

# Chapter 7

## Summary and Policy Implications

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## Chapter 7

### Summary and Policy Implications

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This report described the current status of the cold chain, mainly focusing on (i) demand for the cold chain, (ii) the activities of the main players, and (iii) government policies in Thailand, Viet Nam, Indonesia, the Lao PDR, and Myanmar. We investigated the pathways to improve the cold chain by detecting choke points and opportunities in each country and obtained various findings and suggestions. This chapter summarises the abovementioned three key issues as well as policy implications for the development of the cold chain.

#### 7.1. Demand for the cold chain

##### Total demand and its trend

In this report, the demand for the cold chain was mainly estimated based on the values or quantities of agri-food products that are internationally traded. All chapters focused on the types of products generally needed to be kept under low temperatures, which include fish, fruit and vegetables, and livestock products, regardless of whether those are fresh, chilled, or frozen.

The chapters on Indonesia and Myanmar estimated the cold chain demand by using different methods from other countries. Indonesia focused on the supply-demand balance of frozen products and estimated its quantity of domestic consumption. Indonesia also calculated the demand for cold storage by multiplying the production quantities and specific rates obtained from interviews. Myanmar classified circulated products into those that are internationally and domestically traded and interpreted that the former causes demand for the modern cold chain using refrigerating or freezing systems. The latter is understood as traditional logistics, which use crushed ice, insulated box trucks, and general freight trucks, or denoting the potential demand for the modern cold chain.

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Table 7.1 shows the estimated demand for the cold chain and its change in recent years. Although the values of different countries are not comparable, we can observe common features: the growing international trade of many agri-food products requiring the cold chain, other than decreasing exports of Indonesia and imports of refrigerated and frozen food by Myanmar. Similarly, domestic consumption also drives demand for the cold chain, which is suggested from the rapidly expanding consumption of frozen products in Thailand, the production of livestock products and the number of large farmers in Viet Nam, and the production of agri-food products in Indonesia. Data on Myanmar imply there is a large potential that the modern cold chain could expand to the traditional chain or circulation under ordinary temperatures.

**Table 7.1: Demand for the Cold chain and Values and Changes in Circulated Products**

Item		Demand for cold chain		Annual growth rate*		Table
		Year	Value	Year	%	No.
<b>Thailand</b>						
Frozen food	Consumption	2015	US\$0.50 billion	2011–2015	10.0	2.10
Cold chain products	Export	2018	US\$16.05 billion	2012–2018	3.3	2.11
	Import	2018	US\$10.43 billion	2012–2018	5.3	
<b>Viet Nam</b>						
Agricultural products	Export	2017	US\$36.37 billion	2001–2017	12.5	Fig.
	Import	2017	US\$27.82 billion	2001–2017	13.6	3.1
Pig, cow, and poultry meat	Production	2016	4.93 million tons	2000–2016	16.7	Fig.
Milk		2016	0.80 million litres	2000–2016	6.6	3.6
Number of large farms	Number	2017	34,050 farms	2011–2017	9.6	Fig. 3.7
<b>Indonesia</b>						
Frozen food	Production	2018	6.79 million tons	2014–2018	4.8	4.4
	Export	2018	0.57 million tons	2014–2018	-7.4	
	Import	2018	0.41 million tons	2014–2018	13.5	
Production of agri-food products	–	2018	47.3 million tons	–	–	4.26
Estimated demand for cold storage	–	2018	17.6 million tons	–	–	
<b>Lao PDR</b>						
Frozen / chilled / fresh products	Import	2017	US\$3.87 billion	FY 2015–2017**	10.6	5.2
<b>Myanmar</b>						
Refrigerated products (modern)	Domestic distribution,	FY 2017	0.07 million tons	–	–	6.2
Frozen products (modern)			0.58 million tons	–	–	

Item		Demand for cold chain		Annual growth rate*		Table
		Year	Value	Year	%	No.
Chilled/cold products (traditional)	export, and import		5.31 million tons	-	-	
Ordinary temperature			9.25 million tons	-	-	
Refrigerated and frozen foods	Import	FY 2017	0.04 million tons	FY 2014–2017	-	6.4
			US\$68.2 million	FY 2014–2017	13.3	
					11.7	

Notes: \* Compound average growth rate (CAGR) recalculated from original data. \*\* Growth rate estimated by data in two years, FY 2015/2016 and 2017. FY: Fiscal year (from October to September in the Lao PDR, and from April to March in Myanmar). Values in Thailand are converted from Thai baht to US dollars by the exchange rate, 31.76 baht/US dollar. See each chapter for the descriptions in more detail.

Source: Tables and Figures in each chapter listed in this table.

### Composition of cold chain demand

Table 7.2 indicates the composition of products requiring the cold chain. The remarkable thing is that aquatic products take a large share in the total demand for the cold chain in most countries. The cold chain is deeply related to the circulation of aquatic products in terms of both value and quantity.

The volumes of most products have generally increased. More specifically, there has been notable sharp growth in the export of fruit and chicken in Thailand, the import of frozen shrimps and prawns for intermediate use in Viet Nam, aquaculture production in Indonesia, and the import of frozen meat in the Lao PDR. In Myanmar, the export quantity of fishery products outstripped the international trade of other products and has grown dramatically in recent years.

**Table 7.2: Composition of cold chain demand**

Country	Item	Aquatic products	Agricultural products	Livestock products	Other products	Table
<b>Thailand (2018)</b>	Export (US\$ million)	1,996	2,988	4,198	687	2.13
	Import (US\$ million)	3,183	2,089	1,526	3,632	2.12
<b>Viet Nam (2017)</b>	Import (US\$ million)	813	173	357	–	Fig. 3.2, 3.3, 3.4
<b>Indonesia (2018)</b>	Estimated demand (million tons)	12.51	2.90	2.11	0.07	4.26
<b>Lao PDR (2017)</b>	Import (US\$ million)	31	12	14	–	5.6
	Import (million tons)	0.003	–	0.015	–	
<b>Myanmar (FY 2017/2018)</b>	Current demand (million tons)	0.58	0.03	0.04	0.003	5.6
	Potential demand (million tons)	5.31	5.11	4.14	0	

Notes: Thailand: Aquatic products; agricultural products; livestock products; and the sum of live plants and pharmaceutical products. Exported value of canned and processed foods including fruits, vegetables, and seafood were omitted. Viet Nam: Sum of frozen tuna, salmon, mackerel, cod, shrimps, and prawns for intermediate use; the sum of fresh apples, grapes, pears, cherries, and kiwifruit; and meat. Indonesia: Fishery products; fruits and vegetables; beef and chicken; and other products. Lao PDR: Frozen/chilled salmon/fish; vegetable and fruit; and frozen/chilled meat. Myanmar: Fishery products; selected agricultural products; meat and dairy products; and imported pharmaceutical products. The values for Thailand are converted from Thai baht to US dollars by the exchange rate, 31.76 baht/US dollar. See each chapter for the descriptions in more detail.

Source: Tables and Figures in each chapter listed in this table.

## **7.2. Activities of the main players**

### **Differences in chains and players**

Cold warehouse and transportation companies take their roles in selected parts of the distribution chain split by producer or importer, distribution centre, wholesaler, retailer, and domestic final consumer or exporter, rather than the whole logistics of the chain. The transportation distance of each company may be either short or long. For example, domestically produced products and transit trade may need long-distance transportation runs through the nation, as shown in Lao PDR and Myanmar. The scale of transportation depends on the part of the chain. Refrigerated containers of imported products are directly transported to cold storages as explained in the chapter on Viet Nam. After that, small trucks carry chilled or frozen products to the next nodal point. Viet Nam reported that motorbikes attached with ice boxes deliver products to consumers.

The differences in warehouse and transportation equipment by the purpose of the trade is notable. Modern cold transportation logistics using refrigerated trucks is mainly used for international trade according to the Lao PDR and Myanmar, although trucks do not necessarily equip or use the generating system. Meanwhile, traditional methods by using crushed ice and plastic case are widely used for products targeting the domestic market in those countries. In the case of the circulation of fishery products in Myanmar, products mixed with ice are loaded into box trucks and directly transported are common for Yangon intercity, while they are put into ice boxes and transported with general trucks for the long haul.

### **Representative companies of cold storage and transportation**

Companies using cold storage and transportation can be classified into two types. The first is food processing companies operating own cold warehouses or transportation, particularly in the fishery sector accounting for large parts of the cold storage service in Viet Nam, Indonesia, and Myanmar. Case studies in Myanmar also show that the crushed ice produced by aquaculture farms is necessary for the traditional way of fish transportation. As well as seafood companies, the storage capacity of other food processing companies is remarkably large in Thailand, Viet Nam, and Indonesia.

The other type is that companies rent cold warehouses or transportation services from other companies. There are two types of cold warehouse rental company: third-party cold warehouse or transportation services, and other companies such as food processing companies providing cold warehouses. Information on third-party services is limited in this report. Myanmar showed there were no more than 10 large-scale third-party warehousing and transportation services, respectively. Meanwhile, as shown in the chapter on Indonesia, various types of companies, including transportation, processing, logistics and forwarder, and container supplier, as well as cold storage companies, rent cold storage out to other companies. Companies with cold storage can gradually change their function, such as Hung Vuong Corporation and Minh Phu Seafood Corporation in Viet Nam. Those original seafood processing companies invested in integrated logistics centres to offer cold services for other seafood companies for addressing the degradation of cold storages installed in the 2000s. Similar to cold storage, cold transportation can be provided from various types of companies to the related sector. Myanmar showed an example of fishery exporters renting out cold transport to other fishery businesses.

Tables 3 and 4 list major companies which operate cold warehousing and transportation. We can grasp that the largest cold storage companies in Viet Nam and Indonesia are similar in level, near 60,000 tons, if we can assume the static load capacity of one pallet is a ton. The capacity of the largest third-party company in Myanmar, Ryobi Myanmar Distribution Service, is one rank smaller at 11,460 tons. Furthermore, it there are active operations of foreign capital companies, such as Emergent Cold, Ryobi Myanmar Distribution Service, and Hwasung Thermo Indonesia, and joint ventures with foreign companies including KOSPA, Premium Sojitz Logistics, and SENKOSMI.

**Table 7.3: Major Cold Warehousing Services**

	1	2	3	Table
<b>Thailand*</b>	Chiangmai Frozen Foods	Bangkok Seafood	Pacific Cold Storage	2.23
<b>Viet Nam</b>	Emergent Cold (56,650 pallets)	Mekong Logistics (Minh Phu Seafood Corporation) (50,000 pallets)	ABA Cooltrans (45,000 pallets)	3.2, 3.3, 3.4
<b>Indonesia</b>	Enseval Putra Megatrading Tbk, PT (59,000 tons)	Unilever Indonesia, PT (50,000 tons)	Sukanda Djaya, PT (45,000 tons)	4.2
<b>Indonesia Jabodetabek**</b>	Enseval Medika Prima, TbkPT (59,000 tons)	Sukanda Djaya, PT (45,000 tons)	Kiat Ananda Cold Storage, PT (30,000 tons)	4.21
<b>Myanmar Yangon***</b>	Ryobi Myanmar Distribution Service Co., Ltd (11,460 tons)	KOSPA Limited (9,900 tons)	Phee Central Logistics (4,645 tons)	6.17

Notes: Top three companies in descending order of capacity. Jabodetabek: Metropolitan area surrounding Jakarta. \*Companies carrying out refrigerated storage activities in order of revenue. \*\*Cold Storage Rental Company. \*\*\*Information on third-party cold warehousing services.

Source: Tables in each chapter listed in this table.

**Table 7.4: Major Cold Chain Transportation Service Providers**

	1	2	3	Table
<b>Thailand*</b>	P.M. Distribution	Paramee Logistics	2299 Trading	2.22
<b>Viet Nam</b>	ABA Cooltrans	Tan Nam Chinh Logistics	Tan Bao An	3.5
<b>Indonesia Jabodetabek**</b>	Hwasung Thermo Indonesia, PT	Selaras Mandiri Raya Trans, PT	Armada Container Indonesia, PT	4.22
<b>Myanmar Yangon***</b>	Premium Sojitz Logistics	SENKOSMI	Myan Express	6.19

Notes: Top three companies in descending order of capacity. \*The road transport services of freight by refrigerator vehicles' activity in order of revenue. \*\*Information on third-party cold transportation services, in descending order of the established year. \*\*\*Information on third-party cold transportation services, in descending order of the number of box trucks.

Source: Tables in each chapter listed in this table.



### **Supply of cold chain services**

Table 7.5 shows the supply of cold storage in each country. The capacity of both the public and private sectors is 940,000 tons in Thailand. The capacity of the private sector in Viet Nam is larger than 500,000 pallets. The capacities in Indonesia and Myanmar are 370,200 tons and 88,148 tons, respectively, although those indicate only the capacities of major companies. Companies operating their own cold storage, such as seafood processing companies, have large capacities for cold storage compared with cold storage companies, including third-party warehouse companies, at least in Viet Nam, Indonesia, and Myanmar.

The supplied capacity of cold storage shown in Table 7.5 is quite limited compared with the cold chain demand in Table 7.1. In Viet Nam, the production volume of pig, cow, and poultry meat account for 4.93 million tons, while cold storage provided from the private sector is 0.5 million tons when we assume one pallet can load a ton. Similarly, the estimated demand for cold storage of 17.6 million tons far exceeds the capacity of major cold storage companies of 0.4 million tons in Indonesia. In Myanmar, the total supplied capacity of major cold storage companies of 0.88 million tons is larger than the demand for modern refrigerated and frozen products of 0.65 million ton, while it is smaller than the demand for the traditional cold chain of 5.31 million tons and circulation under ordinary temperatures of 5.31 million tons.

The shortage of cold storage supply allows us to two interpretations. First, the demanded quantities listed in Table 7.5 only indicate the volumes of products that should be circulated under cold temperatures regardless of the actual storage conditions. Second, the supply of cold storage in Table 7.3, especially in Indonesia and Myanmar, only shows that of large-scale companies that can provide modern cold storage services. The large gap between the demand and supply of cold storage suggest that a substantial part of the cold chain demand is satisfied with supply from small and medium enterprises or is not fulfilled and has significant potential for companies to provide cold chain services.

**Table 7.5: Supply of Cold Storage**

	Description	Supply	No. of companies	Table
<b>Thailand (2015)</b>	Public and private sectors	940,000 tons	632	2.18, 2.19
	Private sector	180,000 tons	–	2.18
<b>Viet Nam (2015)</b>	Private sector	349,000 pallets	–	Fig. 3.12
<b>Viet Nam (2018)</b>	Private sector	> 500,000 pallets	–	Unoffic
	Major cold storage companies	246,850 pallets + 73,000 tons***	18	3.2, 3.3
	Major seafood companies*	50,000 pallets + 165,500 tons****	17	3.4
<b>Indonesia (2018)</b>	Major cold storage companies	131,000 tons	20	4.17
	Other companies*	239,200 tons	49	
<b>Myanmar (2018)</b>	Major cold storage companies**	33,658 tons	5	6.17
	Major seafood companies*	54,490 tons	113	6.16

Notes: \*Major companies operating own account cold storage other than the business field of cold storage.

\*\*Cold storage of third-party logistics. \*\*\*Capacity of 14 (pallets) and 4 (tons) of 27 major warehouse companies. \*\*\*\*Capacity of 1 (pallet) and 16 (tons) of the total of 17 warehouses of seafood companies.

Including warehouses under construction. Unoffic: Unofficial data.

Source: Tables and Figures in each chapter listed in this table.

Information on cold transportation in the whole country was briefly shown in the chapters on Indonesia and Myanmar. According to the Indonesian Cold Chain Association, the capacity of refrigerated trucks in Indonesia is around 3,000 units with a capacity of 15,000 tons per day, which meet 10% of the needs. Myanmar's cold chain sector has 7,023 refrigerated box trucks operated by both own-account and third-party logistics.

### 7.3. Government policies

Neither country in this study has an integrated policy on the cold chain, although economic and social development plans might be placed as a guide in a broad sense. Various policies affect the development of the cold chain both directly and indirectly.

### **Policies directly affecting the development of the cold chain**

A noteworthy voluntary regulation directly affecting cold storage and transportation is the service quality standard for truck operation, or the Q Mark standard, in Thailand tested in 2019, which set up a common quality standard of temperature-controlled transport. The evaluation approach of the standard focuses on four key factors, such as the operation of transport, hygiene, the standard and maintenance of cold storage, and human resource development. In addition, the Thailand Professional Qualification Institute is developing a professional cold chain course to improve the Thai workforce's competitiveness in terms of skill and knowledge. We can learn from the advanced efforts of the Thai government to standardise cold transportation and develop human resources.

Other regulations related to the cold chain include the Warehouse, Silo and Cold Storage Act in Thailand and Presidential Regulation No. 71 of 2015 in Indonesia for controlling operations in factories, storage, and transportation that use the cooling system. Rather than regulations, a guideline about the temperature control of fishery products is adopted by the Myanmar Fisheries Federation, although there is weak compliance from local businesses.

Temperature control is generally stipulated in food standards in each country. For example, the Food Safety Law in Viet Nam states the technical requirements for frozen and chilled products, such as seafood and meat requiring temperature control.

The government can directly support facilities and markets, which can be nodes of the cold chain. The government in Viet Nam conducted credit support to purchase machinery and equipment, including refrigerated cargo, machines for producing ice, and cold storage facilities under Decision 68/2013/QD-TTg, although the accessibility to the support is low for targeted groups. The Ministry of Maritime Affairs and Fisheries in Indonesia has allocated funds to introduce cold chain facilities, such as ice flake machines, refrigerated vehicles, cold storage, and fish markets in recent years. In Myanmar, the government supports the development of commodity markets, such as the ongoing Danyingone Wholesale Market with modern cold storage.

### **Policies indirectly affecting the development of the cold chain**

Several policies examined in each chapter would indirectly affect the improvement in the cold chain. First is investment promotion for cold chain businesses, such as tax exemptions for investment and permission for ownership to foreign investors in Thailand. Decree 163/2017/ND-CP in Viet Nam would have impacts on shaping the investment environment while creating more room for foreign investors to join logistics services. One of the aims of Directive 21/CT-TTg in Viet Nam is to attract investment in logistics infrastructure aligned with e-commerce development. Similarly, the Indonesian government has opened the cold chain, especially the field of cold storage, to foreign investments, according to Presidential Regulation Number 44 of 2016.

Infrastructure development led by the government would also affect cold logistics. In the Greater Mekong Subregion, the development of roads and seaports crossing the region is focused on as a factor largely affecting international transportation. Those initiatives include the construction of the Eastern Economic Corridor in Thailand, a few projects affecting transportation in Myanmar, such as India – Myanmar – Thailand Trilateral Highway Project, and China’s One Belt One Road Initiative, containing the Vientiane – Kunming High-Speed Railway Project that is expected to change the transportation environment in the Lao PDR.

Customs operations have been improved in many countries as well as investment promotion. Thailand introduced modern systems, namely the National Single Window, to facilitate the use of electronic data and information sharing, and the Port Community System to set the electronic platform to improve processes at seaports and airports. Meanwhile, the Lao PDR pointed out problems with the regulations on customs that the number is limited and that they miss regulating principles related to perishable goods. This results in the ambiguity of statements and non-integrated and weak enforcement.

### **7.4. Policy implications**

Governments have already implemented or considered the countermeasures to issues of cold chains as shown in the previous section. However, the arguments in each chapter might provide further insights to improve the cold chain. In this section, we summarise the policy implications from the aspects of the hard and soft assets of companies, public infrastructure, and

connectivity of the chain. These would affect the operation cost of the cold chain, one of the common and essential issues, as well as the transportation times and quality of products requiring cold temperatures.

### **Stimulating the investment of companies in hard assets**

Insufficient hard assets, such as warehouses and trucks in specific regions or parts of the chain in terms of quantity and quality was specifically mentioned in the chapter of Viet Nam. For example, both refrigerated vehicle resources and refrigerated warehouse space are not enough in the producing areas of agricultural products. When focusing on farmers, the enhancement of household-scale cold storage technology and equipment, particularly for perishable products, is needed. Companies need to update degraded cold storages in specific sectors, such as the seafood industry, with expanding capacities and by introducing new technologies. Modified cold vans with attached air-conditioners widely used by small transportation companies have the room to reinforce equipment to ensure the quality of transported products. As well, home delivery using cold insulation boxes attached to motorbikes will be demanded according to the expansion of e-commerce and are thought to be a potential investment area.

Facilities should be designed in line with the local market size and its demand. In the case of Myanmar, warehouses with massive capacities, designed based on countries having developed cold chains, are mismatched with local demand and cause a low utilisation rate. Transportation with modified cold vans and motorbikes reported by Viet Nam, domestic circulation using crushed ice and insulation box in the Lao PDR and Myanmar, and farmers' storage utilising natural cold weather at night in Thailand are economically rational ways with the potential for investment or improvement, rather than low-technology which should be cast off.

Investment in agriculture and fisheries, which are affected by natural conditions, is risky and costly. As mentioned in the chapter on Viet Nam, a clear vision of the government showing the development priorities of the cold chain and the public-private partnership mechanism would ease investors to make decisions about entry into those sectors.

### **Fulfilment of soft assets or human resources**

This report often stressed insufficient soft assets, especially human resources, in the cold chain. The Lao PDR mentioned the shortage of truck drivers who have experience in the cold chain. Myanmar argued the need for training for different types of vehicles before issuing driving licences. More skilled professionals for warehouse management and operation to provide services demanded by the international audience are also needed. Thailand mentioned drivers' insufficient English skills and knowledge for working across borders.

In Viet Nam, there are almost no universities offering courses and or with curriculums related to cold chain logistics and management in agriculture. It is expected for that universities will open new education programs and short-course training for the staff and managers of companies involved in the cold chain.

### **Investment in public infrastructure**

The lack in quantity and quality of infrastructure, including roads, railways, waterways, ports, and electricity supply, cause high logistics costs and damage perishable products. The issue of roads includes the availability of short-distance roads, the quality of the roads, and traffic conditions. Regarding short-distance roads in Myanmar, for example, there is a need for consideration of the opening of the Yangon–Mandalay Highway Road, which is currently restricted for trucks. This argument contains a wide range of issues, such as investment for highway equipment, road maintenance, and traffic safety.

Meanwhile, the chapters on Viet Nam and the Lao PDR pointed out the problem of road quality, as roads are damaged by too many or over-weighted trucks. Thailand mentioned that traffic congestion, which can be caused by road construction, would result in delivery delays. There is room for further discussion about traffic control, substitutional transportation modes, and the method of road construction for routes important for cold chain.

Stable electricity supply in the routes of the cold chain is also needed to reduce the costs of cold storage and transportation. This might reduce the need for backup batteries in cold warehouses for power outages as considered by Viet Nam. In the case of Myanmar, the construction of stations with proper charging facilities designed for long-distance transport vehicles would benefit transportation by trucks, which do not equip portable generators for the chilling systems of the reefer containers.

### **Improvement of connectivity of the chain**

Integrative management of the cold chain would decrease the risks and costs during the preservation and transportation of products. Cold chains in Viet Nam, other than that for the in-house seafood chain, are evaluated as highly fragmented in all stages. Strengthening the vertical relationship between companies, or further vertical integration, could be a measure to realise such integrative management. Another essential factor is individual technologies, such as the sensor and transmitter system that is used to send data, and communication networks between the actors of supply chains, which are mentioned as technologies for the fishery chain in the chapter on Indonesia.

Connectivity in terms of international trade through customs is also a notable issue. In particular, the Lao PDR and Myanmar examined transit trade as a key driver to develop the cold chain since it can expand without being restricted by the scale of domestic production. Although the high connectivity of international trade requires efficient customs operations, there are still several issues in customs in the reported countries. Thailand mentioned the inconvenient and complicated import declaration process and the inconsistent clarification of exported products. Similarly, the Lao PDR argued the need to decrease customs procedures and release clear statements about the times and fees of customs operations. These measures would improve competitiveness in terms of transportation time and the freshness of carried products.

We should note the warning in the chapter on Myanmar about the necessity of countermeasures to prepare for international competition, particularly in the field of transit-trade. There will be a downfall for the logistics industry if the cost, time, and quality of the cold chain cannot be guaranteed as neighbouring countries under the condition of high international or regional connectivity. The cold chain should be promptly improved from various aspects since the progress of international connectivity suggests an intensification of international competition in cold chain industries.