although crop cultivation in Thailand is very diverse, rice has always been the key crop and has played a major role in the country's tradition. The rice production in the country is among the top ten countries worldwide, following Vietnam in 2020. Apart from rice cultivation, crop plantation in the country has also extended to rubber, sugarcane, cassava and other major crops including shallots, potatoes, garlic and onions. In recent years, the production volume of sugarcane in Thailand was the highest among other major crops.

Contribution of livestock and aquaculture to agriculture

Compared to crop cultivation, the livestock subsector is relatively small. Beef has been a small part of the overall livestock category. Cattle and buffalo were mainly used to assist in rice cultivation in the past and was increasingly farmed after 1985 as a response to food trends. Poultry production in Thailand, however, has been thriving over the years, with increasing production volume annually. Apart from crop cultivation and livestock farming, fishery and aquaculture has also served as a crucial part of Thai food security and significantly contributes to GDP in Thailand. The production value of aquatic animals is forecast to amount to almost 83 billion Thai baht from fishery and almost 105 billion Thai baht from aquaculture.

DISTRIBUTION AND CONSUMPTION OF FOOD

Food Consumption and Trends[1111] above

Thailand's consumer market is relatively mature with high potential for future growth due to the country's economic growth, on-going urbanization, and growing middle class. Household income in Thailand has increased rapidly over the past decade in line with increasing urbanization. Consumer disposable incomes continue to rise supporting the spending on consumer goods, including food and beverage products. In 2020, Thai consumer expenditures on food and beverages per capita was $1,108, which ranks third in Southeast Asia ($1,625 for Malaysia and $1,468 for Singapore) and per capita disposable income was US $4,074. The typical Thai diet consists of rice, meats, eggs, vegetables, fish, and seafood. In 2020, spending on food and non-alcoholic beverages accounted for 25 percent of total consumer expenditures.

Table 5: Consumer Expenditure on Food and Beverages between 2018 to 2020

Consumer Expenditure on Food and Beverages 2018-2020						
Million US$	2018		2019		2020	
	Value	%	Value	%	Value	%
Food	56,410	80%	61,958	81%	67,493	81%
Bread and Cereals	12,196	17%	13,305	17%	14,443	17%
Meat	6,746	10%	7,380	10%	7,986	10%
Fish and Seafood	6,676	10%	7,349	10%	8,019	10%
Milk, Cheese and Eggs	4,794	7%	5,246	7%	5,737	7%
Oils and Fats	2,559	4%	2,753	4%	2,940	4%
Fruits	5,814	8%	6,414	8%	7,052	8%
Vegetables	13,824	20%	15,334	20%	16,755	20%
Sugar and Confectionery	1,722	2%	1,882	2%	2,042	2%
Other Food	2,079	3%	2,295	3%	2,520	3%
Non-Alcoholic Beverages	8,251	12%	9,015	12%	9,815	12%
Coffee, Tea, and Cocoa	1,643	2%	1,768	2%	2,045	2%
Mineral Waters, Soft Drinks, Fruit and Vegetable Juices	6,608	9%	7,246	9%	7,771	9%
Alcoholic Beverages	5,467	8%	5,952	8%	5,906	7%
Spirits	2,365	3%	2,521	3%	2,454	3%
Wine	374	1%	423	1%	406	0%
Beer	2,728	4%	3,008	4%	3,046	4%
Total	70,129	100.0%	76,925	100.0%	83,214	100.0%

Source: Euromonitor and USDA Foreign Agricultural Service – Bangkok, Thailand

Food Retail and Distribution[14]

Thailand's retail market experienced slow growth of 3 percent over the past few years. The National Economic and Social Development Council forecasted Thailand's economic growth would be around 1.5 to 2.5 percent for 2020 before the pandemic. The overall Thai economy, however, contracted significantly in 2020 by 6.1 percent due to the COVID-19 pandemic that resulted in several containment measures severely impacting tourism, hospitality, and exports. The impact of the third COVID-19 wave in late March 2021 severely impacted consumer spending on food and beverages in the retail sector for 2021 despite the Thai government providing several stimulus measures to help Thai consumers and stimulate spending. Retail businesses have been under major economic pressure due to various factors, including rapid consumer behavioral changes. Retailers across the board are seeing less in-store traffic than average, even those that are considered essential such as food and pharmacies due to an increased use of delivery services.

[14] United States Department of Agriculture Foreign Agricultural Service. (2021). *Retails Foods*. USDA

The growth of the Thai retail industry in the past has been largely driven by Thailand's economic growth. Thailand's growing young, middle-income population with higher disposable incomes and a greater propensity to spend and a trend towards urbanization have also fueled the growth in the retail industry. The Thai food retail industry, however, faced a number of challenges in 2020 such as a slowdown in overall economic activity, shrinking purchasing power, and the impact of COVID-19. The impact of the pandemic continues to impact the retail sector with the Thai Retailers Association reporting that Thailand's retail sector contracted 7 to 8 percent in the first quarter of 2021.

Food and beverage sales are driving Thailand's retail sector. Changes in the structure of Thai households have led to changes in how Thais eat with a rising demand for convenient ready-to-eat meals, healthy food products, and food delivery. Thailand will be considered an aging society in 2022. In 2030, the aging population will increase to 27 percent of the total population. A growing aging population, coupled with the pandemic, has increased demand for healthy and functional food products. Thais are prioritizing healthier eating habits to protect themselves from illness and for their general wellbeing.

Thais are adapting to a new normal way of life due to the COVID-19 pandemic, being more concerned about health, hygiene, and social distancing. Many companies have encouraged their employees to work from home, and the Thai government has restricted dine-in services off and on throughout the past year during spikes in COVID-19 cases. Social distancing measures have led consumers to purchase food and beverage through online commerce and on-demand delivery. Demand for products for in- home consumption and cooking, such as fresh food and ready to cook products, has increased. Due to increasingly hectic lifestyles, demand for products that can offer better health, boost wellbeing, manage weight, and increase nourishment is growing even those that are generally more expensive than normal products.

Retail Sector[14]

There are three major conglomerates dominating the Thai retail market (i.e., Central Group, TCC Group, and CP Group). Central Group owns supermarket chains Central Foodhall and Tops Market. TCC Group, which also has Thai Beverage (the key alcohol beverage producer under Chang beer) has Big C hypermarkets. CP Group runs 7-Eleven, a convenient store chain with over 12,000 outlets and Makro, which is a cash-and-carry store.

Convenience Stores
This sector has experienced continuous growth in comparison to traditional retailers. Competition in this sector is high as Thailand has a total of 19,353 stores nationwide, with 1,113 stores opened in 2020 alone. Demand for convenient, inexpensive, and time-efficient foods has increased significantly due to changes in Thai society. Convenience stores serve ready-to-eat meals and fruits, baked goods, a variety of snacks, desserts, coffee, beverages, and other confectionaries. Food and beverage products account for approximately 71 percent of all products sold in convenience stores including ready-to-eat foods, bakery products, processed foods, frozen foods, prepared fruits, ice cream, beverages, canned food, etc. Convenience store operators have also

increased healthy food assortments such as ready-to-eat fresh fruits and vegetables, fruit and vegetable juices, functional drinks, low-calorie foods, and healthy snacks to accommodate the need and growth of health conscious and aging customers. On average, over 11 million customers per day shopped at a convenience store nationwide in 2020. 7-Eleven has launched vending machines that sell food, beverages, and non-food products in some areas not suitable to have store. In 2020, the company had over 2,500 vending machines nationwide.

The key leader of this sector is 7-Eleven operated by CP All Public Co. Ltd with approximately a 64 percent market share in the number of outlets in 2020, followed by Tesco Lotus Express (9 percent) and Family Mart (6 percent). At the end of 2020, the CP All operated about 12,432 outlets of 7-Eleven nationwide and has more than 40 million user accounts on its online customer channels including its website, application, social media channels, and other communication channels. The CP food group sources most food and beverage products sold in 7-Eleven stores locally.

Table 6: Number of Convenience Stores by Brand and Company

Convenience Store					
Brand	**Company Name**	**2017**	**2018**	**2019**	**2020**
7-Eleven	CP All PCL	10,442	10,988	11,712	12,432
Tesco Lotus Express	Ek-Chai Distribution System Co	1,559	1,607	1,650	1,865
Mini Big C	Big C Supercenter PCL	605	800	1,016	1,215
Family Mart	Central Group	1,132	1,008	968	901
Source: USDA Foreign Agricultural Service, Bangkok, Thailand					

Supermarkets

Supermarkets are highly competitive and are concentrated in Bangkok and in other major provinces such as Chiang Mai, Phuket, Chonburi, and Nakorn Rachasima. Thailand's supermarket segment has many players including Central Food Retail (Central Food Hall and Tops Supermarket), MaxValu, The Mall Group (Gourmet Market and Home Freshmart), Villa Market, UFM Fuji, and Foodland. Middle to high income consumers remain the key target segment for supermarkets, driven by a desire for premium products and services. It is estimated that the average sales per square meter of supermarket was US$291 per month in 2020, a 15 percent decrease from the previous year. Supermarkets are trying to offer imported products by seeking exclusive arrangements with international exporters to offer unique and hard-to-find items to differentiate themselves from their competitors. Imported food and beverages such as fruits, vegetables, seafood, meat, frozen food, beverages, packaged foods, and organic products are well positioned and recognized by consumers. Most supermarkets now have dine-in counters (in-store restaurants) for customers to shop raw materials at the retail store for cooking and dine in as well. This allows them to promote meat and seafood products in their frozen/chilled form, prepared in restaurant menus, or prepared in take-home meals.

Table 7: Number of Supermarkets by Brand and Company

Supermarket					
Brand	**Company Name**	**2017**	**2018**	**2019**	**2020**
Tops Market	Central Group	108	113	116	223
Central Food Hall	Central Group	8	10	11	13
Gourmet Market/Home Freshmart	Mall Group	20	20	17	15
Foodland	Foodland Supermarket	21	23	22	24
Villa Market	Villa Market	34	34	34	34
UFM Supermarket	Fuji Citio Co., Ltd. and Metro Group	4	4	4	4
Rimping Supermarket	Tantraphan Supermarket	9	10	9	8
Big C (Big C Market, Big C Depot and Big C Foodplace)	Berli Jucker Public Co. Ltd.	60	61	61	48
Talad Lotus	CP All PCL	n/a	n/a	n/a	18
Source: USDA Foreign Agricultural Service, Bangkok, Thailand					

Hyper Market/Cash & Carry

Hypermarkets and "cash & carry" establishments present good opportunities for US exporters of fresh and frozen food, and beverage products as well as products that cater to mainstream consumers. Due to limited space and high land costs in the Bangkok metropolitan area, new outlets have expanded to other provinces focusing on large growing provincial cities. Hypermarket operators are also diversifying their store formats to smaller-scale retail stores including mini-supermarkets, express stores, and convenience stores.

The largest two hypermarkets are Tesco Lotus and Big C. Both hypermarkets offer a wide range of premium products including a wide selection of imported foods targeting middle and high-income customers. Siam Makro is the membership-based cash and carry retailer. Its target groups are small and medium-sized businesses including grocery shops, hotel and restaurants, catering, culinary institutions, and food business services providers. Siam Makro also has its own import division, which delivers frozen imported and local food products such as American frozen potato fries, cheese, and frozen seafood.

Table 8: Number of Hypermarket/Superstore/Cash and Carry stores by Brand and Company

Hypermarket/Super Store/Cash and Carry					
Brand	**Company Name**	**2017**	**2018**	**2019**	**2020**
Tesco Lotus Hypermarket	Ek-Chai Distribution System Company	193	205	216	215
Big C Hypermarket	Big C Supercenter PCL	140	147	151	151
Siam Makro (Cash and Carry)	CP All PCL	123	129	134	137
Source: USDA Foreign Agriculture Service - Bangkok, Thailand					

On-line Retailing

Thai consumers keep shifting from the concept of traditional markets towards convenience stores and other modern trends in retail markets. Online retail sales reached US$47 billion in 2020, up from US$33 billion in 2017, according to the Electronic Transactions Development Agency (ETDA). A rapid growth in smartphone penetration, the growing awareness of technology in the young and tech-savvy population, and rising internet penetration has allowed Thais to access the internet at their convenience and at faster speeds. The increased access to the internet has driven more growth in the retail online commercial market. COVID-19 transformed consumer behavior and accelerated the growth of online grocery purchases. People are demanding more convenience and speed from their products and services. The demand for online purchases pushed grocery retailers to quickly launch or expand their e- commerce offerings when the pandemic first started. Nevertheless, online sales revenue accounts for only 10-15 percent of total revenue. Many retailers have utilized omnichannel retailing during the pandemic. For example, Central Food Retail heavily utilized omnichannel retailing and resulted in an increase of 106 percent food sales in the first quarter of 2020 compared to the same period last year.

Several retailers have launched successful online food (e-commerce) channels, including Central Food Retail Co., Ltd (www.tops.co.th), Villa Market (https://shoponline.villamarket.com/home), Tesco Lotus (https://shoponline.tescolotus.com/), Big C Supercenter (https://www.bigc.co.th/), and Siam Makro (www.makroclick.com). Gourmet Market Thailand launched its on-line shopping platform on June 16, 2020, under http://www.gourmetmarketthailand.com. These retailers either developed their own delivery service or collaborated with a third-party grocery delivery service provider such as Happy Fresh, GrabFresh, LINEMAN Mart, etc.

Best Product Prospects

- The top consumer-oriented products imported from the world by Thailand include fresh fruits (apples, grapes, oranges, pears, cherries, strawberries, persimmons, kiwi, avocados), snacks, beef, seafood, dried fruits, nuts, dairy products, soup, prepared food, and pet food.
- Major consumer-oriented products imported from the United States to Thailand include almonds, pistachios, walnuts, raisins, food preparation ingredients, whey, milk and cream, frozen potatoes, apples, grapes, cherries, strawberries, cocoa preparations, beef, seafood, wines, and pet food.
- The United States lacks market access for pork, beef offal, poultry, raspberries, persimmon, pomegranate, and avocados.

Food Service: Hotels Restaurant Institutional Sector[15]

Thailand is one of the most competitive markets for the hotel, restaurant, and institutional food service (HRI) sector. There were approximately 150,000 hotel, restaurant, and other food service outlets in Thailand in 2020. The HRI sector sources about 30 to 35 percent of its food products through imports. The US has an approximately 20 percent share of this market with imports including beef, seafood, cheese, frozen potatoes, seasoning, fresh fruits, dried fruits, nuts, bakery filling, fruit juice, juice concentrate, wine, craft beer, and other health and wellness products.

The COVID-19 outbreak severely disrupted the market with Thailand's HRI sector being the worst-hit sector. The dramatic decline in international tourists and the government's restrictions on operating hours and social distancing limited commercial activity. More than 10,000 outlets were estimated to close by the end of 2021.

Tourism has been extremely important to Thailand. With nearly 40 million tourists visiting the country in pre-Covid 2019, the number of visitors was double compared to Malaysia, the 2nd ranked tourist destination in ASEAN. Now that COVID cases are declining in Thailand and the country has started to relax its COVID related travel restrictions (including elimination of a multiple day quarantine requirement on arrival), tourism is starting to return. According to a report by the Asian Development Bank, Southeast Asia's overall international tourist arrivals increased by 58 percent in July to September 2021 compared to the same period in 2020 but remained 64 percent below 2019 levels.

Table 9: Tourist Arrivals in ASEAN in 2019 Pre-Covid (Millions)

Country	Tourist Arrivals
Thailand	39.8
Malaysia	20.1
Vietnam	18.0
Singapore	15.9
Indonesia	13.6
Philippines	8.0
Cambodia	6.7
Myanmar	4.3
Laos	3.4
Brunei	0.2
TOTAL	130.0

Source: Good News from Southeast Asia, Southeast Asia Tourist Arrivals

Thailand imported US$398 million in consumer-oriented food from the United States in 2020, a 10 percent decline from 2019. Food preparations, fresh fruit, processed vegetables, and tree nuts

[15] US Department of Agriculture Foreign Service. (2021). *Thailand: Food Service – Hotel Restaurant Institutional*. USDA

saw the largest declines. Food preparations and ready-to-eat meals are the key products for HRI establishments. Health and wellness products are also becoming more popular.

The COVID-19 pandemic had a devasting impact on the global economy, as well as in Thailand. The large decline of foreign tourists severely hurt the tourism sector, which accounts for about 7 percent of the country's GDP and 20 percent of employment. The number of foreign tourists fell 83 percent to 6.1 million visitors due to the travel restriction in 2020 and it was predicted that only 150,000 foreign tourists arrived in the country in 2021. The drop of tourism directly impacted Thailand's foodservice industry as more than 15 percent of tourism spending is spent in restaurants.

Thailand had over 100,000 restaurants establishments across the country prior to the pandemic with an expected growth rate of 4 to 5 percent annually. However, government restrictions aimed at slowing the spread of COVID-19 limited business operations of restaurants during the pandemic by restricting restaurants' operating hours, preventing restaurants from serving alcohol, and restricting the number of guests at one time. Since the start of the pandemic in early 2020, the Thai government closed in-person dining in restaurants at three different times. Full-service restaurants were hit the hardest as their main source of income is from dine-in customers. The Thai Restaurant Association estimated that the Thai food industry is losing up to 1.4 billion baht (US$44.97 million) per day and more than 500,000 workers lost their jobs. About 50,000 restaurants have shut down, either temporarily or permanently since April 2021. The association also forecasts that at least 10,000 restaurants will go out of business by the end of the outbreak.

The catering sector has also seen reduced business operations due to the Thai government's restrictions on travel and event hosting. Thailand's catering sector includes four categories: contract caterers (e.g., Compass Group and F&B International Co.), airline and exhibition caterers (e.g., Thai Airways International Plc, LSG Skychefs, Bangkok Air Catering, BITEC, and Impact Arena), hotels and medium to high-end restaurants, and small local caterers have been the most affected category in HRI sector due to the pandemic. THAI Catering, which provides 70 percent of catering services in Thailand, is one key player in this market that directly impacted sales of imported food products as about 21 percent of food purchased by THAI Catering is imported.

The pandemic accelerated the adoption and growth of food delivery in Thailand. Restaurants are developing new dishes that are suitable for delivery and are partnering with mobile-based delivery services such as Line Man, GrabFood, Robinhood, and Food Panda. Consumers are placing more than 1.8 million food delivery orders per day during lock-down and work from home (WFH) periods. Thailand's restaurant can be divided into 3 categories as follows:

Quick Service Restaurants (QSRs) hold a 10 percent market share in the restaurant sector and have become increasingly popular in Thailand due to the growth of urbanization, the change in demographics and income, and the growing influence of Western lifestyles. Patrons of QSRs in Thailand are a diverse group including traditional families, office workers, teenagers, and tourists.

Table 10: Sales in Quick Service Restaurants 2016 - 2020 (in $million)

	2016	2017	2018	2019	2020
Asian Limited-Service Restaurants	12.3	14.0	15.9	19.3	14.3
Bakery Limited-Service Restaurants	292.8	326.0	360.0	390.6	302.7
Burger Limited-Service Restaurants	213.3	258.7	298.2	302.5	250.3
Chicken Limited-Service Restaurants	564.4	629.7	745.6	811.6	758.6
Convenient Stores Limited-Service Restaurants	2,232.1	2,447.1	2,663.6	2,861.1	2,558.5
Pizza Limited-Service Restaurants	207.0	226.4	271.1	297.9	286.0
Ice Cream Limited-Service Restaurants	231.3	251.4	266.4	289.9	208.0
Other Limited-Service Restaurants	544.7	623.4	714.1	810.7	627.2
Total	**4,297.9**	**4,776.7**	**5,334.9**	**5,783.6**	**5,005.6**

Source: Euromonitor and USDA Foreign Agricultural Service – Bangkok, Thailand

Franchises dominate the QSR market, which sell chicken, burgers, bakery products, pizza, ice-cream, and breakfast meals. Partnerships with US brands (e.g., McDonald's, KFC, Pizza Hut, Taco Bell, Domino Pizza, Au Bon Pain, Starbuck, Carl's Junior, Burger King, Baskin-Robbins, Dairy Queen, Auntie Anne's, and Subways) and non-US brands (e.g., Mos Burger, Bonchon Chicken, Yoshinoya, and Chabuton Ramen) form about 80 percent of Thailand's food franchises.

QSRs had an annual growth rate in market value of 8 to 10 percent before the pandemic. The pandemic did reduce QSRs sales, declining 15 to 20 percent, but it was not as strongly impacted compared to full-service restaurants. Despite the slowdown during the pandemic, Euromonitor estimates that QSRs will reach the market value nearly US $6.6 billion by 2024.

Full-Service Restaurants represent about 15 percent of all establishments in Thailand's restaurant industry. Asian full-service restaurants are the most in-demand type since Thai consumers prefer Asian cuisine. The shabu and hot pot dining trend has been gaining more popularity over the past two to three years and is one of the key drivers of the restaurant sector's growth. While chain full-service restaurants make up just over one-third of full-service sector, their market share has been growing due to increased consumer preference for convenience, hygiene, and high-quality standards. High-end or fine dining restaurants have also become a significant player in the restaurant sector. The high-end or fine dining restaurants offer unique food and dining experiences. Increasingly chefs and consumers care more about from where and how food and ingredients are sourced with "farm-to-table" becoming a major selling point. Before the COVID-19 pandemic, high-end restaurants catered mainly to Millennials and Gen Z with unique atmospheres, nice interiors, and, most importantly, great food.

Table 11: Sales in Full-Service Restaurants 2015-2020 (in $millions)

Full-Service Restaurants	2016	2017	2018	2019	2020
Chain Full-Service Restaurants	1,796.20	1,950.60	2,099.10	2,225.50	1,672.10
Independent Full-Service Restaurants	3,048.70	3,245.40	3,515.80	3,810.00	2,620.30
Total	**4,844.80**	**5,196.00**	**5,614.90**	**6,031.20**	**4,292.40**

Source: Euromonitor and USDA Foreign Agricultural Service – Bangkok, Thailand

Euromonitor forecasts that overall market sales of full-service restaurants will grow 10 percent annually until 2024. Unfortunately, the pandemic caused sales to decline to US$4.3 billion in 2020, down 28 percent from the 2019. Full-service restaurants have been hit harder by government restrictions to curb the spread of COVID-19 than QSRs, since many full-service restaurants were not as equipped to shift to delivery as QSRs or they were not suitable for delivery services such as shabu, hotpot, or fine dining.

Small Restaurants (SME-Small Medium Enterprise) represents 75 percent of all restaurants in Thailand. Local stores and street vendors constitute the majority of this category. Hypermarkets and shopping center food courts have helped raise quality standards for this category but have also increased competition for these small-to-medium sized vendors. Despite the increased competition, the category experienced steady growth before the pandemic.

The COVID-19 brought many challenges and disruptions to the HRI sector in Thailand, but the HRI sector adapted to changing circumstances. There are many new business models or adaptions of business models that are starting to thrive in the HRI sector.

The "Cloud Kitchen" model was one of the first new business models to emerge out of the growth of the food delivery market. Cloud Kitchens have become a popular way to deliver food while limiting operational costs. There are two categories of Cloud Kitchens in Thailand, namely: 1) allowing different restaurants to rent space at a central kitchen, and 2) bringing together the different brands of large food operators into one location. The model benefits small- and medium-sized restaurant operators who can adapt to the new business model rather than large restaurant chains or brands that already have several physical locations. Several of the benefits of the Cloud Kitchen business model include lower start-up and operational costs, increased efficiency to receive orders from various platforms, and the ability to monitor ordering trends for further adaptability. There are also some challenges with Cloud Kitchens, including food quality control, food safety and hygiene, and relying on third party food delivery apps. The first player utilizing the Cloud Kitchen model in Thailand was GrabKitchen who brought together popular restaurants in one place in various busy areas. The success of GrabKitchen and continued operating restrictions due to COVID-19 encouraged some large restaurant groups to adapt the Cloud Kitchen model.

The "Delco" (small food outlets) model is bringing the food to the consumers instead of making consumers come to large public spaces and is expected to support delivery and carryout services during the pandemic period and afterwards as the lifestyles of consumers are changing. Small stand-alone locations are more attractive to customers and serve as a hub for delivery service. This model allows more flexibility helping businesses to minimize the risks caused by unpredictable circumstances. Likewise, consumers also enjoy the model since they can more easily access the point of sales and experience different food menus from brands they already know.

The long-term outlook for the restaurant sector in Thailand remains positive with a slower growth rate if Thailand continues to manage the pandemic and prevent the country from another wave of COVID-19. Thailand is one of the most popular tourism destinations in the world and has a strong food culture. The Thai government established a roadmap to encourage foreign tourists to come back to Thailand highlighting it as the "Kitchen of the World." The Euromonitor forecasts that the revenue of Thailand's food and beverage industry will continue to grow fueled by an increase in the number of outlets due to urbanization, growth of food delivery, and the government's plan to support Thailand's tourism and hospitality industries.

New product and menu development are key for restauranteurs to attract customers and differentiate themselves. The pandemic made health and wellness considerations important factors when making food choices. Thai consumers are looking for food that nourish their bodies and mind more than before. Food that is allergen-free, keto-friendly, and plant-based has also increased in popularity. Foodservice operators are launching healthy food to meet the increased demand, especially for plant-based food. QSRs have launched several new plant-based menu items. Burger King Thailand launched "Plant- Based Whopper" to attract and expand their customer segment to the beef-less lovers. US plant-based brand, "Beyond Meat" partnered with Starbucks, Au Bon Pain, Sizzler, and McDonald's. Full-service restaurants are also developing new dishes. Sizzler launched a new dish promoting the use of Thai herbs to help boost immunity and wellbeing, such as spaghetti basil pork and spaghetti tom-yum with mushroom and onion. Other notable trends in the restaurant sector include a rise in raw and organic food, vegan bakeries, locally sourced food, cold-pressed juice, acai bowl, salads, smoothies, and plant-based food.

Foodservice players are collaborating more with each other by sharing customer databases, distribution channels, and media platforms to help decrease costs and increase their consumer base. Thai Born Fire Tiger, a boba tea company, is in discussion with MK Restaurant, a sukiyaki franchise, to sell their Fire Tiger Milk and Fire Tiger Milk Tea at the 463 MK locations throughout Thailand. The possible collaboration between Fire Tiger and MK restaurants could benefit both companies by expanding Fire Tiger's target market and market territory and by providing MK restaurants with new products to increase traffic at their locations.

Social media also had a tremendous impact on the foodservice industry. Not only is social media the main tool foodservice operators use to communicate with their customers, but it has also become an indispensable part of their business strategy. Most foodservice operators have been stepping up their social media marketing efforts in response to changes in consumer behavior. Every meal is now on Instagram, chefs have become celebrities and TV stars, and food bloggers and influencers can be found everywhere. Moreover, consumers are no longer using social media just for browsing or for finding information on products; they are using social media to make decisions and purchase products. Changes in how consumers are dining and in the digital landscape have led to new marketing opportunities for Thailand's foodservice operators. Many restaurants are also adopting touchless technology with reservation application, dedicated mobile menu and order, and QR code for cashless payment.

Best Product Prospects
Best market prospects for US suppliers include the following:

- Meat: frozen and chilled beef;

- Potatoes: frozen fries with variety cuts;
- Fresh and frozen seafood: fish fillets, scallop, lobster, mussels, oysters, salmon, halibut, cod fish, Alaska king crab, etc.;
- Turkey;
- Dairy products: cheese, processed cheese, whipped cream, cream cheese, dips, snack cheese;
- American spices and seasonings;
- Bakery and baking products: flour, biscuits, pancake mixes, waffles, cookies, muffins, cakes, frosting and icings, and puff pastries;
- Beverages: fruit and vegetable juices, wine, liquor, whisky, craft beer, cocktail mixes, and healthy beverages;
- Dried fruits and nuts;
- Canned foods: soup, fruit and vegetables;
- Condiments: bacon bits & toppings, barbecue and cocktail sauce, dips, hot sauce or pepper sauce, mayonnaise, mustard, olives, salsa and taco sauce, pickles, steak sauce, syrups, salad dressing and vinegar;
- Fresh fruit: apples, table grapes, cherries, blueberries, grapefruit, oranges, pears, peaches;
- Jam, jellies, and spreads;
- Snacks, candies, popcorn;
- Health and wellness products;
- Plant-based products; and
- Alternative protein and dairy products.

Food Processing[11]

Food-related industries employ 40 percent of the country's workers, making value addition in food industries a vital component of Thailand 4.0 strategic economic development plan. The Thai government has designated "Future Food" as a crucial economic driving engine. The food processors, especially of future foods (functional, medical, novel, or organic foods) are listed as one of the first S-Curve industries that the relevant government agencies are seeking to add value to in the short to medium term. These are good opportunities for US exporters to supply food ingredients for Thai food manufacturers to develop value added and innovative food products. According to Thailand's Board of Investment (BOI), the project value of new investment applications submitted for agro and food industry in Thailand was $1 billion in 2020. Potential products are plant-based proteins, semi-prepared and ready-to-eat food, seasonings, frozen meats, frozen fruits, processed seafood and healthy beverages.

Food manufacturers are forced to develop new products and stay current on consumer trends to serve the changing preferences of consumers. "Healthy" food and beverages is the leading trend. A wide assortment of healthy food and beverages that boost immunization, such as vitamin waters, healthy snacks using grains, nuts, and dried fruits, or ready-to-eat meals featuring new application of seafood have been introduced to the market and are gaining better shelf space and interest from retailers. The change in customer behavior based on health and beauty concerns as well as an increasingly aging society is a factor that food manufacturers should take into consideration when developing new products to align with consumer needs. Urban dwellers have less time for food preparation due to longer working hours and a greater presence of women in the work force. With rising demand for processed foods, Thai food processors must import large quantities of food ingredients that are not locally available.

In 2020, Thailand's food ingredient imports exceeded US$2.9 billion. The United States is the third largest supplier of these products. US products with the highest growth were dairy ingredients, fish, dried fruits, nuts, and other functional ingredients. The food ingredient market continues to grow due to increases in population, purchasing power, dual income families, and new product development. Although domestic ingredients hold the greatest share of the market, these items tend to be low value. High-value raw, and semi-processed products such as fish and seafood, grains, starches, dairy ingredients, and specialty bakery ingredients are generally not available locally and must be imported.

Best Product Prospects

Best market prospects for the food processing sector include dried fruits, nuts, pulses, plant-based proteins, proteins and amino acids, vitamins, minerals, prebiotics and dietary fiber, probiotics, carotenoids, essential oils, and omega-3 and 6 fatty acids. There is also a growing demand for organic, gluten free, plant-based, and protein boosted food ingredients; bakery (both premium and mass market) ingredients including wheat flour, bread improver, dough blend, wheat flour, milk and cream, butter, cheese, dried fruits, potato starch, nuts, pastry fillings, sugar, colors and flavors; and emulsifying, foaming, stabilizing and thickening agents.

These products are used in frozen foods, bakery products, ice cream and other dairy products, evaporated milk, non-alcohol beverages, snack foods, bakery, instant noodles, a wide range of processed meats and confectionery products and colors and flavors.

FOOD DISTRIBUTION TRENDS

Thailand's healthy pre-COVID tourism industry and the growing food service and retail sectors offer the best opportunities for US exporters of high-value foods and beverages. Consumers of US products are likely to be young and higher income consumers, expatriates, and tourists. There is a wide range of US food products available in Thai supermarkets and growing food service offerings. About half of the food is sold in modern retail markets and half in traditional open-air markets. Clearly the trend is that the majority of food will be sold in modern supermarkets, convenience stores, quick service restaurants, and other modern outlets as the Thai middle class and per capita incomes continue to grow.

TRADE[16]

Thailand is one of the world's leading agricultural suppliers, primarily due to its well- developed food processing sector and global recognition for its quality control and standards, which enables Thailand to export value-added products to international markets like the European Union (EU), Japan, China, and the United States. The food and beverage industry is among the fast-growing industries in Thailand, which has contributed significantly to the country's economy. The food and beverage industry is the country's third largest industry, contributing 21 percent to the country's Gross Domestic Product (GDP). Major food exports include rice, canned tuna, sugar, meat, cassava products, and canned pineapple.

Food Exports

Thailand is one of the world's leading food exporters including seafood products, chicken, rice, sugar, processed fruits, and beverages. The National Food Institute reported that the value of Thai food exports was US$32.67 billion in 2020, a decrease of 4.1 percent from 2019 mainly due to the COVID-19 pandemic, the strengthening of the Thai Baht against the US dollar, container shortages, and the rise in logistic costs. However, Thai food and beverage exports are expected to reach US$35 billion in 2021, a growth of 7.1 percent, which is mainly driven by growing demand in the world market. Thai processed foods exports were valued at US$19.4 billion in 2020, down 5.6 percent from the previous year and represent 59.3 percent of the country's overall food exports in 2020. The product categories that are likely to experience continuous growth for export are fish and products, chicken products, fruits (fresh/chilled/frozen), food seasonings, and herbs.

Thailand's Major Agricultural Product Exports 2019-2020

(in U.S. $ millions)

Products	2019	2020
Fish and Products	6,076	5,988
Rice and Products	4,865	4,404
Meat Products	4,920	5,037
Fruits and Products	3,293	3,141
Sugar and Products	3,453	2,235
Cassava and Products	1,801	1,878
Beverages	1,919	2,235
Vegetables and Products	866	1,762
Residues and Waste, Prepared Animal Fodder	588	1,335
Dairy Products	387	635
Tea and Coffee	142	151
Other Agricultural Products	5,113	5,363
Total	**33,423**	**34,165**

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives

Food Imports

Thailand is also a major importer of agricultural products, including food ingredients and a wide range of food and beverage products. In addition, Thailand produces innovative and high-value products including frozen meals, canned foods, halal foods, food seasonings, food supplements,

[16] US Department of Agriculture Foreign Agricultural Service. (2021). *Thailand: Food Processing Ingredients*. USDA

functional foods, and medical foods. Thailand exported US$30 billion worth of halal products in 2020, making Thailand the 12th largest exporter in the world, the 3rd in Asia, and the 1st in ASEAN. The Federation of Thai Industries expects revenue from halal exports to rise 5 percent in 2021. Thailand exports of halal food products include vegetables, fruits, rice, sugar, poultry, seafood, and processed products, such as ready-to-eat meals, seasonings, beverages, and snacks. Opportunities in Thailand's food processing sector continue to grow. Domestic sales of processed foods are rising due to a major shift in consumption patterns towards convenience food items such as ready-to-eat meals, rice, noodles, bakery, functional drinks, and snacks. With the rapid growth of e-commerce, the food retail segment is also evolving. Online grocery sales are expected to continue to grow due to urbanization, changing lifestyles of customers, working from home, and an increasing tech-savvy demographic. This growth is also pushing up consumers' demand for processed foods and thus, demand for greater imports of food ingredients.

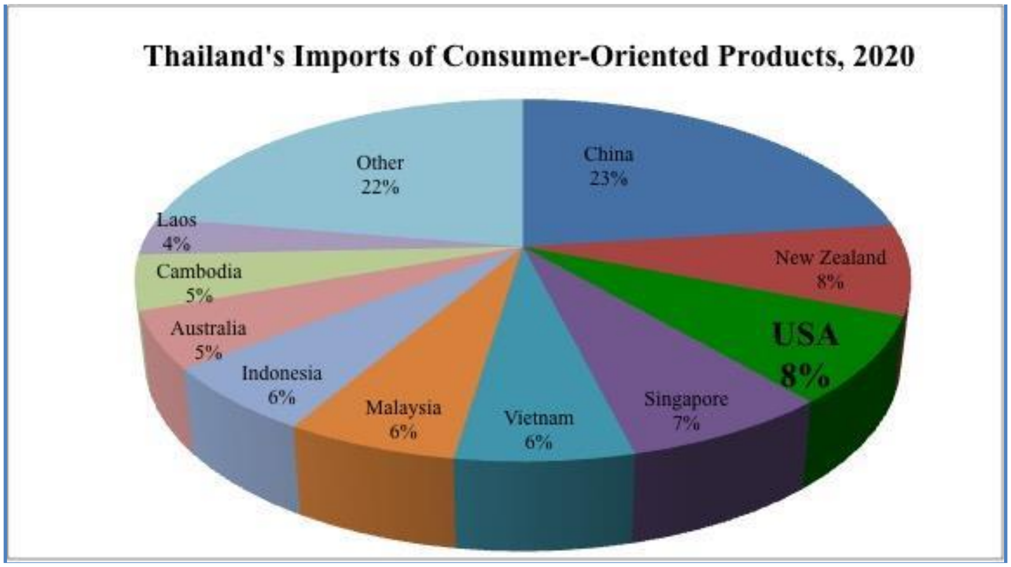
Thailand's Major Agricultural Product Imports 2019-2020

(in U.S. $ millions)

Products	2019	2020
Fish and Products	3,985	4,275
Food Crops and Products	2,002	2,310
Residues and Waste, Prepared Animal Fodder	2,127	1,807
Oil Plants	1,393	1,767
Fruits and Products	1,112	1,481
Other Food Products	920	1,150
Vegetables and Products	869	759
Milk and Products	661	714
Tea and Coffee	252	295
Meat Products	521	934
Beverages	466	484
Other Agricultural Products	1,934	2,822
Total	**16,243**	**18,798**

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives

Furthermore, when it comes to consumer-oriented products, in 2020 the United States was the third largest supplier of these products to Thailand with exports valued at US $459 million.



Major US Exports of Agricultural and Related Products to Thailand

US ag and related product exports to Thailand were just under US$1.8 billion in 2021 and Thailand was the 18th largest market for the US that year. US exports have been trending slightly downward since 2017 but should start moving up again after the effects of Covid start kicking in and tourism picks up to pre-Covid levels.

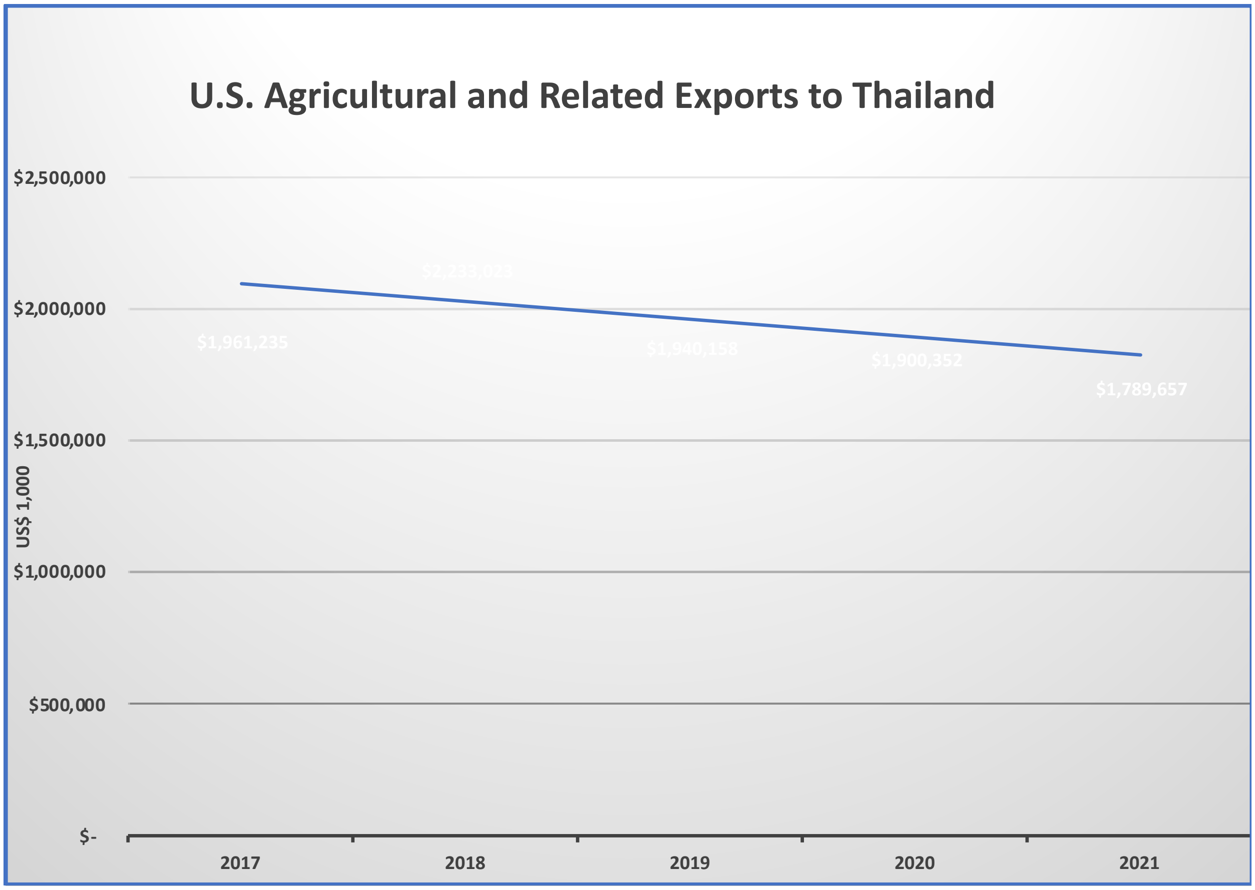
Table 12: US Agricultural and Related Product Exports: World and ASEAN (Value in US$ 1,000)

Partner	January - December Values in Thousands of US Dollars				
	2017	2018	2019	2020	2021
World Total	**$ 158,685,332**	**$ 160,447,907**	**$ 154,930,543**	**$ 162,005,013**	**$ 192,399,706**
Southeast Asia	**$ 12,653,350**	**$ 15,246,343**	**$ 14,395,196**	**$ 14,230,660**	**$ 15,065,033**
Vietnam (#7)	$ 2,953,782	$ 4,461,289	$ 3,982,394	$ 3,744,450	$ 3,872,598
Philippines (#8)	$ 2,709,713	$ 3,118,262	$ 3,023,039	$ 3,230,646	$ 3,587,723
Indonesia (#11)	$ 2,987,469	$ 3,206,455	$ 2,952,472	$ 2,897,691	$ 3,016,202
Thailand (#18)	**$ 1,961,235**	**$ 2,233,023**	**$ 1,940,158**	**$ 1,900,352**	**$ 1,789,657**
Singapore	$ 934,638	$ 926,183	$ 1,047,834	$ 1,108,706	$ 1,353,598
Malaysia	$ 952,507	$ 1,099,623	$ 1,190,783	$ 1,098,485	$ 1,223,308
Cambodia	$ 75,043	$ 67,079	$ 74,113	$ 72,658	$ 112,545
Burma	$ 71,069	$ 127,155	$ 174,956	$ 166,681	$ 91,780
Timor-Leste	$ 92	$ 100	$ 780	$ 2,695	$ 9,339
Laos	$ 1,293	$ 2,315	$ 3,213	$ 3,610	$ 4,547

Brunei	$ 6,509	$ 4,860	$ 5,454	$ 4,685	$ 3,735

Source: Census Bureau of Trade, Product Group: BICO- HS6

Figure 7: Trend of US Exports of Agricultural and Related Products to Thailand (US$ 1,000)



Source: US Census Bureau Trade Data, Product Group: BICO-HS6

SOURCES OF COMPETITION

Domestic

The primary locally produced temperature-controlled products are poultry meat and eggs, tropical fruits, pork, and packaged and processed foods.

International

The primary competitive imported temperature-controlled products are deciduous fruit (China, Australia, New Zealand), beef (Australia, New Zealand), dairy products (Australia, New Zealand).

COLD CHAIN ASSESSMENT

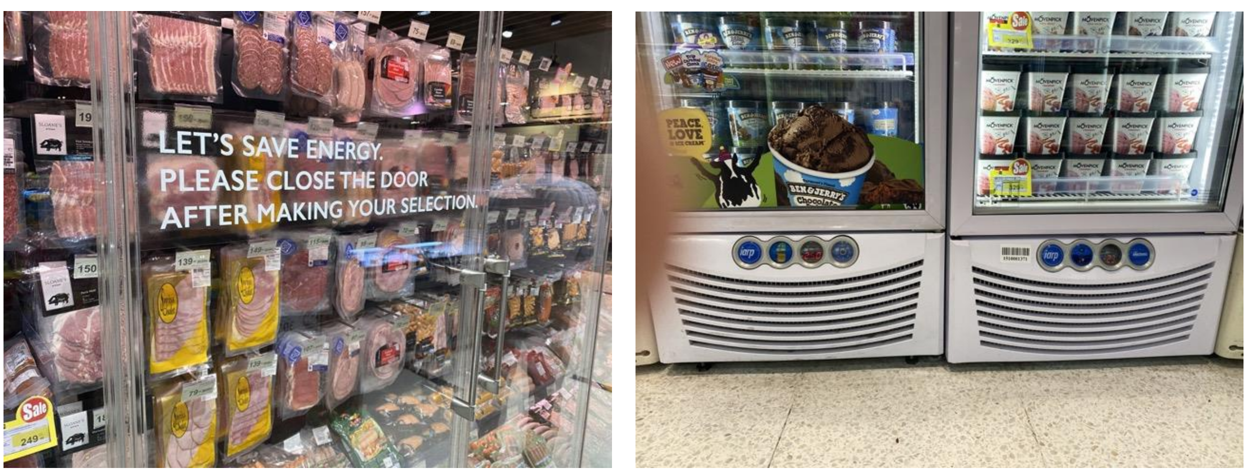
The assessment team met with FAS Bangkok staff and 14 cold chain stakeholders including:

- Food processors (including facility tours)
- Companies with refrigerated transportation (trucking) fleet
- Logistics and cold storage providers
- Sea port and port authorities
- Food Importers/Distributors/Wholesalers/Retailers

The report below is based on these interviews, observations, and the literature review. It is broken down into the different cold chain links with sections discussed in priority order including final point of sale, design/build and warehousing, transport, processing, and government regulations.

FINAL POINT OF SALE

Modern Retail Stores. Thailand has some of the most modern and upscale retail stores in Southeast Asia. They range from nearly 20,000 convenience stores, about 500 hundred supermarkets, and over 500 hypermarkets outlets. Retail stores range from very up-scale stores that featuring premium, imported and domestic products catering to high and middle-income Thais and expatriates, to stores that feature mostly domestic and regional products that cater to lower income consumers. It is estimated that overall, about 50 percent of consumer food purchases are now from modern retail stores. In urban areas – where about 54 percent of Thais now live – an even greater percent of food purchases is made in modern stores. These stores typically have modern temperature-controlled, covered display cases whose temperatures are checked and monitored multiple times per day. Some stores charge slotting fees as high as US$ 30,000 per SKU according to key informants.



Central Food Hall deli meat and ice cream display cases with message to consumers.

However, some stores do display meat, poultry and fish products in less sanitary, uncovered bins with ice or temperature-controlled floors.

Big C Supermarket display of chicken parts in open bins.

Traditional Open-Air Markets. These markets are still widespread in Thailand, even in the urban areas of the large metropolitan cities. However, more and more Thai consumers are buying food from modern retail stores as incomes rise and the middle class grows. In the non-urban areas open air markets are still popular and sometimes frequented on a daily basis by low to middle income consumers, especially for fresh and perishable products including fruits and vegetables, seafood, fish, poultry, and pork. Typically, these markets have very limited means for controlling temperature except for maintaining bins with ice for fish and seafood. Otherwise, all the food is displayed in open areas exposed to high tropical temperatures and humidity and insects.

Chicken parts in traditional open-air market.

Fish and shrimp in traditional open-air market.

COLD STORAGE DESIGN/BUILD & CONSTRUCTION

Design. The lack of professional and governmental code requirements leads to variation in design and construction. The most common designs by local, often smaller and older, facilities followed the box-in-box concept common for designers not familiar with cold storage facilities. This concept includes an outer building shell without insulation or a vapor barrier. The interior walls and ceiling are lined with an insulation component to create a vapor barrier. This corresponds to the construction of small chambers inside older dry warehouses. Many facilities lack temperature-controlled anterooms and variable leveling dock loading/unloading ramps.

Newer facilities, owned and operated by modern 3PL providers have been designed and built to service the retail trade, modern distribution, food service and major manufacturers and wholesalers of frozen and chilled perishable foodstuffs and to a lesser extent for pharmaceutical and sanitary products distribution.

Materials. Most materials are imported. The larger facilities utilized design or best practice technology from countries such as Japan. Some equipment comes from Malaysia, South Korea or Vietnam, depending on ownership of the facilities. Insulated panels and steel structures can be found locally.

Maintenance. It is not easy to find skilled technicians. Key informants noted that they need more qualified technicians in the country to maintain and repair compressors and related equipment as any of their current on-site technicians were trained by other staff members and are only qualified to fix minor issues to equipment. A maintenance program requires on-going training and investment to mechanically and electrically proficient technicians.

Structural. It is common to see chambers in two stories with one elevator to move products. One of the disadvantages of the box-in-box design approach is the reduced clear height in the cold storage rooms. Whether there is racking, or product is floor stacked, lower ceilings reduce available space. Interior columns are concrete pilasters and not tube steel or I-beams. This reduces aisle space and pathways for forklift maneuvering.

While some of the more modern 3P TCL providers, whose facilities were designed for cold storage, had the high ceilings as well as racking and tracking/traceability capabilities expected of a modern and efficient cold storage warehouse. These were less common.

Walls. Insulation is sprayed foam on the walls. This creates a food safety and cleanliness issue. The spray foam is brittle and breaks down over time creating air and floor sanitation issues. The spray foam does not have a vapor barrier which eliminates a cleanable surface. Modern facilities were found to have proper insulation panels both on the walls and at the ceilings.

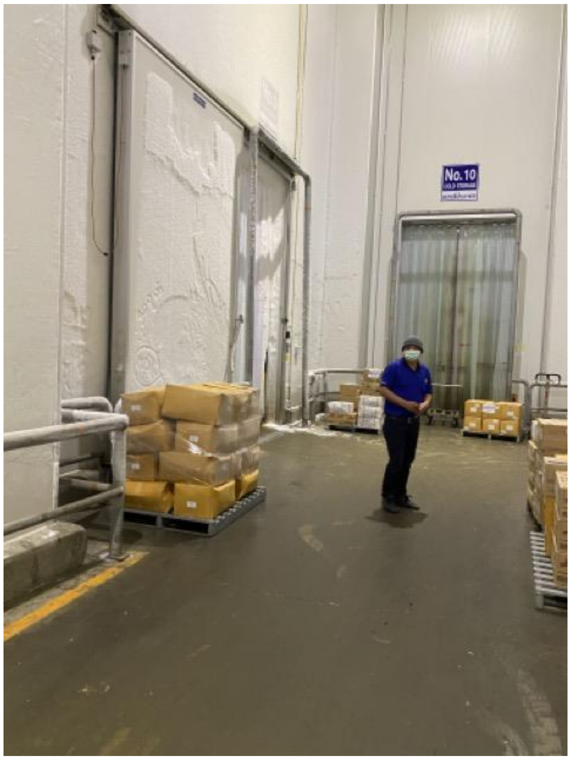
Floors. Concrete floors were minimal thickness' which will result in wear and cracking which could break the floors' insulation capacity and damage material handling equipment. The floors do not have a wearing surface or finished surface for protection and cleanability. The result is a chalking effect which does not meet good food safety practices. Joints in the floor are often not caulked which also is a sanitation issue. In high traffic areas, armored joints with steel plates would be the best design approach.

Roofs. Conventional to the 'box-in-box' design approach, the roof was without cold storage insulation. The built-up roof tended to utilize metal corrugated deck, ply sheet, and some kind of asphalt covering. While these roofs are acceptable, they are prone to leaks. Even though the insulation and vapor barrier are below the roof line as the ceiling to the cold storage box, continuous water and vapor leaks in the roof will cause damage to the insulated ceiling below over time.

Refrigeration. Only Freon gas R404A is approved for use in Bangkok. Ammonia is not allowed for use in the city, though may be used in less residential areas. Although R22 is no longer allowed in the US or Europe, it is still being used by some facilities in Thailand. Sourcing for R22 refrigerant was not disclosed, but the team inferred the refrigerant was imported from China.
The interviewed cold storage warehouse operators who utilize R22 claimed to be unaware of the negative environmental impact of R22.

Doors. Doors are primarily manual and insulated. The insulation is most likely urethane or polystyrene with galvanized steel covering. The doors are adequate in construction, but installation and maintenance are critical in a cold storage facility, and they were not adequately protected from forklift or pallet jack damage. The seals were not properly set or were knocked off their tracks which resulted in air infiltration. No high speed roll up doors were evident.

In one facility, the strip door curtain was cut to allow forklifts to travel through the doorway without the curtain strips touching the packaged product. The inefficient temperature curtains lead to temperature fluctuations in the room, which results in higher energy costs and a reduction in product quality and safety.

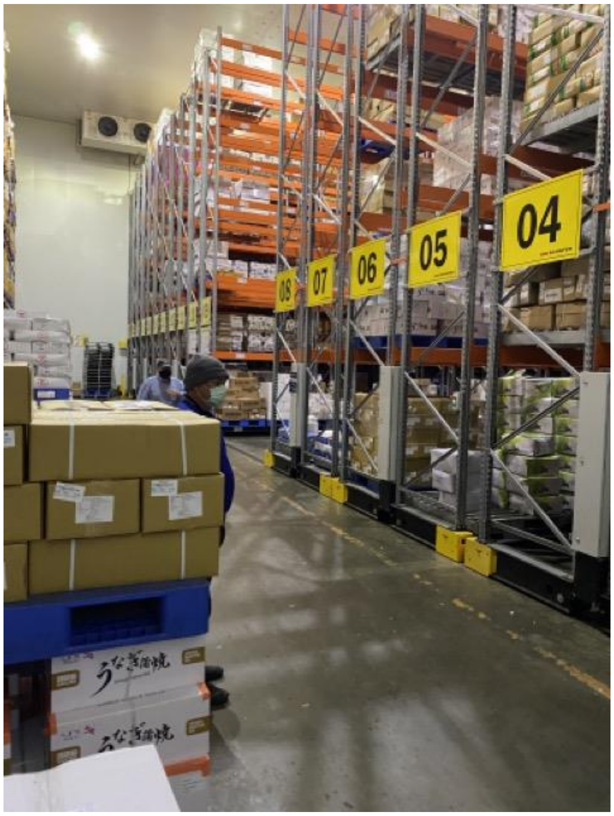


Ice build-up in doorway of frozen storage room due to open doors between room and hallway.

Lighting. Lighting used an older technology with high pressure sodium fixtures. Some fluorescent lighting was seen in the newer facilities; however, no LED with motion sensors were evident.

Fire Prevention. No fire sprinkler systems were evident in the older facilities. Since product racking was not prevalent or very high, in-rack sprinklers were not an issue. Box-in-box design allows for dry pendant heads to be installed in the ceiling with overhead piping above the ceiling; therefore, a conventional wet sprinkler system was utilized.

Racking. Ranges from basic two-deep multiple level racking systems to more sophisticated mobile racking systems. Most modern chambers have rack systems installations of different types: back-to-back, mobile racks systems, semi-automated drive-in racks and a number of projects are considering installing Automated Storage and Retrieval Systems (ASRS).



Racking systems

Dock Equipment. Docks are typically not enclosed or only partially enclosed. They are usually too small and not refrigerated. No dock levelers were observed except on modern facilities, mainly Japanese-owned businesses.

Docking Areas. Most conventional cold stores do not have refrigerated receiving and dispatching zones neither adequate size areas to perform value added services. Only newer facilities have some refrigerated docking areas but those observed were still not enough to perform those services.

Electricity. Electricity is not a challenge, especially when compared to other Southeast Asian countries that the team has visited (Vietnam and Cambodia). There is a reliable and consistent supply with very few blackouts or brownouts.

Chinese Influence. Given its proximity, the interests and influence of China are relevant to Thailand. According to some interviewees, these interests are currently focused on controlling the industrial manufacturing and real estate sectors. When it comes to influence, Chinese products are most easily accessible. Chinese equipment is available at lower prices than other domestic and international suppliers, but the quality and service are not very high. Therefore, the lifetime of the equipment is much shorter. Further, the continued use of R22 refrigerant in some cold stores in Thailand is assumed to be imported from China.

WAREHOUSING

Cold Storage Services. In the Bangkok area there are many business models being used for cold storage services. Ranging from large and modern 3PL providers to smaller companies; private importer, distributor and retailer-owned facilities; and individually leased box-type chillers at the largest fresh fruit and vegetable market that each hold the equivalent of a 20-foot reefer shipping container. Interviewed operators were knowledgeable about the correct temperatures for storing various products and manage their operations accordingly.

Private Warehousing. There is an abundance of private warehousing in the Bangkok area. Many food importers and large distributors have their own facilities. The large retail chains such as Big C, Villa, and Makro own large distribution facilities as well as smaller cold storage warehouse outside of Bangkok.

Demand. The peak season for temperature-controlled logistics is October to April. During this time, containers may be used for excess storage capacity. The lack of cold storage capacity has some potential clients looking to build their own facilities. Some importers/distributors were considering expanding their current cold storage facilities. At least one stakeholder stated they are looking to build their own cold storage but would avoid this if a provider was available.

Logistics Service Providers. Interviewees reported different fees charged by 3PL providers. One said they are charged charge 2 baht per kg per month. Another said they are charged 2 baht per piece per 15 days. Two Baht is equivalent to about six cents in US dollars at the current exchange rate.

Labor. There does not appear to be a shortage of labor. Most training is done in house. However, the Thai Frozen Food Association (TFFA) falls under the Thai Commercial Department and does provide some training programs. It was unclear if the other relevant temperature-controlled logistics association, the Warehouse, Silo, and Cold Storage Association (WSCSA), provided training.

Future Growth. The Thai Government does not allow the building of any new cold storage facilities within Bangkok. However, it is allowed to expand storage capacity of an existing facility, provided there is adequate land to expand upon. One importer/distributor of US red meat products has plans to expand their cold storage in the next 12 months.

PORTS & TRANSPORTATION

The World Economic Forum (WEF) Global Competitiveness Report (2019) ranked the quality of overall infrastructure of Thailand 71 out of 141 countries. This compares to a ranking of 13 for the US. Regarding transportation infrastructure, Thailand ranks in the top 10 (#9) in the world for airport connectivity and 48th in terms of efficiency of air transport services. For shipping liner connectivity and seaport services, Thailand ranks 35th and 73rd, respectively. Thailand ranks 54th and 55th worldwide in terms of road connectivity and quality of road infrastructure, respectively.

For the efficiency of train services, it ranks slightly above the middle of the pack at 75th. In terms of electricity, 100 percent of the population has access to it, and Thailand ranks 31st in terms of the quality of electricity.

Container Seaports

According to the World Port Source[17], Thailand has seven container ports (e.g., Bangkok Modern Terminal, Port of Bangkok, Port of Laem Chabang, Port of Map Ta Phut, Port of Rayong, Port of Songkhla, and Sriracha Harbour), three of which are located in or near Bangkok. The largest is the Port of Laem Chabang which the team visited during the in-country rapid assessment. The other two in Bangkok and Map Ta Phut are medium sized and the rest are considered small. The names and locations of the seven ports is noted in Annex E.

Laem Chabang Port[18]

Consistently ranked in the top 20 overall global ports, Laem Chabang Port is Thailand's main deep seaport and has 710 reefer plugs. When excluding Chinese gateway ports or those with a large percentage of their overall volume coming from transshipment, Laem Chabang Port is third in the rankings for Origin-Destination or "Gateway" cargo, just behind the Ports of Los Angeles and Long Beach in the United States. According to the Thailand Board of Investment, the Laem Chabang port currently handles 54 percent of Thailand's overall exports and imports.[19] As of 2022, Thailand's Laem Chabang deep seaport is beginning its Phase 3 expansion (30 billion Baht or US$927 million), which will see a container throughout capacity of 18 million twenty-foot equivalents (TEU) per year.[20]

The port is located approximately 120 KM east of Bangkok, inside Thailand's Eastern Economic Corridor (EEC) and prominent manufacturing zone. The Port Authority of Thailand manages Laem Chabang Port for long term concession holders. It is the home to several leading Global Port and Terminal Operators as well as domestic companies.

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[17] World Port Source. (2022). *Thailand Ports with Container Liner Service*. World Port Source.
[18] Finn, R. (2021). *An In-Depth Look at PAT's Five Ports.* Logistics Manager.
[19] Thailand Board of Investment. (2021). *Seaports*. Thailand Board of Investment.
[20] The Association of Southeast Asian Nations. (2021). *Thailand's Laem Chabang Deep Seaport to Begin Phase 3 Expansion*. ASEAN.


View of Laem Chabang port area

Laem Chabang Port sits on a total area of 10,150,000 square meters comprised of 11 container terminals, 4 multi-purpose terminals, a combination Ferry/Ro-Ro, a dedicated Ro-Ro, and general bulk terminals. There is also a coastal terminal and shipyard located inside the port.

All sizes of containership, including the latest Ultra Large Container Vessels of nearly 400 meters in length, can call at the port. There is abundant land inside the port available for logistics-related activities and services. Like Bangkok Port, Laem Chabang Port has excellent and frequent multimodal connections to the national highway, rail, and barge waterways systems. There are no cold storage facilities near the port, as reported by key informants. However, one logistics company is considering a feasibility study to understand the market demand for cold storage and related logistics around the port.

The team was told that the port is currently operating at about 70 to 80 percent of its capacity, approximately 12,000 TEUs for reefer containers. The turn-around time for outgoing reefer containers is about two to three days. For incoming reefers, the turnaround time depends on the importer. Nine million TEUs is the total port capacity for container handling. No inspection or customs clearance is done at the port. It is all done outside the port at appropriate inspection locations. In summary, imported reefer containers are never opened at the port.

Refrigerated Transportation. Chilled and frozen distribution is well developed but it appears there is a shortage of refrigerated trucks. As with other areas of the cold chain, there emerges differentiation in the types and sophistication of services offered. There is some capacity to distribute higher end products with trucks that are properly precooled. Most trucking companies and distributors understand the importance of precooling refrigerated product areas and minimizing the time that container and compartment doors are opened. Compliance by the drivers and delivery staff is less than desired. The team did not assess refrigerated transportation by rail or river barges/ships.

Cost. Fees charged are based on the total weight and mileage for each trip plus the cost of gas. When they make multiple stops, they charge an extra 100 Baht (about US$3.00 at the current exchange rate) for each stop. Supervisors are trained by the customers like the retailer and then the supervisor trains the drivers.

Road Network. Within and around the Bangkok metropolitan area there are high-quality, paved roads. Nationwide, the road network seems to be fairly well developed, especially between the major cities in the country and to the major border areas between Thailand and its neighboring countries of Cambodia, Myanmar, and Laos.

Truck Types and Capacity. There are three basic truck types used for refrigerated deliveries:

- 4-wheel – delivery of up to 1-2 MT
- 6-wheel – delivery of up to 5 MT
- 10-wheel – deliver of up to 20 MT

The majority of trucks are 4- and 6-wheel vehicles because they can operate 24/7. The larger 10-wheeler are restricted to operate the Bangkok metro area only during the hours when traffic is the lightest. The team interviewed one company that has a fleet of 100 trucks; 10 owned and 90 leased. Most of his are 4-wheeler that carry up to 2 MT. His main customers are modern supermarkets and hypermarkets. His trucks can cool down to -18 C and in practice they precool them down to -15 C prior to loading.

Refrigerated Transport Training. The trucking company interviewed by the team said his supervisors are trained by his customers (e.g., the retailers he delivers to) and then the supervisor trains his drivers. Training includes how to load and unload products to and from the truck. Drivers are audited two times per year. Delivery schedules are very well respected. His drivers typically arrive 15 minutes early for checking documents and products then the products are unloaded on schedule.

Maintenance. There appears to be a shortage of mechanics to maintain trucks and the reefer units on the trucks. One trucking company does its own truck maintenance but relies on a subcontractor for maintaining their refrigerator units.

Traffic Concerns. Traffic congestion is a major problem in the Bangkok metropolitan area. Although it does not appear as bad as in the capital cities of Indonesia (Jakarta) and the Philippines (Manila). In Bangkok, large trucks (10-wheeler/20MT) are only allowed to operate in the city from 10:00 AM to 3:00 PM. Larger tractor trailers, including trucks with refrigerated reefer containers from ports, are permitted between 9:00 PM to 6:00 AM. Smaller trucks (4-wheeler/1-2 MT and 6-wheeler/5MT) are allowed to operate 24/7. That is why most trucking companies have large fleets of the smaller trucks for deliveries in the Bangkok area.

Cross-Border. One company transports products into Laos, Cambodia and southern Thailand. The trip to Southern Thailand is about a 10-hour trip. They can bring product back from Southern Thailand but not from Laos. Products delivered to Laos are usually meat and high-end products usually imported into Thailand from other countries. For Cambodia, the products are usually products that are needed in larger volumes like frozen French fries, fish and some products that are near expiration. Most of these products are also imported into Thailand as opposed to being produced in Thailand. Demand for shipments to Cambodia and Laos is growing quickly and has doubled every year, even every month. The strong growth is attributed to the rise in consumer purchasing power in those countries.

GOVERNMENT REGULATIONS[21]

Cold Storage Construction and Operations. New cold storage facilities may not be built in the city of Bangkok. However, existing facilities in the city may be expanded. Ammonia may not be used as the refrigerant in cold storage facilities in the city limits. R22 is being used in some facilities in Thailand.

Inspections and Training. The Thai Food and Drug Administration (FDA) in the Ministry of Public Health inspects and audits all food production, processing and storage premises. This includes FDA inspections of new cold storage facilities when they are being constructed. They also conduct routine inspections of cold storage warehouses and food processors. Workers are required to be well trained, certified, and in good health. Training is typically done by outside private sector sources and includes food safety, HACCP and hygiene, as reported by key informants.

Food Safety and Standards. In general, food processors, modern retail stores, and restaurants practice good food safety standards. This is particularly true for those producers and processors that export their products since they must comply the international standards and practices of their overseas customers. Examples include package food products, shrimp, fish and other seafood. Most modern retail stores require 30 to 45 days of shelf life for the products they buy.

Enforcement. It is estimated that nearly half of Thai consumers – and more in rural areas – purchase their food from traditional open-air markets where food safety standards and practices are not followed closely and/or not enforced. Quality standards are not imposed. Some business will operate below sanitary standards due to cost and customers do not complain. There are almost

[21] United States Trade Representative. (2021). *2021 National Trade Estimate Report on Foreign Trade Barriers*. Office of the United States Trade Representative

no regulations, no sanitary controls, no requirements or specifications and no enforcements at any level including code compliance for design/build.

Duties and Taxes. Import duties for US products are relatively high, especially when compared to competing countries with zero duties including other ASEAN countries, Australia, New Zealand, and China that have free trade agreements with Thailand. High tariffs in many sectors continue to hinder access to the Thai market for many US products. The highest *ad valorem* tariff rates apply to imports competing with locally produced goods, including automobiles and automotive parts, motorcycles, beef, pork, poultry, tea, tobacco, flowers, beer and spirits, and textiles and apparel.

Most Favored Nation (MFN) applied tariff rates on imported processed food products range from about 30 percent to 50 percent. Tariffs on meats, fresh fruits and vegetables, fresh cheese, and pulses (*e.g.*, dry peas, lentils, and chickpeas) are similarly high. For corn, the in-quota tariff is 20 percent, and the out-of-quota tariff is 73 percent. The type of potato used to produce frozen French fries, for example, is not produced in Thailand, yet imports of these potatoes face a 30 percent tariff. Tariffs on apples and almonds are 10 percent, while duties on pears, cherries, citrus, prepared almonds, and table grapes range from 30 percent to 40 percent.

Sanitary and Phytosanitary Barriers. In 2012, after the Codex Alimentarius Commission established MRLs for ractopamine in cattle and pig tissues, Thailand indicated it would lift its ban on imports of pork from countries that allow ractopamine use, including the United States. However, Thailand has not yet established MRLs for ractopamine in pork, which effectively prevents the importation of US pork products. In 2019, Thailand and the United States agreed to review potential risk management options for Thailand to develop an MRL for ractopamine. However, due to lack of progress on the issue, in October 2020, the US Government revoked approximately one-sixth of Thailand’s duty-free trade preferences under the US Generalized System of Preferences program.

Thailand imposes bans on US live poultry and poultry meat due to the sporadic presence of highly pathogenic avian influenza in the United States. The ban applies to all such US products, notwithstanding World Organization for Animal Health guidelines that recommend importing countries regionalize their bans rather than apply them on a country-wide basis. Thailand has banned US turkey meat since late 2014. After a few years of effort, Thailand sent delegates to conduct a production-system audit of US turkey in July 2019. Thailand has not yet informed the United States of the audit’s outcome.

SWOT ANALYSIS

Strengths	Weaknesses
✓ *Economic* • 2nd largest economy in ASEAN after Indonesia • 4th largest GDP per capita GDP in ASEAN after Singapore, Brunei, and Malaysia • Recently graduated to an Upper Middle-Income country • The size of the middle class is growing as are per capita incomes • Pre-COVID, Thailand had the largest number of tourists visiting the country – 40 million per year – nearly double of any other Southeast Asian country • At #21, Thailand ranks very high in terms of ease of doing business and except for Singapore, is the best in all of ASEAN ✓ *Food & Consumer Trends*[11] • The US is the 3rd largest exporter of consumer-oriented products to Thailand • Thais spend 25 percent of total expenditures on food and beverages, and about 38 million middle-to-upper income consumers are eager to purchase imported food products • 55 percent of Thailand consumer food expenditures in 2020 were for temperature-controlled products including meat, fish/seafood, dairy products and eggs, fruits and vegetables • Thais in urban areas (54 percent of the population) increasingly spend more on imported food items and have become relatively brand conscious • Increasing purchasing power of consumers in rural areas translates into more discretionary spending on non-traditional agricultural products • Well-developed food service industry	✓ *Economic* • COVID-19 led to a decline in GDP of 6.5 percent in 2020 • Tourism visits dropped by about 50 percent due to COVID-19 ✓ *Food & Consumer Trends* • US food and ag related exports to Thailand are trending slightly downward • Imports of some US food products are currently subject to restrictive trade barriers, including high import tariffs, rigid food import procedures, and burdensome documentation requirements, making such products non price competitive • Free trade agreements with China, Australia, New Zealand, Chile, Japan, Korea, Peru, and India have made US products less competitive especially for high value consumer products such as meats, processed meat, wine, spirits, cherries, peaches, plums, pears, frozen potatoes, and cheeses • Local production is increasingly substituting imported food items – locally produced snack foods, salad dressings, sauces, jams, and other processed foods are relatively inexpensive • Market penetration for imported products is mostly concentrated in Bangkok and major tourist-destination areas • The oligopolistic nature of hypermarkets exerts some control over prices, while convenience stores prefer low priced locally or regionally sourced products • Strong government protection on local agricultural products such as poultry and livestock products make it difficult for imported products to enter the market • Regional tourists sometimes seek cheaper local food alternatives or food products sourced from their respective countries • The relevant national cold chain association is not well known, according to key informants • There is inconsistent access to cold chain knowledge and training

Opportunities	*Threats*
• Unemployment rate is now falling below the 10-year trend after a spike in 2020 and 2021 due to COVID-19 • Middle income women give greater attention to health and beauty and are demanding new products from retailers • Growing number of retail outlets • Restaurants are offering more niche products to appeal to consumers with higher incomes by offering premium products • The Thai food processing industry is looking for new ingredients and shows a strong interest in importing healthy and functional food ingredients • Thai consumers are changing their eating habits to accept more Western-style foods • A dynamic and eager younger population (between ages of 15 and 35, representing 29 percent of the total population) is willing to try new products and receptive to trends that fit their Westernized lifestyles • There is increased attention on the cold chain industry due to concerns over COVID vaccine distribution and storage and food safety • The Thai Warehouse, Silo, and Cold Storage Association reports having over 100 cold storage members and could be a network for sharing information	• Stagnation in economic productivity and poverty reduction in since about 2015 • Slowdown in economic growth due to COVID-19 • Thailand's participation in the Regional Comprehensive Economic Partnership (RCEP) agreement may lead to greater investment by regional companies in competition with US investors vying for the Thai market • Increasing food processing competition with Thailand from its ASEAN neighbors, especially Vietnam and Malaysia

MARKET OPPORTUNITIES

There are good market opportunities for continued growth in US exports of temperature-controlled products to Thailand in the short-term. Comparing US ag export trade data for the ten ASEAN countries, Thailand is the fourth largest market in Southeast Asia. That ranking is not likely to change for the foreseeable future for the following reasons:

- Total and per capita GDP will continue to grow
- Size of the middle class and consumer disposable incomes will continue to grow
- Ease of doing business is relatively good and will continue to attract investment and businesses
- As a major food producer, processor, and exporter, Thailand will continue to meet the high food quality and food safety standards of its domestic and international customers
- Consumers will purchase a greater share (over 50 percent) of temperature-controlled products from modern retailers/supermarkets/hypermarkets versus traditional open-air markets, due to growing consumer trends for convenience and demand for more safe, quality and healthy food
- Post-COVID-19 tourism numbers will bounce back to around 40 million per year and will continue to grow annually

This bodes well for greater demand from consumers for a more reliable cold chain to preserve both food quality and food safety.

Table 13: Ranking of Best US Ag Export Opportunities and Estimated Value in 2026 (US$ 1,000)

Product	2021 Value/1	2026 Value/2	% Increase
Dairy Products	91,659	150,000	64%
Fresh Fruit	22,503	60,000	167%
Beef & Beef Products	7,878	15,000	90%
TOTAL	122040	225000	**84%**

1/Source: US Census Bureau Trade Statistics
2/Trendline and SIAM Professional's Estimate

RECOMMENDATIONS FOR PHASE TWO

CAPACITY BUILDING TRAINING AND CONSULTATIONS

There are several areas where the WFLO can have a positive impact on improving the cold chain system in Thailand under Phase Two. Once COVID-19 travel restrictions are fully relaxed, companies will benefit from specific consultations. For example, for in-country workshops, seminars or third country study tours, participants will be invited to sign up and identify the area(s) where they need specific services, but it is anticipated that training and material covering the "last mile" will be an area of focus. WFLO can also assist decision makers planning to invest in new or upgraded facilities to expand knowledge about proper storage design, construction and operations when they are negotiating. Importers and distributors that own or lease their own refrigerated vehicles as well as refrigerated transportation service providers, can also benefit from consultations, in-country workshops, and materials provide by WFLO and its member experts.

Recommendations are presented below in order of priority.

Focus on the "Last Mile"

A. Training, materials and guidance should prioritize assistance for the organizations, managers, and staff involved in handling and delivering products from in-country distribution centers all the way through to the retail/hotel/restaurant managers and staff.

   a. Based on the interviews and observations starting from the Laem Chabang port to retail stores, improvements can be made at all major points along the cold and value chain for fresh, chilled and frozen products. However, the greatest need for assistance is at the final stage (retail) before consumers make their purchases. Consumers would also benefit from more information on proper handling of frozen and chilled products. For example, it is best to buy temperature-controlled products last and use thermal bags to bring the products home. Specific recommendations at this level include:

      i. Food handling training for modern retailers, hotels and restaurants from the point of delivery, to handling and storage areas in stores and restaurants, and managing the chilled and frozen display cases in retail stores following HACCP processes and standards. This should have the greatest impact on optimizing product quality, shelf-life, and food safety.

         1. Some stores do not have a cold storage room, or they may have only one room set at one temperature where all temperature-controlled products are stored at the same temperature. Manuals and training on the optimal storage temperature and location should be provide on a product-by-product basis as well as information on which products should not be stored next to each other or in the same room.
         2. There is generally a high turnover rate of staff at the retail level so there is a need for continual (2 or more times per year) training.

Cold Storage Design Build and Operations

The team interviewed companies and observed multiple cold storage facilities with various levels of capacity and types of business models. These included one of the largest fresh fruit and vegetable markets in Asia that receives containers from around the world (but mostly from China) to privately owned and operated chilled and frozen storage facilities, to large modern 3PL facilities owned and operated by large multinational companies. The newer facilities are generally well designed, well managed, and efficiently operated. Older facilities are in need of design and management up grades and in some cases, use refrigerant that no longer meets international standards.

- **A.** As indicated above, this is not a pressing, nation-wide concern and over time will improve as new facilities are built or existing facilities are upgraded. Perhaps the best approach would be to identify and select those companies that would benefit the most from a study tour to another country in the region (perhaps the Philippines) that is more consistently applying international standards and has a strong cold chain association that can highlight how the association works with the industry in providing guidance and training opportunities/materials.
- **B.** Training on commodity storage handling and best practices would be beneficial. During the in-country assessment, it was apparent that temperature abuse occurred most frequently in instances where warehouse operators were unsure of handling and storage procedures for different commodities. This will also boost energy efficiency, which was an area of interest for many key informants.
- **C.** Training on the importance of adopting science and risk-based food safety policies, laws, and regulations would encourage international best practices. This would be well received by government and consumers alike and would facilitate improvement in the quality of perishable food products in both the traditional and modern retail sectors as well as facilitate exports of Thai produced seafood, poultry, and processed foods.

Transportation

Transportation from importer, distributor, and retail storage distribution centers is typically where most cold chain breaks occur. Refrigerated trucks of various sizes (4-wheel, 6-wheel and 10-wheel, with carrying capacities ranging from 1-2 MT to 20 MT) are available but there appears to be a need for more. There is a variety of business models for those companies that store and distribute food using refrigerated trucking. Some companies own all their trucks but not many. Most own a small fleet and then lease trucks for their use and/or hire a trucking service. For all models, there is a need for the drivers to be trained on proper handling and delivery practices to make sure trucks are pre-cooled, keep the refrigeration on at all times, and minimize the amount of time that the truck doors are left open. Proper truck maintenance is also of great concern. Additionally, companies should be encouraged to adopt surveillance methods to secure and protect products from being taken from containers and pallets at the ports.

Association Development

WFLO should engage with existing warehousing and cold storage associations in Thailand. The team was not able to meet with them during the assessment so there is a need to follow-up with the Warehouse, Silo and Cold Storage Association (WSCSA) and the Thai Frozen Food Association (TFFA). These two organizations were mentioned by some of the companies interviewed, but there seemed to be mixed feelings or lack of knowledge about what the organizations do and how they are helping the entire industry. Compared to the cold chain associations in the Philippines and Indonesia, it appears that in Thailand, these associations are not as strong and would benefit from discussions with WFLO staff and members.

Should the local association(s) grow in strength, their promotion of the design and building of new or upgraded facilities that included temperature-controlled anterooms, adjustable ramps for loading and unloading trucks of various sizes, and alternative refrigerant and refrigeration systems will be necessary to modernize the industry in Thailand. Similarly, the local associations should promote international food safety practices, such as GFSI, through awareness and training. The identification of importers and distributors in Thailand, Vietnam, and Singapore that service CLM and sharing of their information more widely with buyers (distributors, retailers, and end-users) of perishable products in CLM will encourage growth. This should be an important area of discussion at relevant trainings and events (such as Cold Chain Connections or study tours) and should be a goal of the local associations to improve their membership and industry's business practices. While GCCA/WFLO can encourage this in training, sustained measures by the local associations will be required to maintain best practices.

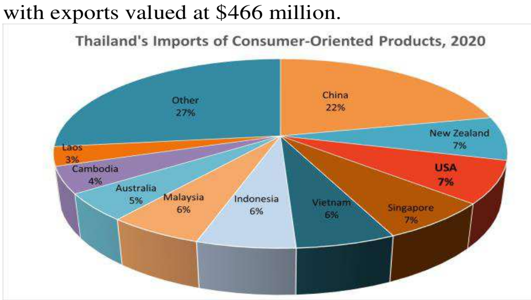
Market Fact Sheet: Thailand

Executive Summary

Thailand is Southeast Asia's second largest economy with a 2020 Gross Domestic Product (GDP) of $502 billion. Thailand remains a strong agricultural competitor as it is the world's leading exporter of natural rubber, frozen shrimp, canned tuna, canned pineapples, cooked poultry, and cassava. It is also a major exporter of sugar and rice. Thailand is the 14th largest export market for U.S. agricultural products, while the United States is the third largest supplier of agricultural products to Thailand, with 13 percent of total import market share.

Imports of Consumer-Oriented Products

In 2020, the United States was the 3rd largest supplier of consumer-oriented products to Thailand with exports valued at $466 million.



Food Processing Industry

Thailand's food processing industry has developed rapidly and is one of the most developed in South East Asia. There are many medium-to-large food processors that produce high-value products for domestic and export markets. Thai processed foods exports were valued at U.S. $19.4 billion in 2020. In 2020, Thailand's food ingredient imports exceeded $2.9 billion. With rising demand for processed foods, Thai food processors must import large quantities of food ingredients that are not locally available.

Food Retail Industry

The Thai Retailers Association reported that Thailand's retail sector contracted 7-8 percent in the first quarter of 2021. The food and beverage industry is one of the biggest retail segments in Thailand. The country's economic growth, coupled with higher disposable incomes in the middle-income population, a greater propensity to spend, and a trend towards urbanization fueled the growth in the retail sector prior to the pandemic.

Changes in the structure of Thai households and the pandemic has led to changes in how Thais eat with a rising demand for convenient ready-to-eat meals, healthy food products, and food delivery.

Quick Facts 2020

Imports of Consumer-Oriented Products: $6.5 billion

List of Top 10 Growth Products in Host Country

1) Dairy products	2) Fresh vegetables
3) Seafood products	4) Food preparation
5) Fresh fruits/.	6) Bread, pastry, cakes
7) Tree nuts	8) Wine and beer
9) Chilled/frozen beef	10) Healthy beverages

Food Industry by Channels (U.S. billion) 2020

Total Agricultural Exports:	$37.9
Total Agricultural Imports:	$18.0
Full-Service Restaurant Sales	$4.3
Food Delivery Sales (Est. by 2020)	$1.1
Food and Drink E-commerce Sales	$0.4

Top Thailand Retailers

Supermarkets
1) Central Food Retail
2) Gourmet Market
3) Villa Market
4) Foodland
5) UFM Fuji Super
6) MaxValu

Hypermarkets
1) Tesco Lotus
2) Big C

Cash and Carry
1) Makro

Convenience Stores
1) 7-Eleven 2) Family Mart 3) Lawson 108

GDP/Population
Population *(millions)*: 69.18
GDP *(billions USD)*: $502 (as of 11/2021)
GDP per capita *(USD)*: $7,217 (as of 11/2021)

Strengths/Weaknesses/Opportunities/Challeng

Strengths:	Weakness:
Strong food industry with well-established retail, food service, and food processing industries.	High level of local industry protection results in restrictive trade barriers for imported food and beverages
Opportunities:	**Challenges:**
Rising incomes and rapid urbanization. Urban Thai consumers are more willing to pay for premium food products.	High import tariff on U.S. food exports to Thailand.

Data and Information Sources: Euromonitor, TDM, Office of the National Economic and Social Development Board, World Bank, Kasikorn Research, and Industry Estimates

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22 The data and information in this Annex were taken from FAS GAIN Report, "Exporter Guide", TH2021-0087; December 9, 2021.

ANNEX B: THAILAND'S CONSUMER ORIENTED FOOD IMPORTS FROM THE WORLD & US

Thailand Imports	Imports from the World					Imports from the United States					U.S. Market Share				
(In Thousands of Dollars)	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
CONSUMER ORIENTED AGRICULTURAL TOTAL	5,114,515	5,589,266	5,848,902	6,217,544	6,469,641	395,951	393,415	427,916	482,829	466,498	7.7	7.0	7.3	7.8	7.2
Dairy Products	796,329	987,118	1,004,288	1,015,400	1,077,619	42,035	51,065	41,297	55,953	85,122	5.3	5.2	4.1	5.5	7.9
Processed Vegetables	626,128	713,392	739,447	805,286	788,755	25,769	23,045	26,052	23,037	22,506	4.1	3.2	3.5	2.9	2.9
Fresh Fruit	681,588	604,988	587,320	616,331	733,202	33,149	33,040	32,508	40,874	28,895	4.9	5.5	5.5	6.6	3.9
Fresh Vegetables	221,278	250,475	274,688	328,754	328,572	1,244	1,892	3,421	4,139	2,057	0.6	0.8	1.2	1.3	0.6
Tree Nuts	202,045	304,065	241,346	269,336	358,891	34,723	20,703	41,563	55,342	39,851	17.2	6.8	17.2	20.5	11.1
Bakery Goods, Cereals, and Pasta	238,769	275,257	308,959	315,271	313,160	6,997	6,892	6,416	6,617	6,683	2.9	2.5	2.1	2.1	2.1
Spices	209,074	228,176	223,761	269,210	264,779	2,823	3,079	3,383	2,821	2,808	1.4	1.3	1.5	1.0	1.1
Chocolate & Cocoa Products	181,596	185,469	198,881	201,072	188,807	16,842	17,859	16,994	21,917	19,207	9.3	9.6	8.5	10.9	10.2
Processed Fruit	152,049	156,380	168,773	183,032	216,365	19,294	18,008	15,662	13,229	13,040	12.7	11.5	9.3	7.2	6.0
Coffee, Roasted and Extracts	102,132	109,773	115,290	116,142	143,664	2,029	2,540	2,838	2,302	2,695	2.0	2.3	2.5	2.0	1.9
Condiments & Sauces	67,784	73,403	89,165	106,845	104,201	5,548	5,230	6,370	7,444	6,033	8.2	7.1	7.1	7.0	5.8
Beef & Beef Products	87,726	92,584	101,748	103,927	129,941	3,318	4,442	6,847	7,142	7,047	3.8	4.8	6.7	6.9	5.4
Wine	65,900	69,320	90,626	82,997	62,284	3,225	3,657	6,656	5,947	6,972	4.9	5.3	7.3	7.2	11.2
Beer	13,335	15,294	17,421	17,009	16,370	500	333	270	412	381	3.7	2.2	1.6	2.4	2.3
Distilled Spirits	235,211	214,336	256,392	265,436	175,244	6,824	6,875	8,492	6,508	4,032	2.9	3.2	3.3	2.5	2.3
Chewing Gum and Candy	77,438	88,410	99,895	108,711	96,145	838	646	730	1,016	1,023	1.1	0.7	0.7	0.9	1.1
Other Meat Products	103,077	106,703	135,242	96,218	78,570	860	614	791	718	854	0.8	0.6	0.6	0.7	1.1
Fruit & Vegetable Juices	74,272	68,781	71,108	61,497	60,926	9,021	8,100	8,117	6,695	5,895	12.1	11.8	11.4	10.9	9.7
Dog & Cat Food	53,715	59,401	59,848	55,862	54,636	9,440	10,474	11,888	12,363	14,805	17.6	17.6	19.9	22.1	27.1
Nursery Products & Cut Flowers	30,507	32,296	39,409	45,320	53,327	57	89	150	178	81	0.2	0.3	0.4	0.4	0.2
Tea	37,594	37,293	41,283	44,699	46,860	7,532	8,697	9,699	7,042	6,533	20.0	23.3	23.5	15.8	13.9
Pork & Pork Products	29,435	24,632	20,679	23,301	19,049	314	67	1	0	0	1.1	0.3	0.0	0.0	0.0
Eggs & Products	22,088	22,002	24,497	18,626	17,012	311	322	913	710	676	1.4	1.5	3.7	3.8	4.0
Other Snack Foods	170,999	187,417	193,340	219,506	219,069	2,704	2,048	1,754	2,117	2,524	1.6	1.1	0.9	1.0	1.2
Non-Alcoholic Beverages	29,652	33,326	34,763	49,679	44,092	861	1,188	940	781	639	2.9	3.6	2.7	1.6	1.4
Poultry Meat & Prods. (ex. eggs)	8,727	7,518	9,399	10,883	7,526	1,098	780	1,066	1,030	794	12.6	10.4	11.3	9.5	10.5
Other Consumer-Oriented Products	596,068	641,458	701,333	787,194	870,575	158,594	161,728	173,095	196,495	185,346	26.6	25.2	24.7	25.0	21.3
FISH and SEAFOOD PRODUCTS	3,111,873	3,600,600	3,985,781	3,701,523	3,673,400	204,302	241,811	260,844	186,579	178,284	6.6	6.7	6.5	5.0	4.9
AGRICULTURAL PRODUCTS TOTAL	11,782,810	12,368,893	12,982,241	13,488,825	13,862,363	1,733,195	1,823,211	2,287,789	2,040,061	1,733,640	14.7	14.7	17.6	15.1	12.5
AGRICULTURAL & RELATED TOTAL	15,419,224	16,503,100	17,562,187	17,749,671	18,039,264	1,965,610	2,092,033	2,573,235	2,250,091	1,937,115	12.7	12.7	14.7	12.7	10.7

Best High-value, Consumer-Oriented Product Prospects Categories:
Dairy products, dried fruits and nuts, fresh fruits, chocolate and cocoa products, meat products, snacks, meat alternative products, health and functional food and beverages.

ANNEX C: AGENDA

GCCA Assessment of COLD CHAIN in Thailand

MARCH 28-APRIL 1, 2022

AGENDA – a total of 13 meetings as follows;

WHEN		**WHO**			**WHERE**	**Type of cold chain management**
Date	**Meeting time**	**Company name**	**Interviewee**	**Business type**		
March 28		**Pick up 9:30**				
	10:00-11:00	1 FAS-Bangkok	Kelly	FAS	FAS Office	-
	13:30 – 14:30	2 Food Gallery	Ms. Jaruwan-MD	Importer/WS/ - Dairy, Fresh produces, Salmon, Florida Juice	Office, ATK test required	In-house cold chain operation, trucking to retailer's Distribution Center (DC).
	16:00-17:00	3 Thai Import Corporation (TIC)	Ms. Pink nterpreter needec	Importer of ESL milk, Yogurt smoothie and Artisan Cheese	Sheraton hotel	Using Konoike Cool Logistic services and Mobile Logistic Services for cold storage facility and trucking.
March 29		**Pick up 8:30**				
	9:30-10:30	4 Visit Talad Thai Wholesale market and container facility	A few wholesalers	Fresh produce wholesalers	Talad Thai wholesale market	Visit cold chain facility operations
	10:30-12:00	5 Vatchamon Import & Export	Ms. Wipawee	Importer/WS/ - Fresh produces,	Talad Thai (ATK test required)	In-house cold chain operation, trucking to retailer's Distribution Center (DC).
	14:00-15:00	6 CEVA Logistics	Mr. Russel Pang	Logistics Operations	office	Cool logistic company
March 30		**Pick up 7:30** **7 Travelling to Laem Chabang Sea Port** **FAS/USDA-BANGKOK; KELLY/ERIC/SUKANYA will come along.**			Sea Port About 2 hours drive (ATK test required) TV/Tulip to be prepared Special safety and shoes uniform	

March 31		**Pick up 7:30**				
	10:00-11:30	8 Pan Food 081-449-4489	Mr. Nonthawat Hongkoo (Director) 1 QA 2 Logistics 1 Consultant Interpreter needed	Import & Export Seafood, Meat and dairy products	Office and warehouse in City outside of Bangkok (1.5 hours drive) (ATK test required)	In-house cold chain operation, logistics
	13:00 – 14:00	9 Pornchai Car Services	Mr. Ood Interpreter needed	Cool trucking service provider	Office at Udomsuk road	3rd party Chilled truck Service provider
	15:00-17:00 (Group dinner at Meat Work)	10 Udom Supply	Ms. Salina	Meat, seafood importer	Office and warehouse visit	In-house cold chain operation, logistics and 3rd party warehouse and logistics
April 1st		**Pick up 9:45**				
	11:00-12:00	11 Tohkaiya Company Limited	Ms. Wallapa	Import Seafood, Meat and Frozen	Office and warehouse in City outside of Bangkok (1.5 hours drive) (ATK test required)	In-house cold chain operation, logistics
	13:00 – 14:30	12 Yogurtland 13 Mobile Logistics Company	Mr. Mark And 3rd party logistics company	Importer of frozen yogurt ice cream Mobile Logistics warehouse & Logistics	Meet at Mobile Logistics warehouse to observe the operations	3rd party warehouse and logistics ATK test result within 48 hours and 2 jabs vaccinated

Remark: Kent will be back to the hotel to interview Pecan Deluxe (Thailand) Company at 15:00-16:00.

ANNEX D: CONTACT BUSINESS CARDS

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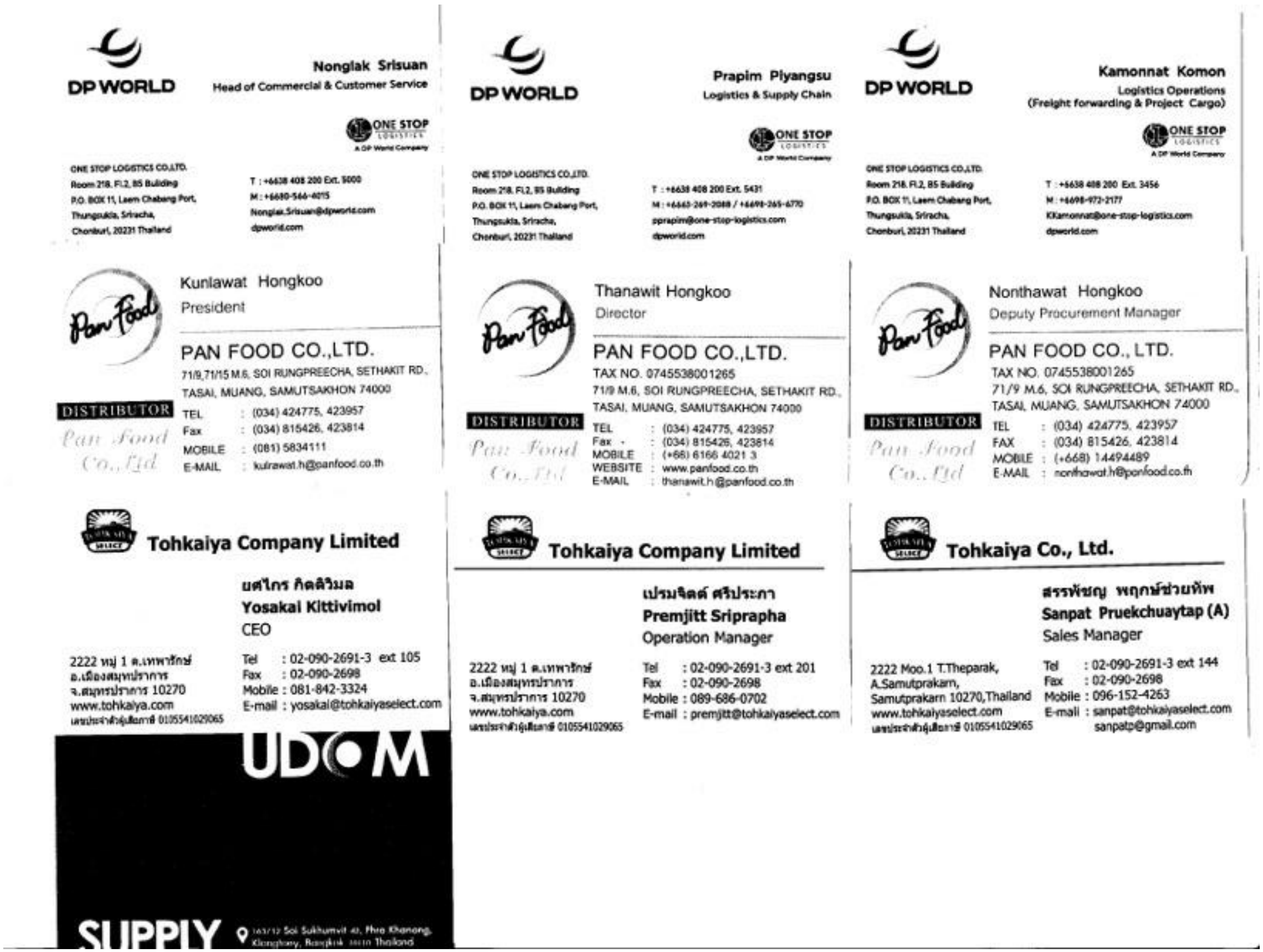
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UDOM
SUPPLY

ANNEX E: BANGKOK PORTS WITH CONTAINER LINER SERVICE

Location	Port
Bangkok	Bangkok Modern Terminal
Bangkok	Port of Bangkok
Laem Chabang	Port of Laem Chabang
Map Ta Phut	Port of Map Ta Phut
Rayong	Port of Rayong
Songkhla	Port of Songkhla
Sriracha	Sriracha Harbour

Source: World Port Source