Chapter 3

Overview of the Cold Chain for Agriculture in Viet Nam

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Chapter 3

Overview of the Cold Chain for Agriculture in Viet Nam

Dang Kim Khoi[10], Pham Thi Kim Dung[10], Dang Kim Son[10], Do Huy Thiep[10], Pham Duc Thinh[10]

3.1. Introduction

This research aims to provide an overview of the key agricultural cold chains in Viet Nam by identifying the main related stakeholders in Viet Nam's cold storage and transportation system and their capacity, analysing the associated issues/problem related to the development of Viet Nam's cold chain, reviewing the relevant policies and regulations to Viet Nam's cold chain development, and discussing the mid-term prospects of the cold chain in Viet Nam. Fruit and vegetables, livestock, fishery, and processed foods are the main agricultural products considered in this research.

The research methodologies include desk study, in-depth interviews, and expert consultations. Desk study provides basic information and data on the demand drivers of cold services, including agricultural trade, the development of modern retail and the food sector, and changes in dietary habits from fresh foods to chilled/frozen foods for Viet Nam's consumers. This methodology was also used to collect fundamental information on the main stakeholders and their characteristics. Meanwhile, in-depth interviews with some main stakeholders in cold storage and transportation services help to map out the main cold chain flows and figure out key issues to foster cold services in the nation. Currently, a national database related to household food consumption and production is collected by the General Statistic Office via two main surveys: the Viet Nam Household Living Standard Survey every two years (VHLSS) and an annual enterprise survey. Nevertheless, both datasets have no specific information on chilled/frozen food products and there is also no official information or dataset to estimate cold storage and transportation capacities in Viet Nam. Therefore, in-depth interviews with various stakeholders and expert

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consultations with senior managers from different companies and organisations are used to estimate these numbers.

The results indicate that the cold chain in Viet Nam is in the early stage of development and has a great potential for new investment. Specifically, the seafood sector seemingly outpaces other sectors in terms of capacity, integrity, and continuity regarding cold-chain utilisation. In addition, the emergence of domestic modern retail, fast-food services, and high-value food consumption has created new demand for cold services in Viet Nam and is regarded as a key factor to accelerate Viet Nam's cold chain development in the medium term and long term. However, Viet Nam so far has not established specific policies and regulations for the cold chain sector. In most cases, provisions for cold services are derived from food safety, post-harvest, and logistics policies as well as TCVN.[11] This situation would open various opportunities for related stakeholders to implement policy advocacy activities to set up a comprehensive policy framework for Viet Nam's cold chain.

3.2. The current situation of the cold chain in Viet Nam

The development of the cold chain in Viet Nam, including cold storage and cold transportation, can be seen from both the supply and demand sides.

Demand drivers of cold chain development in Viet Nam

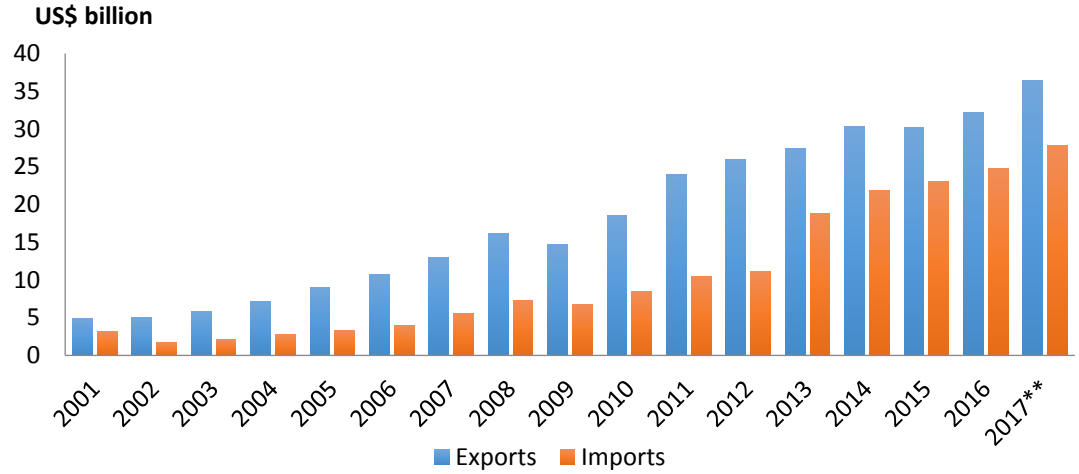
- Viet Nam's agricultural trade growth

Over the last two decades, Viet Nam's agricultural trade growth has experienced a fast pace, with a compound average growth rate (CAGR) of export value from 2001–2017 of 12.5%/year and that of import value in the same period of 13.6%/year. Wooden furniture, shrimp, cashew nuts, fruits and vegetables, coffee, rice, rubber, and pangasius are the top agricultural exported products, for which fruit and vegetables enjoyed the most significant increases from under US$500 million in 2010 to US$3.5 billion in 2017. Meanwhile, livestock and its related products,

[11] TCVN (or Tieu Chuan Viet Nam) means Standards of Viet Nam.

intermediate seafood for further processing, and fruits and vegetables account for notable shares in the national agricultural import structure.

Figure 3.1: Viet Nam Agricultural Trade Growth, 2001–2017



Note: **Preliminary data.

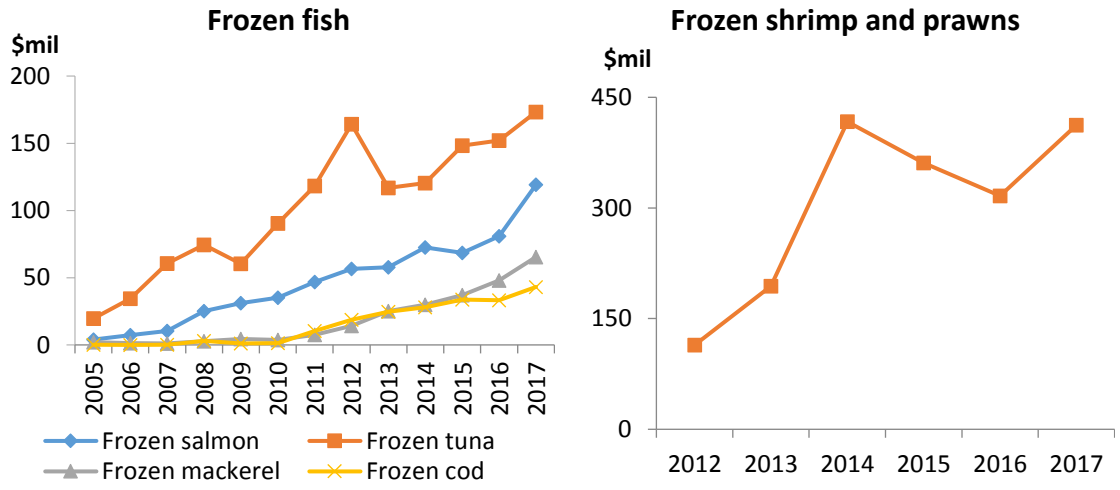
Source: General Statistic Office of Viet Nam (2018).

Seafood, fruit and vegetables, and meat are perishable goods that create major demand for cold services, in which seafood plays a dominant role (Nomura Research Institute 2016). From the export side, finished products of chilled/frozen shrimp and pangasius, which in total account for two-thirds of the seafood export value, control the demand growth of cold services. The production of raw materials and processing for seafood exports is concentrated in the Mekong River Delta, creating the leading role of the region in creating demand for cold storage services. According to Stoxplus (2016), the storage market is 14 times larger in the South compared to the North of Viet Nam.

In Viet Nam's seafood sector, in the last eight years, diseases and unfavourable weather have created some periodic shortages of shrimp materials for processing, triggering the import of unprocessed shrimp from India and Ecuador to fill the supply gap. An emergent phenomenon is that seafood manufacturers with ample processing capacity import intermediate seafood materials, conduct processing, and re-export to international markets. From 2005 to 2017, the total import value of frozen salmon, tuna, mackerel, and cod accelerated from around US$25

million to US$400 million, which brought Viet Nam to become a marked outsourcing hub for seafood processing in the world. The current United States–China trade conflict is expected to foster the shift of intermediate seafood flows from China to Viet Nam.

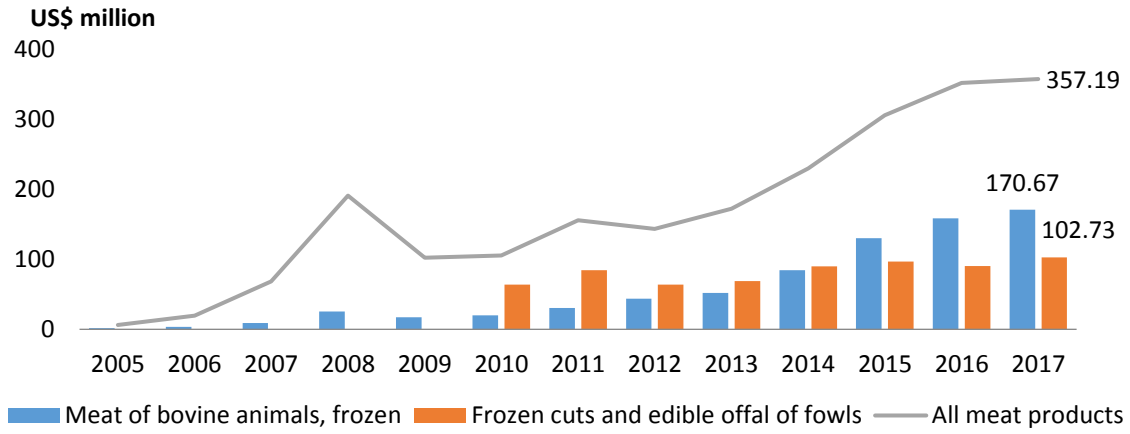
Figure 3.2: Intermediate Seafood Imports of Viet Nam (US$ million)



Source: Trademap (2018).

Meat imports are another important driver for the development of cold chains in Viet Nam. Urbanisation, higher income, and food safety perceptions also accelerate Viet Nam's meat imports for domestic consumption, in which fast-food services/full-service restaurants seem to play the main role. Frozen bovine and frozen cuts and edible offal of fowls made up over 75% of the total imported meat value in 2017. Not only international fast-food brands and full-service restaurants using imported meats but also street food vendors/kiosks also find higher profits when using cheap imported meat. International trade statistics show that during 2005–2017, the import value of frozen meat-related products increased significantly and reached the amount of US$357 million in 2017.

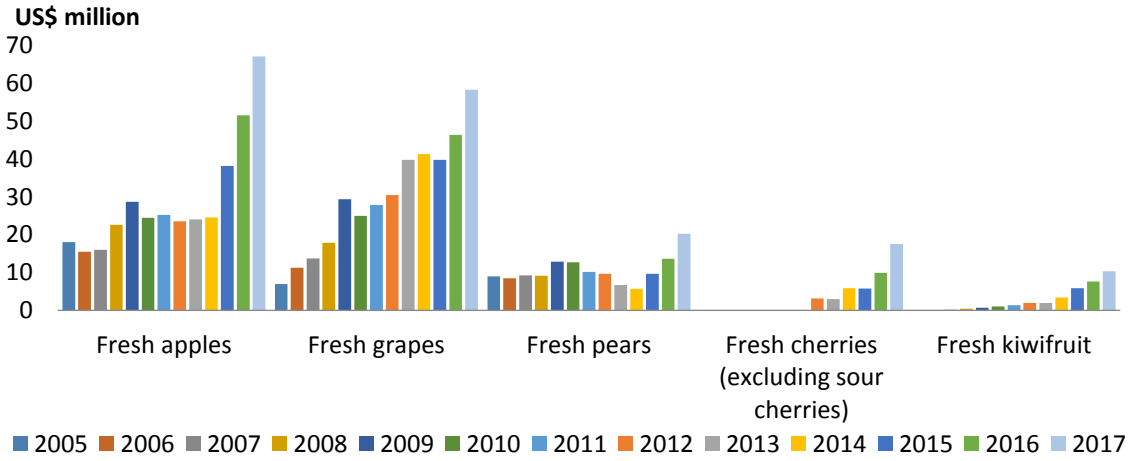
Figure 3.3: Viet Nam's Meat Imports by Value, 2005–2017



Source: Trademap (2018).

Viet Nam's imports of fruit and vegetables also increase demand for cold storage and transportation. During 2005–2017, the CAGR of import values of fresh apples, grapes, pears, cherries, and kiwifruit in Viet Nam reached significant amounts of 54%, 19%, 12%, 33%, and 57%, respectively. In 2017, the total import value of these five fruits in Viet Nam reached US$170 million.

Figure 3.4: Import Values of Selected Fruits in Viet Nam, 2005–2017



Source: Trademap (2018).

- The development of modern retail and fast-food services

Rapid urbanisation, higher incomes, and increasing awareness of food safety in the context of a highly integrated economy thanks to the participation of free trade agreements (FTAs) fuel the development of modern retail and fast-food services in Viet Nam. Although the retail market system is still dominated by traditional wet markets and small independent stores, the modern retail food sector has performed at a faster growth rate. The CAGR of sales of modern grocery retailers from 2012 to 2017 reached 14.6%, compared to 9.5% for traditional grocery retailers. Similarly, the number of modern groceries has grown 260% since 2012, compared to only 5% for traditional grocery outlets.

Table 3.1: Comparison between Traditional and Modern Grocery Retail Channels in Viet Nam, 2012–2017

Type		2012	2013	2014	2015	2016	2017
Sales (US$ million)	Modern	1,712	2,097	2,696	2,807	3,254	3,612
	Traditional	39,303	46,804	53,742	58,109	61,980	67,331
Number of Outlets	Modern	897	1,054	1,211	1,748	2,600	3,272
	Traditional	629,222	635,176	641,542	447,556	652,988	658,005

Source: USDA (2018).

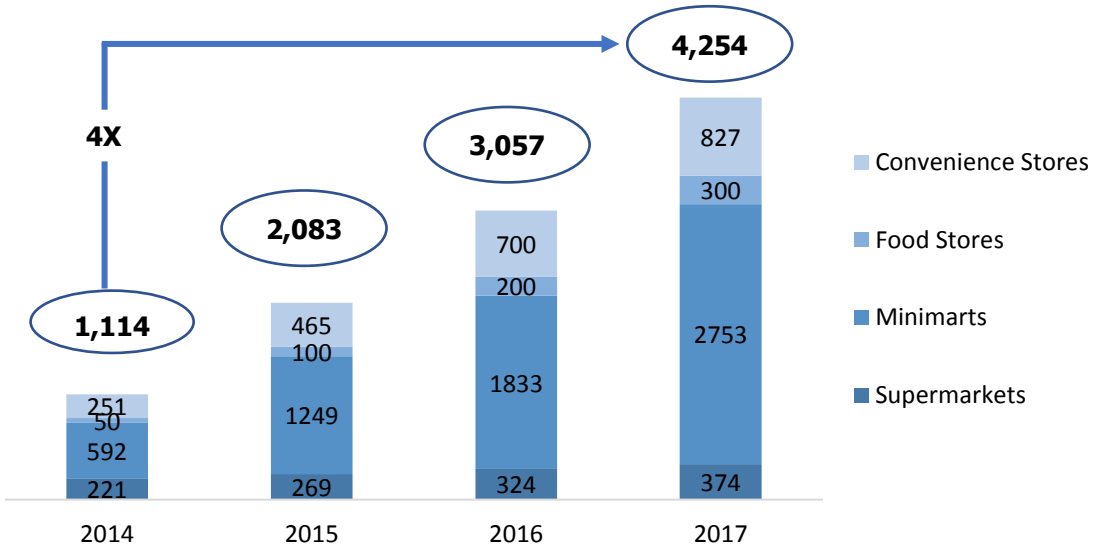
Modern retail food chains are in the process expanding their distribution networks, not only in first-tier cities[12] like Hanoi and Ho Chi Minh City but also in second-tier cities[13] and provinces across Viet Nam. The presence of modern supermarkets and convenience stores in lower-tier cities has gradually changed spending habits and the perception of local people, creating new experiences and helping consumers change their perspectives, diversify their choices, and direct their consumption from traditional retail channels to modern ones. In 2019, Vinmart+ even arrived in third-tier cities[14], making a pioneering role in the next round of competition in the

[12] First-tier cities are the economic centres of the nation, such as Hanoi, Da Nang, Ho Chi Minh City, and Can Tho.
[13] Second-tier cities are the economic centres of provinces, such as Nam Dinh, Vinh, etc.
[14] Third-tier cities are economic centres of districts, such as Ha Dong, Son Tay towns, etc.

modern retail chain in Viet Nam. This indicates that the demand for cold services in inter-provincial and regional levels have great potential for development.

Furthermore, in first tier-cities, the presence of mega malls, such as Big C, AEON, LOTTE, etc. and modern apartment complexes, such as Royal city, Times city, etc. with food courts, the steady growth of fast-food chains and the increasing popularity of quick-service restaurants also contribute to expanding demand for cold services. Fast food is one of the main users of Viet Nam's cold chain and accounts for 35% of the market share in Viet Nam's food-service sector, especially in the cases of imported beef and chicken meat cuts.

Figure 3.5: Number of Modern Retail Shops in Viet Nam, 2014–2017



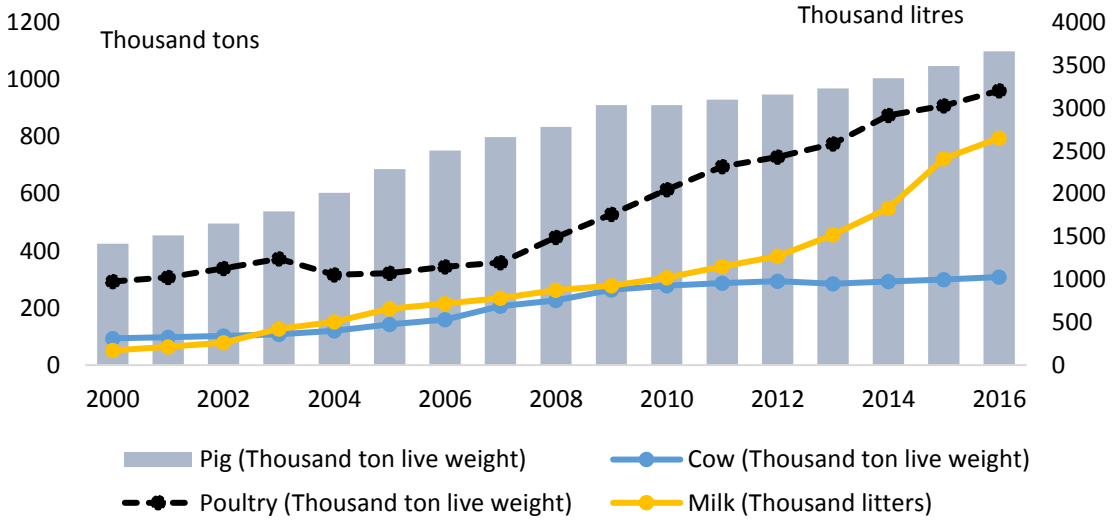
Source: Carrier (2018).

- Higher proportions of production of high-value and perishable agricultural products

Commercialisation in agriculture production, particularly the development of large farms, and the transformation of the farming system from low-value to higher-value products have formed a concrete base for cold-chain demand in the long-term. From 2000 to 2016, the total production of most agricultural products doubled, tripled, or increased even more. The production of beef (cow live weight) increased from 93,800 tons in 2000 to 308,600 tons in 2016 with an average annual growth rate of 7.73%. The poultry sector has witnessed a similar average

annual growth rate of 7.71%, but the evolution of this sector has fluctuated more because of bird flu outbreaks during 2003–2007. However, since 2008, the sector started to rocket and reach a very high growth rate in the following period of 11.58% per year. Over the whole period, pork is still the dominant type of meat for Vietnamese households. The production of pork in 2016 was 3.67 million tons, which was nearly three times higher than the production of cow and poultry combined.

Figure 3.6: Production of High-value Agricultural Products



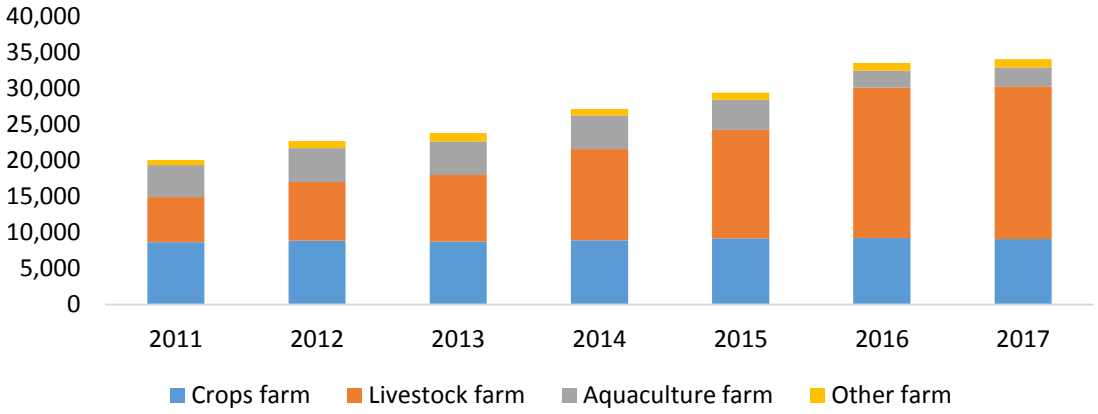
Source: General Statistic Office of Viet Nam (2018).

Calculations based on the VHLSS data show that the percentage of households selling their products increased constantly in the last decade. During the 2008–2016 period, the proportion of farmers selling high-value perishables increased rapidly, with vegetables rising from 2.54% to 6.96%, fruit from 1.60% to 7.62%, milk from 3.23% to 8.38%, pork meat from 14.02% to 30.9% and poultry from 6.27% 14.21%. It can be seen that all of these high-value products are more perishable than basic grain crops, such as rice and corn, and lead to an urgent need for the cold chain instead of regular fresh product storage and transportation services.

Moreover, the number of large farms in Viet Nam has increased steadily in recent years. Nearly 14,000 new farms were established in Viet Nam during the 2011–2017 period, which means on

average that about 2,300 farms are established every year (GSO, 2019). These farms who are commercialised producers are more likely to employ cold chain facilities to store and transport their products.

Figure 3.7: Number of Large Farms in Viet Nam, 2011–2017



Source: General Statistic Office of Viet Nam (2018).

- Higher proportion of consumption of chilled and cold products

The proportion of chilled and cold products in household food consumption has increased for three reasons. First, people spend more money on foodstuffs (meat, fruits and vegetables, etc.), which require cold-chain services more than grains, which do not require a strictly temperature-controlled environment. Statistics based on the VHLSS show that the share of household grain consumption (mainly rice) dropped from 11.7% of total household consumption in 2006 to only 6.4% in 2016, while that of foodstuff remained at about 28% of total consumption. Second, because of convenience and increasing awareness of food safety, more consumers choose supermarkets or minimarts (small supermarkets) to buy their foodstuffs rather than traditional markets. According to IPSARD (2013), only 8.3% of household-bought food and foodstuffs from supermarkets/minimarts, and these food/foodstuffs only accounted for less than 13.2% of their food consumption. In 2018, this number increased to 14.9% and 18.6% respectively. Many households now go to supermarkets once a week to buy food and foodstuff supplies for their whole week, and most of these meats/vegetables are chilled/frozen.

Thirdly, our value chain analysis and expert consultancy information show that most chilled/frozen foodstuffs are consumed in restaurants and public kitchens/canteens rather than in individual households. Currently, different types of chilled/frozen products are used in restaurants. On the one hand, high-quality imported chilled/frozen meat/vegetables (e.g., beef from Australia, United States, Japan; salmon from Norway) go to elegant restaurants, fine dining, fast-food restaurants, and casual restaurants. On the other hand, cheap imported frozen meats (especially chicken from the United States, Brazil, and Korea and buffalo from India) are used by Com Binh Dan restaurants, Noodle/Pho Restaurants, school kitchens, and office/factory canteens. Based on the author's calculations using the VHLSS, the proportion of out-of-home food consumption in total income has nearly doubled in the last 10 years from 7.1% in 2006 to 12.1% in 2016.

Supply drivers and the main cold chain channels in Viet Nam

The supply side of the cold chain for agriculture in Viet Nam consists of three main channels: (i) imports of finished food products for consumption, (ii) seafood products, and (iii) chilled fruits and vegetables in the domestic market. Each channel is characterised by its integrity, continuity, and affordability. Integrity refers to the fact that the whole channel is undivided and managed by a few stakeholders; thus, the fewer stakeholders in a chain, the higher the integrity of the chain is. Continuity describes the unbroken and consistent operation of cold services along a chain; so, the less interrupted chain shows the higher continuity. Affordability indicates the relative costs among chains, including fixed investments of cold service suppliers as well as price offered to achieve the client's acceptance.

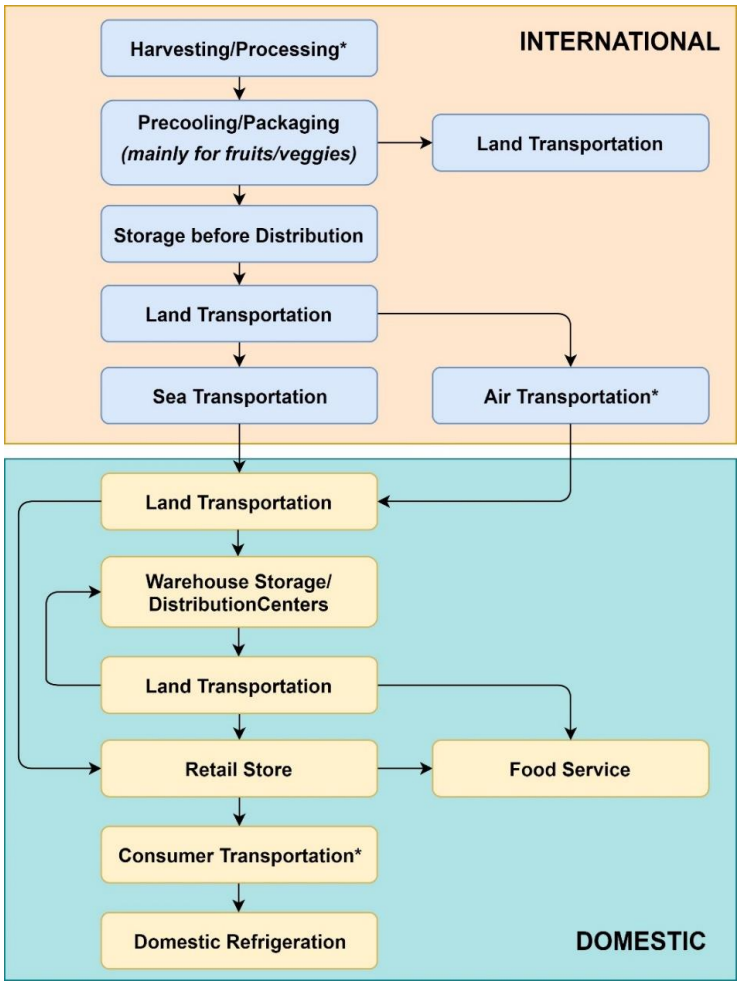
- The channel of imports of finished products for direct consumption

Finished products for direct consumption contain imported fruits and vegetables, and meat, seafood, and dairy products for either direct consumption or food services. The flow is characterised by high continuity, medium integrity, and low affordability aimed at high-quality, high-value food segments, mainly coordinated by distributors/retailers. Currently, the flow scale is small but still highly promising for further expansion thanks to the increasing demand for imported foods.

The flow starts from international material sources and penetrates to Viet Nam when refrigerated containers approach ports and arrive at warehouses/distribution centres by land transportation on trailer trucks. Containers are unloaded under temperature-controlled procedures in warehouses/distribution centres. Products are preserved and organised in cold/chilled facilities before being delivered to retail stores/food service suppliers via small temperature-controlled vans, usually under 2 tons in weight, which is easy to travel in crowded urban areas. From retailer stores, chilled/frozen foods are purchased and self-carried home by customers or delivered to homes in simple insulation boxes.

This channel shows clearly the high continuity in most stages, and foods are maintained in a strictly temperature-controlled and uninterrupted process. Meanwhile, its integrity is ranked as medium because a stakeholder could only provide services for up to two or three steps with a certain level of outsourcing along the flow. To maintain food quality in the channel, cold chain providers must equip high-tech facilities, professional services, and modern management systems. Therefore, both their fixed and variable costs are usually higher than average in Viet Nam, leading to high prices offered to customers. In other words, the affordability of the flow is low and only high-quality, high-value food importers/providers could cover the cost.

Figure 3.8: The Flow of Imported Products for Direct Consumption



Note: *Steps where no refrigeration is generally applied.

Source: Authors.

This channel is likely driven by distributors/retailers than cold service providers because the modern retail market is relatively small but highly concentrated. This means that professional cold chain services have to rely on a few big clients to cover their high costs. Moreover, most domestic value chains of agricultural and food products in Viet Nam are long and significantly diverse, building up various constraints to both local and international manufacturers to establish their own, direct sales channels. At the same time, higher income and lower tariffs led by different FTAs are favourable conditions for Viet Nam to import more foods in the future. As a result, distributors/retailers hold long-term advantages to create new demand and expand scale for the flow.

Box 1. Thang Long Logistic Center

The Thang Long Logistics Center opened in October 2018 in My Hao District, Hung Yen Province. It is the first modern multi-functional logistics centre in the province. The centre has a total investment capital of nearly D280 billion from Transimex Corporation, Vinafreight Joint Stock Company, VNT LOGISTICS Joint Stock Company, Cho Lon Investment and Import Export Joint Stock Company (CHOLIMEX), and Tuan Manh Trading and Investment Co, Ltd.

The three-hectare project boasts a general storage system, freezer storage, an eight-storey racking system, humidity control, a camera system, a fire fighting system, and modern management software. The storage system meets ISO, HACCP, and CT–PAT standards. It will store and distribute fast-moving consumer goods (FMCG), fresh foods, and raw materials to local people and producers in industrial zones in Hung Yen and neighbouring provinces. The chilled and frozen storage is 5,000m^2, with a capacity of 12,000 pallets with temperature adjusted from 10–30°C.

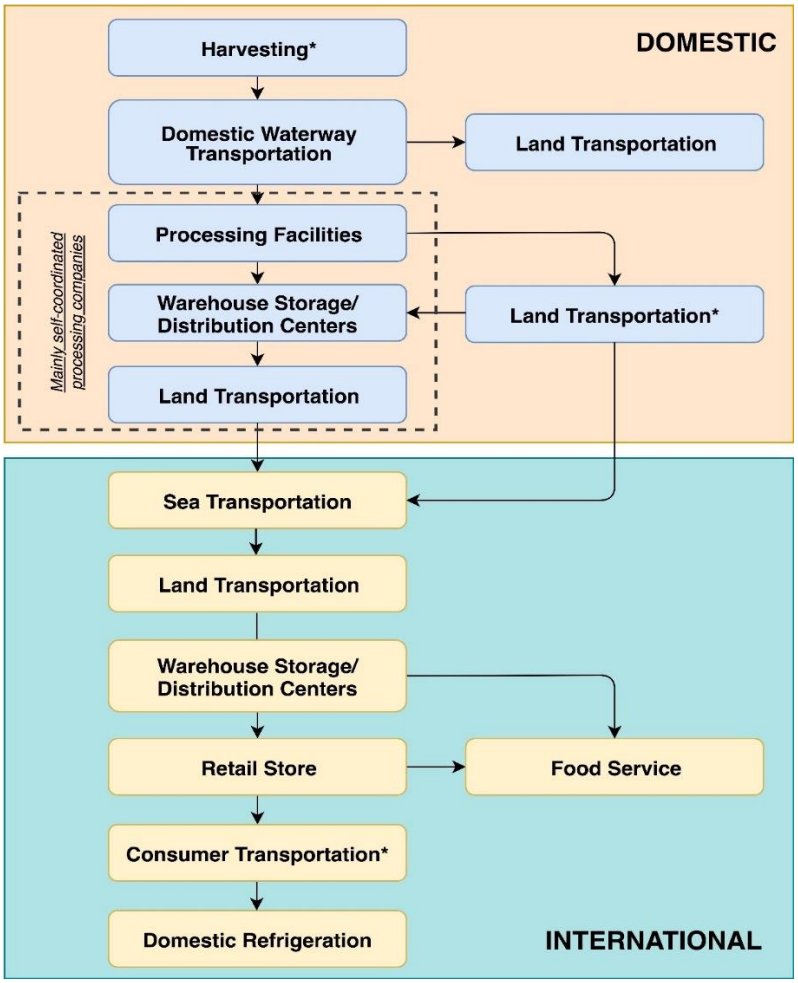
The multi-functional logistics segment generally, and cold services particularly, in the North is harder to penetrate than that in the South due to the limited scale of goods flows, land availability, smaller retail market, and higher institutional obstacles. More straightforward and higher price-sensibility demand by clients using cold services is also a restriction for cold chain development in the North. Foreign multi-functional logistics suppliers are using mergers and acquisitions as a strategy to join the North cold chain market and lower initial costs.

Source: Field trip conducted by authors.

- The channel of seafood products

There are two main channels of seafood products in the cold chain in Viet Nam: exported seafood products and intermediate seafood products. While the former uses sources from domestic raw materials, the latter exploits international raw material supplies. The phenomenon of importing intermediate seafood materials for extra processing and re-exporting to international markets has emerged since the last few years, creating more demand for cold services. These two flows are recognised to have the biggest shares in the cold chain demand structure in Viet Nam and featured by its high integrity, high continuity, and low affordability.

Figure 3.9: The Flow of Seafood Exports

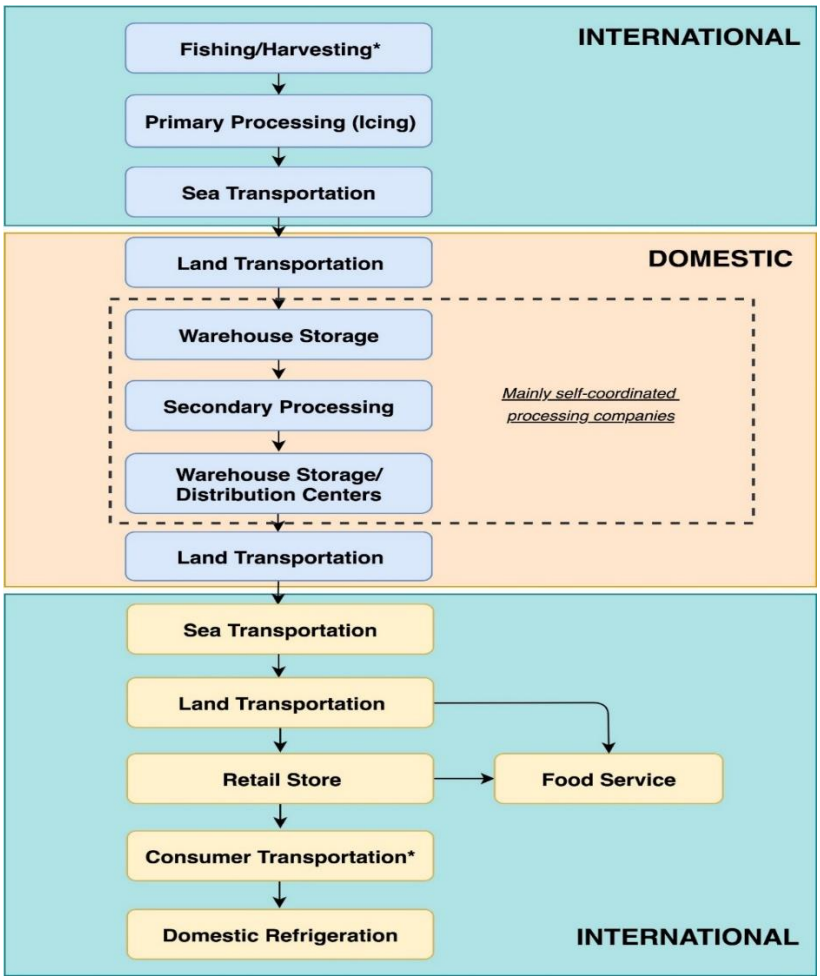


Note: *Steps where no refrigeration is generally applied.

Source: Authors.

The seafood export flow starts from the local harvesting and transporting of raw materials, mainly by domestic waterways either with or without temperature control, to processing facilities mostly equipped with freezer and cold storage. The finished products are land-transported to either warehouses/distribution centres or seaports to export. Meanwhile, the intermediate seafood flow has a similar route but begin with international fishing/harvesting and raw materials freezing before shipping by sea to Viet Nam for further processing. Right after entering the processing facilities, the raw materials are stored in constant temperature-supervised procedures to ensure their quality from the factory gates to the export markets.

Figure 3.10: The Flow of Intermediate Seafood Products



Note: *Steps where no refrigeration is generally applied.

Source: Authors.

These two channels demonstrate both high integrity and high continuity when cold services are exploited uninterruptedly along the chains, from the very early stage of raw materials in the case of intermediate seafood materials and run largely by seafood manufacturers. Cold storages are an integral part of seafood manufacturing, but in many cases, seafood processors face periodic capacity shortages when their businesses grow up. They could make investment decisions in either constructing upgraded self-operating cold storages or outsourcing cold services from professional providers. These flows are considered affordable because they have been utilising their own cold storage and services for a long time. Thereby, the fixed costs have depreciated significantly and the variable costs have been managed tightly. Thanks to the low operating cost of these flows, Viet Nam's seafood exporters can offer competitive prices in its international markets.

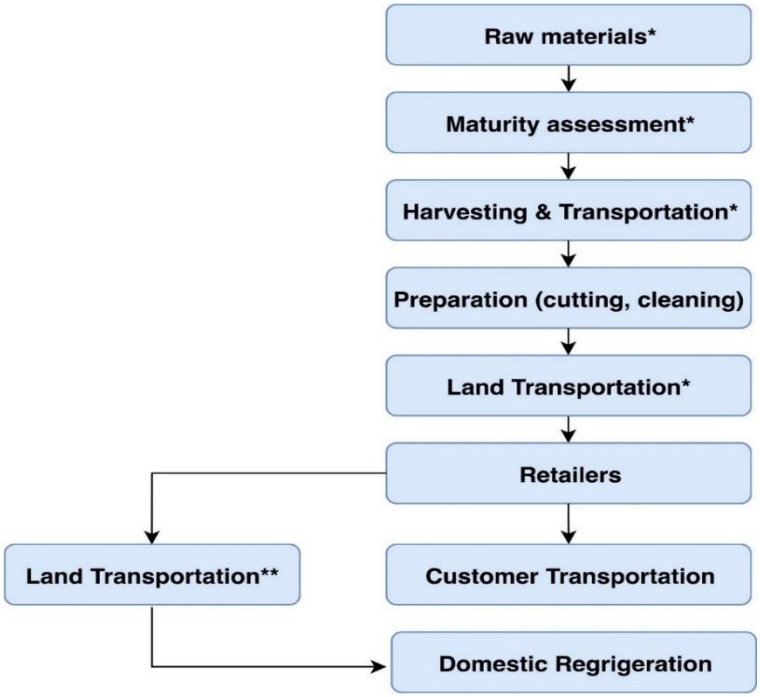
- The channel of chilled fruits and vegetables in the domestic market

This flow is hugely disrupted, and semi-professional cold services are significantly costly. Chilled fruits and vegetables in the domestic market are used mostly in modern retailers, including modern grocery stores, super/hypermarkets, and convenience stores. In other words, retailers dominate the chain and set rules for other stakeholders.

From raw materials to land transportation and assigned preparation facilities, fruits and vegetables are loosely temperature-tracked and preparation facilities have been installed with elementary temperature-controlled devices, mainly air-conditioners in closed rooms to maintain the quality of fruit and vegetable products on hot days. This situation demonstrates low integrity and continuity of the chain as it has recruited various stakeholders with different procedures and products that experience unstable temperature conditions along the chain. However, the flow is burdened with its high costs, especially variable costs, due to small and fragmented raw material production, and lack of demand as well as integrated management solutions. Stakeholders in the flow also practice high outsourcing rates to disperse costs and risks along the chain and, more importantly, and they do not consider their cold chain services as a significant part of their business. The low affordability of the chain is reflected in the high rates offered to retailers (D14,000/km) compared to uncontrolled-temperature services for

transporting the same type of products (under D10,000/km). Notably, the cold transportation service providers in the North in the flow are mainly active in relatively short distances.

Figure 3.11: The Flow of Chilled Fruit and Vegetables in the Domestic Market



Notes: *Steps where no refrigeration is generally applied. **A step where refrigeration is applied but in very basic form and with a lack of standards.

Source: Authors.

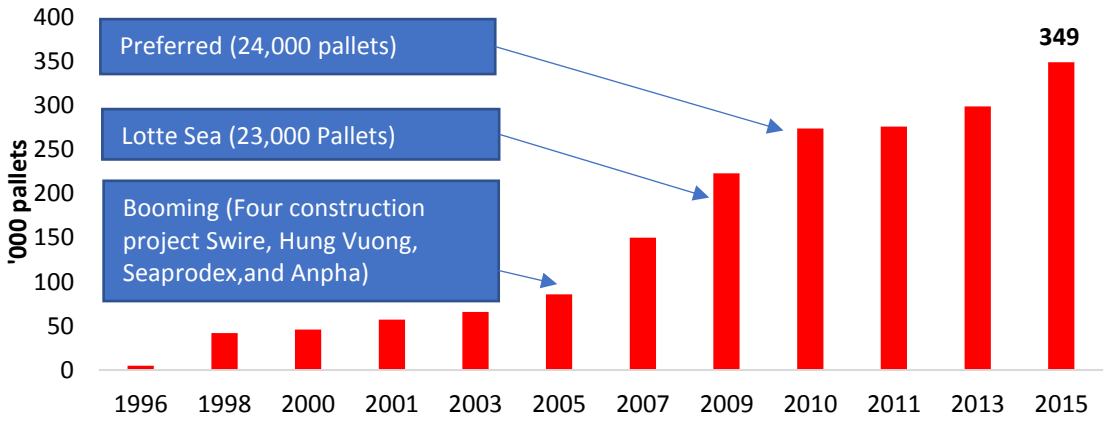
Cold service stakeholders in the chain seem not to be optimistic of the short-term growth prospects, but they enjoy a relatively low competitive market with few cold storage/transportation services providers. New players on the ground make efforts to attract clients to use their professional, advanced-tech, and transparent services instead of old-style, obsoleted-tech, and small-scale services from established providers.

Main stakeholders of cold chains in Viet Nam

- Main players in storage services

The cold storage services market in Viet Nam is divided into two major parts: commercial cold facilities and self-operating facilities, in which the self-operating segment is dominated by the seafood processing sector. StoxPlus (2016) estimated that in 2015, the total designed capacity of Viet Nam commercial cold storages was estimated at 349,000 pallets and dominated by domestic local players. In the last three years, both foreign and domestic companies have increasingly invested and expanded new storage facilities generally, and cold storage in particular, but the former are making bigger investments in cold storage industry than the latter. Therefore, they are gaining higher market shares. An unofficial estimation[15] has estimated the current total commercial capacity at 500,000 pallets, but it could be higher in the fact. The tables below have shown that domestic players and their foreign competitors are more or less equal in terms of market share in the situation of an incomplete dataset.

Figure 3.12: Cold Storage Capacity Growth in Viet Nam



Total designed capacity of Viet Nam commercial cold storages was estimated at 349,000 pallets in 2015

Note: The boxes indicate the notable additional capacities that were brought to market in those years. For example, in 2010, among many investments in cold storage development, the new cold storage built by Preferred with a capacity of 24,000 pallets was the biggest one.

Source: Stoxplus (2016).

[15] These numbers are derived from the presentations of some experts in the cold chain workshop in Ha Noi in January 2019.

Commercial cold storage services in the South have developed far ahead of the North, demonstrated by the outstripped number of both foreign and domestic cold services providers as well as their sizes in the former compared to the latter. According to expert estimation,[16] Mekong Logistics of Minh Phu–Gemadept, ABA Cooltrans, Emergent Cold, and Hoang Lai Group are the top leading cold storage providers, with the capacity of each being up to 45,000–50,000 pallets, followed by Meito (30,000 pallets), Lotte Logistics, Preferred Freezer Services (23,000–24,000 pallets), and New Land of Sojitz and Kokubu (15,500 pallets). Currently, paralleled with modern, advanced tech in terms of infrastructure and management, and professional cold storage services, many small, obsolete, and scattered cold storages are actively running to serve more spontaneous and basic demand.

The flow size of import and export goods, the higher competitiveness and support of the provincial government, land availability, and favourable transportation conditions have led to the supremacy of the South in the cold storage market (Mekong Logistics 2017). Among FDI investment flows, Japanese investors seem more sensible and determined in penetrating the cold storage market in Viet Nam having conducted a range of new launches, including Meito, CLK Cold Storage, Sojitz and Kokubu, Konoike Vina, especially in the medium scale. Meanwhile, United States players, notably Emergent Cold and Preferred Freezer Services, are likely to prefer a larger scale.

In the last two years, it is acknowledged that there is a shift up North of both domestic and foreign cold storage players. The potential thresholds in the South, lower agricultural exports growth, and optimistic prospects of the domestic market are likely to activate this shift. FDI players seem to consider mergers and acquisitions as a solution to penetrate the North's cold storage sector to lower fixed costs as well as some administrative obstacles, and the most outstanding case was the acquisition of Swire Cold Storage Viet Nam by Emergent Cold. Meanwhile, domestic players are seeking to expand their presence in the North via joint ventures and specialise their businesses in the South into more integrated services, notably Transimex Saigon Hi-Tech Park (SHTP).

[16] These numbers are derived from the presentations of some experts in the cold chain workshop in Ha Noi in January 2019.

Table 3.2: Information and Glossaries of Major Foreign Stakeholders in the Commercial Cold Storage Market by Region

	Company Name	Location	Services	Temp. (°C)	Capacity				Client Types	
					Area (m^2)	Weight (tons)	Pallets	Stores	Industry	Type
Foreign Capital										
	In the North									
1	Emergent Cold	Bac Ninh	Cold storage Distribution centre CS management	+25 to -25	22,000	n.a.	20,000	6	Hypermarkets, seafood manufacturers	B2B
2	FM Logistic	Bac Ninh	Cold storage Distribution centre CS management	n.a.	5,000	n.a.	n.a.	n.a.	Supply all Auchan stores in the northern half of Viet Nam	B2B
	In the South									
1	Emergent Cold	Binh Duong	Cold storage Distribution centre CS management	+25 to -25	42,500	n.a.	36,650	18	Fast food services, hypermarkets, seafood manufacturers and exporters	B2B
2	Konoike Vina	Ho Chi Minh City	Cold storage Re-packing CS management	+5 to -20	3,000	n.a.	1,000	n.a.	Fast food services, convenient stores	B2B
3	CLK Cold Storage	Binh Duong	Cold storage Distribution centre CS management	+25 to -25	9,300	n.a.	n.a.	n.a.	Food, seafood manufacturers	B2B
4	Sojitz and Kokubu New Land Co. Ltd.	Binh Duong	Cold storage CS management	n.a.	n.a.	n.a.	15,500	4	Food, seafood manufacturers	B2B
5	Kuehne Nagel	Dong Nai	Cold storage Logistic centre	15/4/-18	4,000	n.a.	n.a.	n.a.	Hypermarkets, seafood manufacturers and exporters	B2B

			CS management Custom clearance							
6	Preferred Freezer Services	Ho Chi Minh City	Cold storage Refrigerated Loading/unloading Dock	n.a.	n.a.	n.a.	24,000	n.a.	Fast food services, hypermarkets, seafood manufacturers and exporters	B2B
7	Sagawa Express	Dong Nai	Cold storage Logistic centre	+3 to -20	2,322	n.a.	n.a.	n.a.	Hypermarkets, manufacturers	B2B
8	Meito Viet Nam	Binh Duong	Cold storage Distribution centre CS management	-15 to -25	n.a.	30,000	30,000	8	Food/seafood manufacturers, exporters	B2B
9	Anpha–AG	Long An	Cold storage Distribution centre CS management	n.a.	n.a.	n.a.	n.a.	n.a.	Food/seafood manufacturers, exporters	B2B
10	Panasato	Binh Duong	Cold warehousing and logistics services	n.a.	5,200	n.a.	n.a.	n.a.	Fast food services, hypermarkets, seafood manufacturers, exporters	B2B
11	Lotte Logistics	Long An	Cold storage Distribution centre CS management	10 to -30	n.a.	n.a.	23,000	10	Fast food services, hypermarkets	B2B

Source: Collated by authors from official websites of companies.

Table 3.3: Information and Glossaries of Major Domestic Stakeholders in Commercial Cold Storage Market by Region

	Company Name	Location	Services	Temp. (°C)	Capacity				Client Types	
					Area (m^2)	Weight (tons)	Pallets	Stores	Industry	Type
Domestic Capital										
	In the North									
1	ABA Cooltrans	Ha Noi	Cold storage CS management	+22 to -25	n.a.	n.a.	15,000	17	Fast food services, hypermarkets, food manufacturers	B2B
2	Quang Minh	Ha Noi	Cold storage CS management	10 to -30	n.a.	n.a.	n.a.	5	Fast food services, hypermarkets, food manufacturers	B2B
3	Duc Tan - Sai Gon	Ha Noi	Cold storage CS management	0 to -25	1,100	n.a.	2,700		Fast food services, supermarkets;	B2B
4	Thang Long Logistics	Hung Yen	Cold storage CS management	10 to -30	5,100	n.a.	12,000	3	Fast food services, supermarkets	B2B
	In the South									
1	Transimex – ICD Transimex	Ho Chi Minh City	ICD, cold storage, CS management	10 to -30	3,000	n.a.	>5,000	n.a.	Food/seafood manufacturers, exporters	B2B
2	Transimex–Saigon Hi-Tech Park (SHTP)	Ho Chi Minh City	Integrated logistics services	10 to -30	9,000	n.a.	n.a.	n.a.	Fast food services, hypermarkets, food/seafood manufacturers	B2B
3	Depot Tan Cang – My Thuy	Ho Chi Minh City	Cold storage CS management	n.a.	37,400	n.a.	n.a.	n.a.	Food/seafood manufacturers	B2B
4	Hoang Lai Group-Hoang Lai I - II	Ho Chi Minh City	Cold storage CS management	15 to -30	n.a.	10,000	10,000	15	Food/seafood manufacturers, exporters	B2B

5	Hoang Lai Group-Hoang Phi Quan	Ho Chi Minh City	Cold storage CS management	15 to -30	n.a.	20,000	n.a.	n.a.	Food/seafood manufacturers, exporters	B2B
6	Hoang Lai Group-Long An	Long An	Freezing Cold storage CS management	15 to -40	n.a.	20,000	n.a.	n.a.	Food/seafood manufacturers, exporters	B2B
7	Satra	Ho Chi Minh City	Freezing Cold storage CS management	n.a.	11,545	n.a.	22,000	5	Food/seafood manufacturers, exporters	B2B
8	Phan Duy–Long An	Long An	Freezing Cold storage CS management	15 to -25	n.a.	30,000	n.a.	n.a.	Food/seafood manufacturers, exporters	B2B
9	ABA Cooltrans	Ho Chi Minh City	Cold storage CS management	25 to -25	n.a.	n.a.	30,000	8	Food/seafood manufacturers, exporters	B2B
10	An Phu	Binh Duong	Cold storage CS management	25 to -18	n.a.	3,000	n.a.	n.a.	Food/seafood manufacturers, exporters	B2B

Notes: The above tables list professional cold storage services providers, not including storages run by seafood/meat manufacturers/exporters. The capacity indicates the current situation, not including any under-construction capacity of each stakeholder. The tables were updated in January 2019.

Source: Collated by authors from official websites of companies.

Meanwhile, the seafood sector accounts for a significant part of Viet Nam's cold storage market (Mekong Logistic 2017). While all export-oriented seafood processors own their self-operating cold storages, some of them even run commercial cold storages, creating the flow of seafood exports and intermediate seafood products. Most cold storages for seafood exports in Viet Nam are for pangasius and shrimp products, which combined comprise two-thirds of Viet Nam's seafood export value. Due to the higher weights of pangasius products, the cold storage capacity in pangasius facilities is clearly higher than that in shrimp facilities, as shown in the below tables. Over the last two decades, the extraordinary emergence of pangasius exports from Viet Nam has created a boom in cold storage capacity serving the seafood sector. Meanwhile, the phenomenon of importing intermediate seafood products for further processing and re-exporting also requires additional capacity.

Most cold storages in seafood processing facilities were installed in the 2000s, and have degraded, inadequate capacity, and backward technologies (Mekong Logistics 2017). To address this, seafood companies have two choices: (i) companies with medium cash flow strength will build extra infrastructure for self-operating, equipped with energy-saving technologies and more professional management systems; (ii) companies with more abundant cash flow are spreading over commercial cold storage market by investing in more integrated logistics centres to offer cold services for other seafood companies. The latter's most noticeable cases are Hung Vuong Corporation with a new investment of a 60,000 tons cold storage in Ho Chi Minh City and the joint venture of Minh Phu and Gemadept to build Mekong Logistics JSC possessed a capacity of 50,000 pallets.

To sum up, cold storage services in Viet Nam have been solely serving B2B and are highly international-trade oriented. There is a vast market segment closer to the upstream chain, which belongs to agricultural production that is left unexploited due to its own constraints of high transaction and transportation costs as well as inadequate infrastructure.

Table 3.4: Information and Glossaries of Major Domestic Stakeholders in the Self-operating Segment of Seafood Cold Storage by Product

	Company Name	Location	Current Situation	Capacity		Usage		Note
				Weight (tons)	Pallets	Industry	Type	
	Pangasius							
1	Vinh Hoan Corporation	MRD	In operation	9,000	n.a.	Frozen fillet pangasius	Self-operation	
2	Hung Vuong Corporation	Ho Chi Minh City	In operation	12,000	n.a.	For rent	B2B, self-operation	
		Ho Chi Minh City	In operation	30,000	n.a.	For rent		Sold to ABA
		Ho Chi Minh City	Under construction	60,000	n.a.	For rent		
3	International Development &Investment Corporation (IDI)	Dong Thap	In operation	4,600	n.a.	Frozen fillet pangasius	Self-operation	
		Dong Thap	Under construction	10,000	n.a.	Frozen fillet pangasius		
4	Nam Viet Corporation	An Giang	In operation	6,000	n.a.	Frozen fillet pangasius	Self-operation	
5	Cadovimex II	Dong Thap	In operation	5,000	n.a.	Frozen fillet pangasius	Self-operation	
6	Mekong Fishery JSC	Can Tho	In operation	400	n.a.	Frozen fillet pangasius	Self-operation	
7	Godaco Seafood JSC	Tien Giang	In operation	8,500	n.a.	Frozen fillet pangasius	Self-operation, B2B	Updated by 2014
8	Hung Ca Co., Ltd	Dong Thap	In operation	>10,000	n.a.	Frozen fillet pangasius	Self-operation	
	Shrimp							
1	Minh Phu Seafood Corporation	Hau Giang	In operation	n.a.	50,000	Integrated logistics services	B2B	Mekong Logistics JSC
2	Sao Ta Foods JSC	Soc Trang	In operation	4,000	n.a.	Frozen shrimp	Self-operation	Parent company: Hung Vuong Corp

3	Camimex Group	Ca Mau	In operation	2,000	n.a.	Frozen shrimp	Self-operation	
		Ca Mau	Under construction	1,500	n.a.			
4	Seaprodex Minh Hai	Bac Lieu	In operation	1,000	n.a.	Frozen shrimp	Self-operation	Central cold storage
5	Au Vung I Seafood Processing JSC	Bac Lieu	In operation	>1,500	n.a.	Frozen shrimp	Self-operation	

Notes: The above tables are listing cold storages owned by seafood manufacturers/exporters. The tables updated by Jan 2019.

Source: Collated by authors from official websites of companies.

- Main players in transportation services

The cold transportation sector in Viet Nam is characterised by a high outsourcing rate and a small proportion of total transportation capacity and is seemingly dominated by local players (Luong 2018). There are no official estimations for total cold transportation capacity, and data are unlikely to specify leading players, market share structure in the sector, or report the number and capacity of cold trucks serving agricultural and food products. ABA Cooltrans, Tan Nam Chinh Logistics, Tan Bao An, and Binh Minh Tai possibly seize some big shares of the market, in which ABA Cooltrans is a relatively new, significant player that was established in 2008 and started as a cold transportation service provider before expanding to the cold storage market via acquisition. Their main clients currently are Big C, Vinmart, METRO, Unilever, Vinamilk, Kinh Do, and BEL.

There are four types of cold transportation. First, for imported, chilled, or frozen products, refrigerated containers are transported directly from ports to cold storage houses using container trucks. Second, to transport from cold storages to companies, such as supermarkets and restaurants, etc. (B2B), small cold trucks are usually used. This is because the urban road infrastructure in Viet Nam is characterised by small alleys and exceptionally high rates of using motorbikes.

There are two truck types: (i) professional trucks belong to new companies such as ABA Cooltrans, Tan Nam Chinh Logistics, etc; and (ii) modified trucks belong to small transportation companies. Professional trucks range from 1 ton to 14 tons with real-time updates on cargo to clients, global positioning system-enabled for real-time tracking, data loggers for temperature monitoring, and multi-temperature adjustment. Most importantly, the setting of the air conditioner systems of professional trucks is well designed and constructed to maintain the cool air spread evenly in the chambers. Most of these trucks are imported from Japan or Korea.

Modified cold trucks are mainly small for urban services and locally produced, notably by THACO Truong Hai Company, with prices ranging from D500 million–D700 million for trucks under two tons. A typical modified cold van is equipped with an air conditioner to control the temperature at the desired levels of each product category. However, according to experts, the setting of air conditioners without air tubes on the top do not spread cold air evenly inside the truck chamber, and thus do not ensure the quality of the transported products.

In addition, business-to-consumer (B2C) cold services carry out very flexible solutions to deliver goods to customers by using motorbikes attached with ice boxes on the back to keep food chilled/cold. However, on hot days, ice boxes are insufficient to maintain low temperatures, leading to the rapid deterioration of food. E-commerce and 'bricks-and-clicks' retailers[17] are in need of improving their home-delivery services for perishable products and foods.

[17] Bricks-and-clicks retailers refer to a business model in which retailers operate both offline and online stores and integrate the two into a single retail strategy.

Table 3.5: Information and Glossaries of Major Stakeholders in Commercial Cold Transportation Services

	Company Name	No of Vehicles	Capacity (tons)	Temp. (°C)	Services	Client Types	
						Industry	Type
Foreign Capital							
1	Konoike Vina	15 trucks as of Apr 2016	5 – 15	25 – -25	FCL, LCL temperature-controlled road and courier services Border temperature-controlled road transportation services	Food manufacturers/ distributors/ traders	B2B
2	Panalpina World Transport (Viet Nam)	n.a.	n.a.	n.a.	Temperature-controlled air freight Ocean reefer freight Temperature-controlled road and courier services	Food manufacturers/ distributors/ traders	B2B
3	Agility Logistics	n.a.	n.a.	n.a.	Integrated trucking network across ASEAN region linking major cities, ports and airports to one another and 150 destinations in China.	n.a.	B2B
4	Meito Viet Nam	n.a.	1.8 – 13	15 – -18	Temperature-controlled road transportation services	Food manufacturers/ distributors/ traders	B2B
5	Panasato	n.a.	n.a.	n.a.	Handling perishable-specialised in refrigerated cargo, big quantity agricultural products	n.a.	n.a.
Domestic Capital							
1	ABA Cooltrans	200	1 – 14	n.a.	North-South and vice versa temperature-controlled road transportation Small cold trucks for distribution in urban areas	Hypermarkets/ Food manufacturers, distributors, traders	B2B
2	Tan Bao An	35	n.a.	0 – 5; -25 – -18	Truck transportation for perishable products: meat, seafood, fruit and vegetables, milk, medical, pharmaceutical products	Food manufacturers, distributors, traders	B2B
3	Tan Nam Chinh Logistics	100	n.a.	n.a.	Nationwide temperature-controlled road transportation Integrated trucking network across the ASEAN region and China	n.a.	B2B
4	Duc Tan – Sai Gon	n.a.	1 – 1.25 – 2.5	n.a.	Truck transportation for perishable products for Hanoi and neighbouring areas	Food manufacturers, distributors, traders	B2B
5	Binh Minh Tai	30	1.4 – 18	n.a.	North-South and vice versa temperature-controlled road transportation for perishable products	Hypermarkets/ Food manufacturers, distributors, traders	B2B

Source: Collated by authors from official websites of companies.

3.3. Government policies related to the cold chain in Viet Nam

Currently, the Vietnamese government has not established a strategy or specific policy framework for promoting cold chain agriculture. Instead, cold chain related policies are scattered in various laws and regulations issued by different agencies, mainly derived from three policy categories: (i) food safety law and regulations; (ii) logistics development promotion policies; and (iii) food standards in Viet Nam.

In terms of strategy, in 2013, the government issued Decision 899/2013/QD-CP by the Government on Agricultural Restructure Program, in which Viet Nam would transform its agricultural sector towards a high-value, sustainable development model. Thanks to this policy, the Ministry of Agricultural and Rural Development (MARD) and 63 provinces have promoted the conversion from traditional grain crops, such as rice and maize, to high-value vegetable, flower, fruit, and aquaculture production, which are high value but also perishable and, thus, have indirectly pushed the demand for cold services.

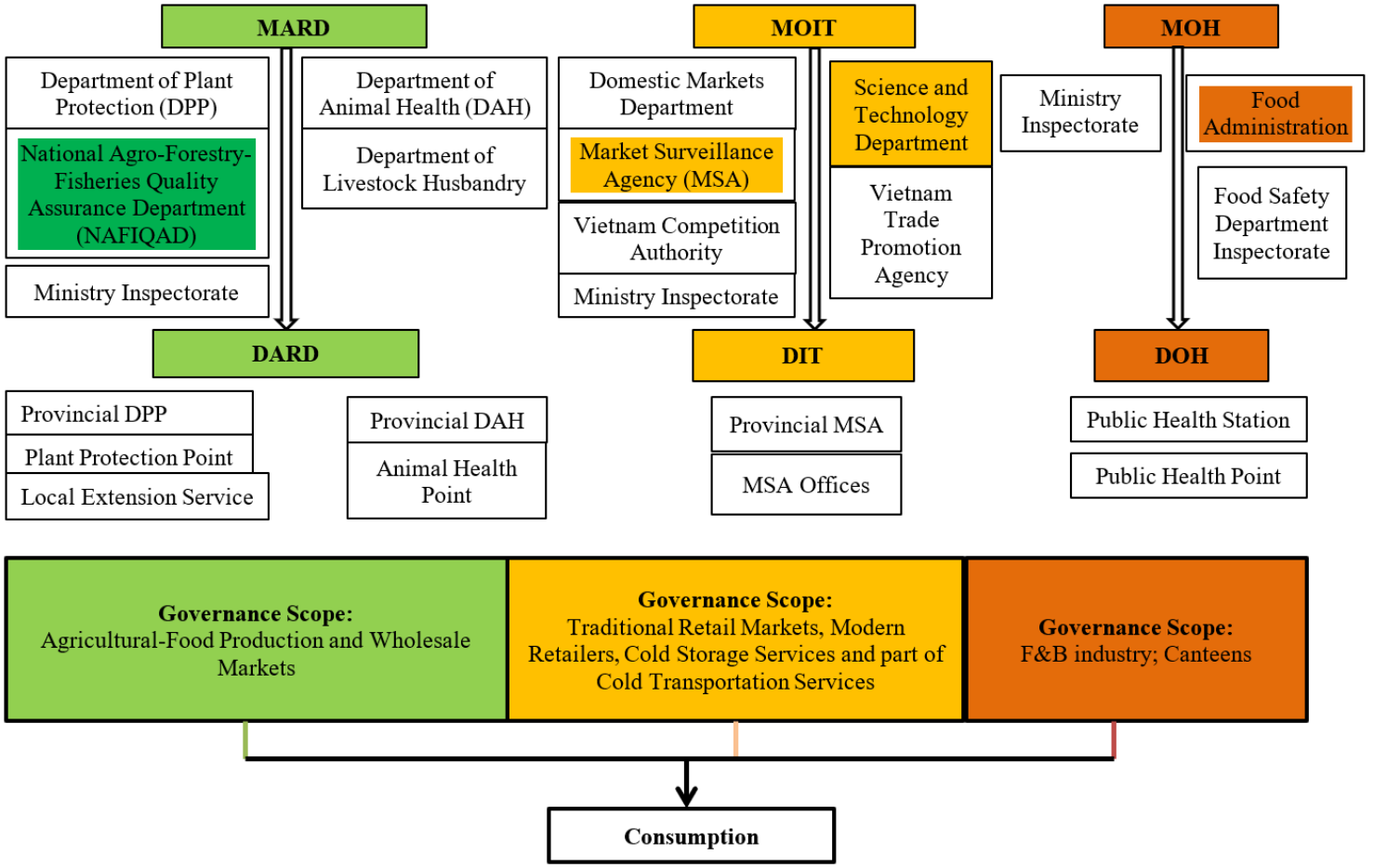
The top policy influencing cold chain service is the Food Safety Law, enacted in 2011; in which, temperature-related conditions are stated in Provision 1b of Article 20: “Food producers and traders must meet the following conditions for food preservation: Preventing the effects of temperature, humidity, insects, animals, dust, strange smell and negative environmental effects: guaranteeing sufficient light: having special-use equipment for adjusting temperature, humidity and other climate conditions, ventilation equipment and other special preservation conditions required by each type of food”. The provision was explained in detail in Joint Circular 13/2014/TTLT-BYT-BNNPTNT-BCT on the allocation of tasks and cooperation among regulatory agencies in food safety management, in which MARD is assigned the responsibility of managing meat, fisheries, fruit and vegetables, eggs, and raw milk. The National Agro-Forestry–Fisheries Quality Assurance Department (NAFIQAD) and its local branches (under MARD) are authorised to issue food safety certification to cold storage for agricultural products and foods. While the registration of cold transportation vehicles is the responsibility of Viet Nam Register under the Ministry of Transportation, the Ministry of Industry and Trade (MOIT) has been authorised to issue food safety certification to hypermarkets, supermarkets, and other modern retail channels.

The second policy category is logistics development promotion policies, notably Decree 163/2017/ND-CP by the government on the provision of logistics services. The decree has

decisive impacts on shaping the investment environment currently when creating more room for foreign investors to join logistics services in Viet Nam by specific regulations on the 'rights of foreign investors to acquire shares, contribute capital or establish an enterprise in sea transport, container handling services, customs clearance, inland waterway transport services, road transport services'. Directive 21/CT-TTg, issued in 2018 by the prime minister on promoting the implementation of solutions to reduce logistics costs and effectively connect transport infrastructure, attempts to link more effectively transport infrastructure and lower logistic costs, thereby encouraging integrated logistics services and motivating e-commerce retail, new ground for cold chain services in Viet Nam.

Specifically, to promote the post-harvest technology application for agricultural production, Decision 68/2013/QD-TTg targets mitigating losses in post-harvest stages through credit support to purchase machines and equipment, including refrigerated cargo; machines for producing ice; and cold storage facilities. However, the policy has not been appreciated due to low accessibility to targeted groups, especially farmers, cooperatives, and farming households. Meanwhile, the cold services providers surveyed and interviewed by the research team confirmed they were not aware of the policy.

Figure 3.13. Map of Government Agencies Related to Good Safety in Viet Nam



DARD = Department of Agricultural and Rural Development, DIT = Department of Industry and Trade = DOH: Department of Health, MARD = Ministry of Agriculture and Rural Development, MOH = Ministry of Health, MOIT = Ministry of Industry and Trade. Source: Authors.

The third policy category in supporting cold chain development is food standards applied in Viet Nam. To boost fishery exports, the nation has formed a range of technical requirements for frozen shrimp, pangasius, and raw fishery materials requiring temperature control. TCVN 4379 was the first standard on frozen fish exports and was issued more than 30 years ago in 1986. The most recent one is TCVN 12429:2018 issued in October 2018 on chilled meat and its technical requirements.

3.4. Opportunities and challenges of cold chain development for agriculture in Viet Nam

Within the cold chain

While investment in pre-cooling – getting perishable fruits and vegetables into a controlled environment as quickly as possible after harvest – helps to reduce food loss, perhaps the biggest challenge in developing economies like Viet Nam's, is a shortage of refrigerated vehicle resources and refrigerated warehouse space in material zones (Mercier et al. 2016). Small-scale and fragmented agricultural production in Viet Nam inhibits professional cold transportation companies. Given the fact that the average size of a household's farm in Viet Nam is less than one hectare and most farms are far away from cities with low-quality roads, it is excessively costly for cold trucks to come to collect agricultural products timely after harvesting. Depending on the products, farmers have to wait from one day to one week before their products are collected. Normally, for perishable products, such as shrimps or fruits, collectors or traders may come in one day. However, they usually use non-refrigerated vans and motorbikes to transport the products to wholesalers or to the market. In the Mekong River Delta, boats are the main transport vehicles of agricultural products in remote areas. This means the fragmented agricultural product and foodstuff flows from the upstream in cold chains have not favoured cold-chain development from the very beginning. They have also been discouraging new investments in the cold chains that directly serve farmers and rural areas.

For farmers, due to the lack of household-scale cold transportation and storage facilities, farmers usually harvest agricultural products when they are immature. Uneven maturity among agricultural products harvested and poor-managed household storage force farmers to sell their products with large volumes immediately in the peaks of their harvesting periods to maintain the product quality. The seasonality of agricultural production and abundant supply in short harvesting periods generate unstable flows of products and pose high risks for both agricultural producers and cold service providers at the early stage of cold chain flows. The market for agricultural household-scale cold storage technology and equipment, particularly for perishable products, such as high-value fruit and vegetables, is promising for cold chain suppliers in the future.

Traditionally, the cold chain logistics sector in Viet Nam has been fragmented with small and medium service providers that provide localised services that do not cover the end-to-end food supply chain. Except for highly integrated in-house seafood cold chains, commercial cold chains of other goods flows are highly fragmented in all stages. Even big companies rarely

offer integrated services in both cold storage and cold transport markets. The lack of long-distance cold transport services demonstrates high risks and high variable costs in operating the services.

Although retailers have expanded in Viet Nam in recent years, the distribution networks remain underdeveloped to provide a safe and efficient last mile distribution service. The phenomenon of e-commerce has been realised clearly year by year, and some retailers have been offering fresh foods and home-delivery services. The home delivery services have exploited mainly motorbikes attached with insulation boxes to control the temperature. However, this solution has appeared ineffective on hot days. This is also a potential investment area for cold chain suppliers in the future.

Outside the cold chain

Low connectivity in transport infrastructure, especially roads, domestic waterways, and seaports, is always considered as a main factor causing high logistics costs in Viet Nam (MOIT 2015; Dexion 2015). First, the lack of integration and connection between ports and material zones. For example, in Mekong River Delta, the main agricultural source of the nation, there are many small ports (37 ports), but few container ports where big ships can approach. Consequently, most agricultural products in the delta have to be transported to ports in Ho Chi Minh City or Vung Tau province for exports and this practice significantly increase the cost of Vietnamese products. Overloaded road transportation and under-developed railway transportation are other issues in Viet Nam. Most warehouses are located near big cities, such as Ho Chi Minh, Ha Noi, Da Nang, Can Tho and far away from agricultural material zones. Agricultural products are mainly transported via degraded, poor-quality roads with too many container trucks, while there is no internal railway system in intensive agricultural production zones, such as the Mekong River Delta, Red River Delta, Central Highlands, and Southern East Region. Energy also causes problems for cold chain development in Viet Nam. Interrupted electricity supply causes huge costs to cold chain storage suppliers in Viet Nam as they have to equip a standing by back-up battery system, which is very expensive.

In addition, professional cold storage and transport services would require high-qualified labour, with their own specific knowledge of the nature of perishable products and quality changes due to temperature (Asia Pacific Economic Cooperation 2015). Both the cold storage and cold transportation sectors are facing shortages of labour. At the moment, there are almost no university offering courses with curriculums related to cold chain logistics and management in agriculture. This is an important segment for universities to open new education programs and short-course training to staff and managers of companies using cold chain services in the near future.

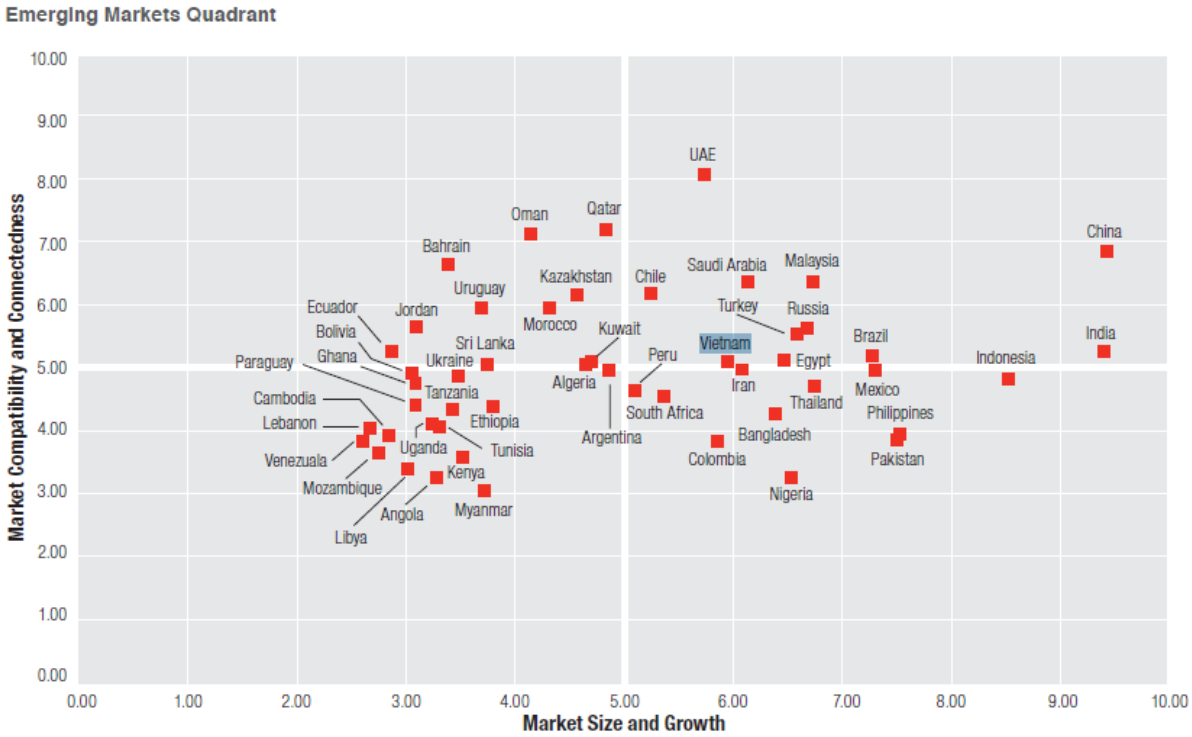
The lack of policy framework for cold chain development is among the notable issues and challenges. As discussed above, while the high logistics cost has attracted the attention of central government with the issuance of Directive 21, a specific policy framework or a development strategy of cold chain logistics does not exist in Viet Nam. One of the key policy priorities for the government is how to integrate the cold chain into the current logistics

infrastructure system of Viet Nam effectively and efficiently. Given the fact that the demand for cold chain development in agriculture is obvious but it is risky and costly to invest in agriculture, the government has to issue policies to promote investors to go to this sector. The absence of a vision for cold chain development and public–private partnership mechanism causes difficulties for investors to make their decisions matched with the government's development priorities.

3.5. The mid-term prospects of the cold chain

According to Agility (2018), India and China remain, by far, the leading investment destinations for the logistics industry. Viet Nam leads the second group, which includes the United Arab Emirates, Brazil, and Indonesia. This research selected Viet Nam as the market with the third-highest potential thanks to its impressive economic and trade growth over many years. Economic growth, foreign direct investment, trade volume, location, and transport infrastructure ahead of cheap labour are keys to making Viet Nam an important emerging market.

Figure 3.14. The Emerging Markets Logistics Index 2018



Source: Agility (2018).

These results have partly reflected the prospects of Viet Nam's logistics market in general, and the cold chain in particular. Especially, the strong commitments of Viet Nam to various free trade agreements (FTAs), notably the EU–Viet Nam FTA, Comprehensive and Progressive

Agreement for Trans-Pacific Partnership (CPTPP), Viet Nam–Japan FTA, and Korea–Viet Nam FTA, are highly expected to attract more FDI and imported product flows, thereby promoting significantly the development of the cold chain in the mid-term. Decree 163/2017/ND-CP on the provision of logistics services to create a more friendly investment environment for FDI investments into logistics services generally, and cold chains services in particular, is on time to exploit the advantages.

In the mid-term, seafood, food, and drink export-oriented manufacturers likely continue to dominate in Viet Nam's cold chain. Therefore, their inbound logistics and integrated production systems possibly remain as a main driver in Viet Nam's cold chain development. In particular, the recent launches of highly integrated logistics complexes of Transimex–Saigon Hi-Tech Park (SHTP) in Ho Chi Minh City and Mekong Logistics of Minh Phu–Gemadept in Hau Giang Province in Mekong Delta region would mark a new chapter for cold chain development in Viet Nam.

Increasing consumption of high-value imported food in the domestic market and demand for 'clean', eco-friendly, chilled, packed foods would likely provide some momentum. For example, in February 2018, Masan Nutri-Science (MNS) opened its largest pork processing complex in the north of Viet Nam, to target supplying 140,000 tons of pork, accounting for 5% total domestic supply. Its main product is chilled meat kept in cold storages set at temperatures from 0 – 4°C and optimally used in five days. MNS is cooperating with VinGroup to offer its Meat Deli brand in separated zones inside Vinmart supermarkets. Both enterprises are among the pioneers in developing food processing complex and modern retail chains in Viet Nam, driving new demand for cold storage and transportation. The FTAs would lower tariff rates and, given the low non-tariff trade barriers in Viet Nam, in the mid-term, Viet Nam would likely have an influx of imported foods, especially meat, dairy products, fruit, and packed foods. Meanwhile, the rapid growth of modern retail channels, e-commerce, and food service sectors would definitely help to create more demand for cold chain services, especially for third-party cold chain logistics service.

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Table 2. Information and Glossaries of Major Foreign Stakeholders in the Commercial Cold Storage Market by Region

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Konoike Vina: http://www.konoikevina.com/vi

CLK Cold Storage Company Limited: https://www.kline.co.jp/en/news/other/other-9079631322222887844.html

Sojitz and Kokubu or New Land Co. Ltd. (Vietnam): https://www.newlandvj.com/

Kuehne Nagel: https://vn.kuehne-nagel.com/vi_vn/dich-vu-kho-bai-va-phan-phoi/trung-tam-logistics-kuehne-nagel-vietnam/tour-ao-tham-quan-nha-kho/

Preferred Freezer Services: https://www.preferredfreezer.com/us-locations.php?Ho-Chi-Minh-City-40?expanddiv=interior-nav-region-vietnam

Sagawa Express: http://sagawa-vtm.com.vn/?lang=en

Meito Vietnam: http://www.meitovietnam.com.v

Anpha-AG: http://anpha-ag.com/gioi_thieu

Panasato: www.panasato.com.vn

Lotte Logistics Vietnam Co. Ltd.:

http://www.lottelogistics.com.vn/system/application/views/default/images/LOTTE-SEA%20CATALOGUE.pdf

Table 3: Information and Glossaries of Major Domestic Stakeholders in Commercial Cold Storage Market by Region

ABA Cooltrans: https://aba.com.vn/

Quang Minh: http://quangminhcorp.com.vn/detail/vi-Vn/201/lich-di-hang-2018

Đức Tấn – Sài Gòn: http://www.kholanhductan.com.vn/default.aspx?webid=2

Thăng Long Logistics: http://www.tll.com.vn/

Transimex: www.transimex.com.vn

CTCP Giao nhận Xếp dỡ Tân Cảng: http://s.cafef.vn/hose/TCL-cong-ty-co-phan-dai-ly-giao-nhan-van-tai-xep-do-tan-cang.chn

Hoàng Lai Group: http://www.hoanglaico.com/Default.aspx

Satra: http://satra.com.vn/linh-vuc-hoat-dong/kho-lanh-satra-31076

Phan Duy Corp: www.phanduycorp.vn

An Phú: www.apic.com.vn

Table 4: Information and Glossaries of Major Domestic Stakeholders in the Self-operating Segment of Seafood Cold Storage by Product

Vinh Hoan Corporation: http://vinhhoan.com/

Hung Vuong Corporation: https://www.hungvuongpanga.com/

International Development &Investment Corporation (IDI): http://www.idiseafood.com/en

Nam Viet Corporation: http://navicorp.com.vn/?lang=en

Cadovimex II : http://www.cadovimex2.com.vn/

Mekong Fishery JSC: http://www.mekongfish.vn/en/AboutUs.asp

Godaco Seafood JSC: https://godaco-seafood.com.vn/vi/

Hung Ca Co., Ltd: https://www.hungca.com/

Minh Phu Seafood Corporation: http://minhphu.com/en/home/

Sao Ta Foods JSC: https://www.fimexvn.com/index.php/en/

Camimex Group: https://www.camimex.com.vn/

Seaprodex Minh Hai: https://www.seaminhhai.com/

CTCP Chế biến Thủy sản XNK Âu Vững I: http://www.auvungseafood.com/

Table 5. Information and Glossaries of Major Stakeholders in Commercial Cold Transportation Services

Panalpina World Transport (Vietnam):

http://www.panalpina.com/www/global/en/home/industry_verticals/IVChem.html

Agility Logistics: https://www.agility.com/en/emerging-markets-logistics-index/rankings-2018/

Tân Bảo An: www.xelanhtba.com

Tân Nam Chinh Logistics: https://tannamchinh.com/gioi-thieu/gioi-thieu.html

Bình Minh Tải: www.binhminhtai.com.vn