

High Level Public-Private Forum on Cold Chain to Strengthen Agriculture & Food's Global Value Chain

Focused Report on Cold Chain in APEC Economies

October 28, 2015



Mitsubishi UFJ Research and Consulting Co., Ltd.



三菱UFJリサーチ&コンサルティング

Contents

Objectives of the Study

I. History of the Development of Cold Chains in Developed Economies

- 1. 1 Brief Background of Development of Cold Chain
- 1. 2 Cold Chain Development in Japan
- 1. 3 Cold Chain Technologies Development in Japan
- 1. 4 Japanese Cold Chain Technologies Contribute APEC Economies
- 1. 5 Lessons and Applicability to Least Developed and Developing Economies

2. Current Situation and Challenges of Cold Chains in Developing Economies

- 2. 1 Literature Review
- 2. 2 Questionnaire Survey
- 2. 3 Field Survey

3. Good Practices and Pilot Projects of Cold Chains

- 3. 1 Literature Review
- 3. 2 Questionnaire Survey

4. Conclusion and Policy Implication for Empowering Cold Chain in APEC Region

Objectives of the Study

- Identify best practices on establishment of cold chains and share the experience;
- Understand the current situations and the benefits of cold chain systems;
- Share experiences and knowledge regarding cold chain system and
- Develop a network, “Cold Chain Infrastructure Consortium” among the stakeholders

I. History of the Development of Cold Chains in Developed Economies

1. 1 Brief Background of Development of Cold Chain

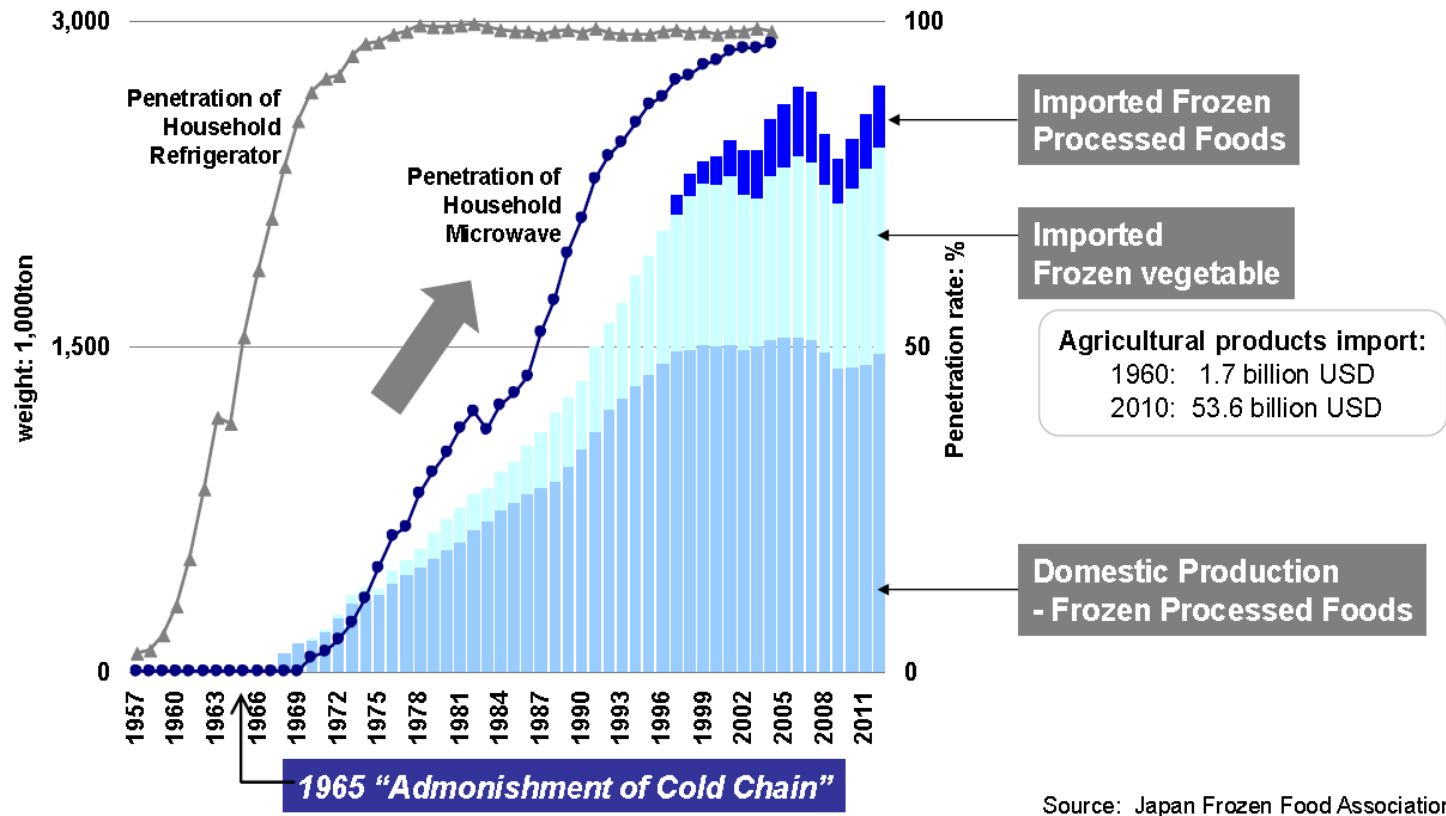
- The first time of using the term, “cold chain” was in the report; *The cold chain in the U. S. A.*, published in 1951.
- Sufficient economic power is indispensable for the maintenance of full-fledged cold chain in one’s economy.
- In fact, the period Japan achieved to establish domestic cold chain network had been paralleled by the period of rapid economic growth from 1955 to 1973.
- When GDP per capita in one economy becomes over 1,000 US dollars, the demand of electrical appliances including a refrigerator would rapidly increase.
- Since the beginning of the twenty first century, emerging economies like Asian economies have continuously achieved economic growth so that their interests for cold chain have been basically rising with growth in household incomes and diversification in foods consumption behavior.
- Other important factor to develop cold is “distance” between production area and consumers. For example, in the United States, it takes over days to transport food products from remote agricultural area to city by reefer truck because of its vast land area.)
- “Urbanization rate” is also largely influential to the introduction of cold chain. For example, Australia, 90% population concentrate in urban areas, maintains cold chain as indispensable.
- “Food import” is also significant factor to develop cold chain. The maintenance of cold chain is indispensable to keep food products fresh for importing economies . Economies such as Japan and Singapore, depending food import their own food supply, have been sophisticated cold chain in terms of technologies, intuitions and policies..

1. 2 Cold Chain Development in Japan

- Frozen techniques had been introduced in 19th century from the United States and refrigerated vessel services had started.
- Full-scale development of the cold chain had been restarted after the WW II. *Nichirei* had started the frozen food business such as seafood, meat, ice and so forth in 1943. Home refrigerators had been spread in almost every household in the late 1950s.
- Japanese government promoted the cold chain development :
 - Ministry of Science and Technology (present Ministry of Education, Culture, Sports, Science and Technology) showed the recommendation on the Cold Chain in 1965.
 - Ministry of Agriculture and Forestry (present Ministry of Agriculture, Forestry and Fisheries) played the important role to set up the cold chain infrastructure.
 - National Railway Service had launched the second five year plan to modernize the railways with cold chain during 1957-1961. Until 1968, refrigerated and tanked containers run through 144 stations and 1,257 zones.
- In 1970, public-private Committee for Frozen Food Industry had been established and it introduced independent (not mandatory) Standard for Frozen Food in 1971.
- Around late 1970s, the amount of the frozen processed foods reached 0.5million ton, and it reached more than 1million ton in 1990, 1.5million ton in 2000. Private logistic companies provided the cold chain home delivery services after the late 1980s.

1. 2 Cold Chain Development in Japan

Trends in domestic frozen food consumption and penetration of home appliances

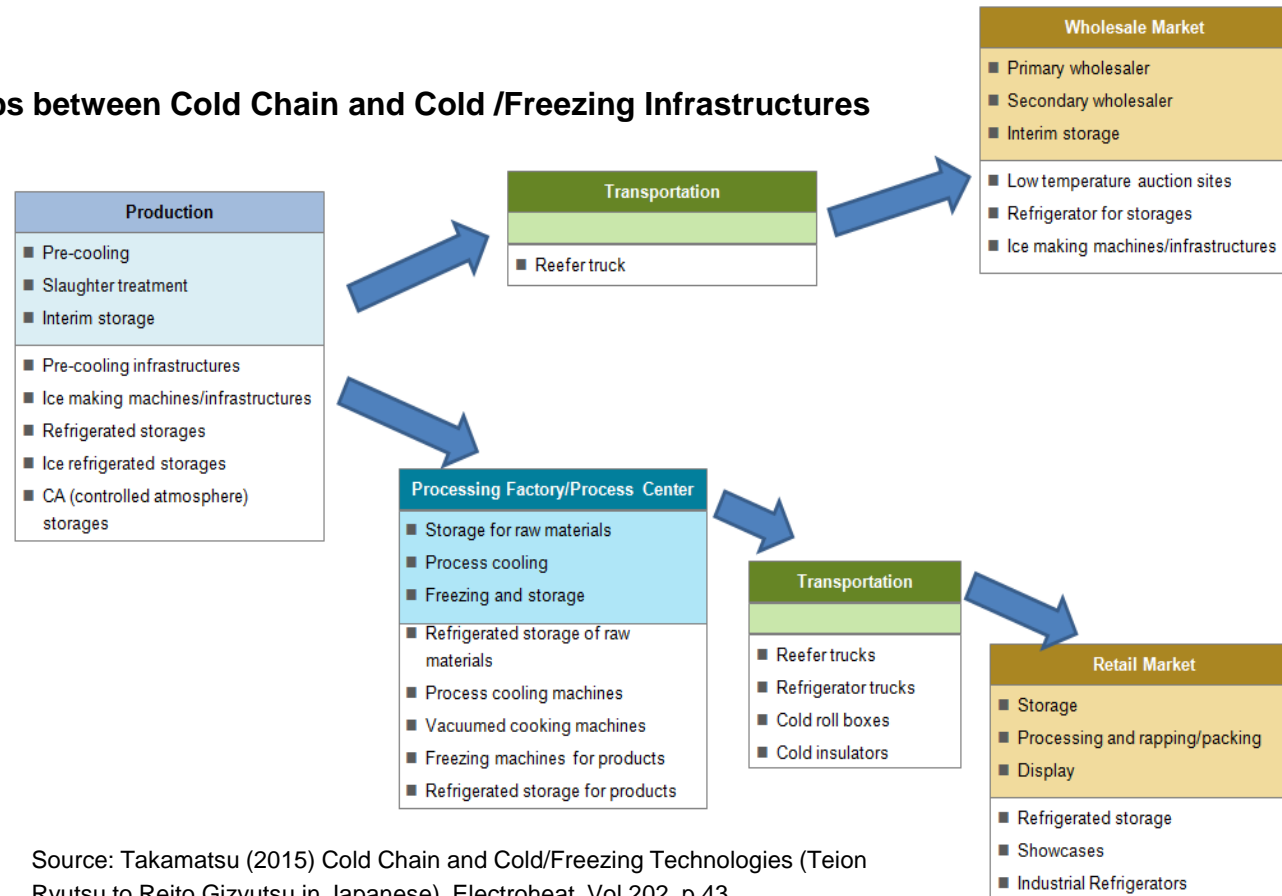


Source: Kato (2013) Cold Chain Infrastructure and related Industries -Contribution to food losses / waste reduction-, presented at Symposium on Human Resource Development in Food-related Area through Partnership with ASEAN Universities Jakarta, Indonesia, January 21, 2013

1. 3 Cold Chain Technologies Development in Japan

- Required technologies and machines/infrastructures in the cold value chain for food will be divided into three parts; 1) production and processing, 2) logistics, 3) consuming/market.
- Basic and common technologies and machines/infrastructures are summarized into the figure below.

Relationships between Cold Chain and Cold /Freezing Infrastructures



Source: Takamatsu (2015) Cold Chain and Cold/Freezing Technologies (Teion Ryutsu to Reito Gizyutsu in Japanese), Electroheat, Vol 202, p.43.

1. 3 Cold Chain Technologies Development in Japan

■ Main cold chain technologies in each product :

1) Agricultural products and processed products

(1) Pre-cooling (vacuumed pre-cooling, forced draft cooling, pressure cooling)

(2) Refrigerated storage (forced draft cooling), low temperature and high humidity storages, controlled atmosphere (CA) storages

2) Meats and the related products

(1) Drying and pre-cooling

(2) Refrigerated storage

3) Fisheries and the related products

(1) Ice making machines (auto ice making machines, ice cube making machines)

(2) Freezing machines (forced draft cooling system, contact freezer)

■ Refrigerated trucks and freezer trucks are the main vehicle to carry agricultural products in cold chain.

Traditional data loggers record temperature and/or humidity and report upon arrival.

■ Currently Japanese companies focus on the energy saved cold chain technologies. For instance, most of the companies have been launched non-fluorocarbon (CFC) refrigerator systems utilizing CO2 instead of CFC and LED light for the further eco-applicant.

1. 4 Japanese Cold Chain Technologies Contribute APEC Economies

■ Malaysia

Yamato Holdings has offered chilled parcel delivery service in Malaysia since 2011, and it increased handling volume by 30% in 2013. Win Far Trading, a seafood wholesaler in the southern city of Johor Bahru, is using Yamato's services to expand its customer base in Kuala Lumpur and the northern city of Penang.

■ Thailand

Yokohama Reito, a cold-storage warehouse operator headquartered in Yokohama, entered the Thai cold-chain market two years ago. Yokohama Reito offers delivery services to 50 companies, of which 60% are local clients. Yokohama Reito focuses on personnel development. It examines the skills of truck drivers and assigns experienced drivers to give on-the-job training to those who need to improve. It also gives skilled drivers incentives.

■ The Philippines

Sumifru Corporation a subsidiary of Sumitomo Corporation, currently supplies about 30% of the bananas sold in Japan. To ensure that Japanese consumers can get the best-tasting bananas, Sumifru was the first in the industry to establish a fully temperature-controlled supply chain. Its own port facilities work untiringly, shipping bananas 24 hours a day, 365 days a year.

■ People's Republic of China

Shandong i-Logistics Co., Ltd, a joint venture of Itochu Logistics, has a large scale frozen and fridge storage at the Qingdao port, which is strictly managed by the latest cold chain system and Japanese managers, and provides high quality logistics services to many Japanese costumers in the food and food related industry.

1. 5 Lessons and Applicability to Least Developed and Developing Economies

- One of the general and common issues on cold chain in developing economies is the fiscal burden for the cold chain infrastructure. In addition, the cold chain management requires local staffs to have the high level know-how of operation compared to the dry logistics. This shortage of know-hows and knowledge on cold chain management leads to the lack of quality of food and processed foods.
- Looking at some Japanese experience, they utilized the rapid economic growth and global events such as Olympics (1964) or World Exposition (1970) to develop the basic cold chain infrastructure as well as the basic frozen/chilled food and processed food industry since the governmental budgets were more distributed at the world events and private companies tried to respond the demand for the high valued frozen/chilled foods.
- Regarding the cold chain management, Japanese companies traditionally put strong emphasis on the human resource development at every field and levels. Food and processed food companies provided intensive trainings and education and developed guidelines, manuals, handbooks and so forth to disseminate the same level of standard or skills.

2. Current Situation and Challenges of Cold Chains in Developing Economies

2. 1 Literature Review

- There are several common challenges to improve cold chain in developing APEC economies from each perspective as follows;

- Human Resource Development

The workers involved in cold chain are not educated or trained to manage products carefully. They sometimes leave food products at normal temperature for hours before loading it onto refrigerator car.

- High Transportation Cost

Using cold chain is expensive by several causes, such as unreliable electricity and inefficient delivery system.

- Insufficient Infrastructure

Due to a delay of transportation infrastructure maintenance, there is significant influence for temperature control during the delivery. In addition, the number of refrigerated warehouses is small in local areas.

- Inappropriate and lack of institutional systems

Due to the inconvenience of customs clearances at the international, imported fresh foods are exposed to normal temperature for a long time in warehouse of the airport. In addition, there are many cases that it is no clear guidelines regarding temperature control for food products.

2. 1 Literature Review

- Actions for solving them are sometimes raised as stated below;
- Assistance to small-scale farmers (support for traceability system, capacity building for participation in global value chain)
- Improvement of infrastructure and development of a distribution services system
- Training for staffs in the logistic field to obtain handling skills and knowledge for cold products and cold chain system
- Creating an enabling environment for private sector, especially small and medium sized enterprises (SMEs) (create an environment connecting the farmers, industry and market)

2. 2 Questionnaire Survey

■ Two kinds of questionnaires survey were conducted;

- Survey 1: questionnaires to APEC Agricultural Technical Cooperation Working Group (ATCGW) mailing list members
- Survey 2: questionnaires to the persons who are engaged in the cold chain related business

■ Basic information

➤ Responses by economy

- Survey 1

Chile	Indonesia	Rep. of Korea	Mexico	New Zealand	Papua New Guinea	The Philippines	Singapore	Chinese Taipei	Thailand	Total
1	1	1	1	1	1	3	1	1	3	14

- Survey 2

Australia	Canada	Chile	Hong Kong, China	Malaysia	Mexico	New Zealand	Peru	The Philippines	Singapore
12	15	7	6	10	17	14	6	16	9

Chinese Taipei	The United States	Total
5	53	170

2. 2 Questionnaire Survey

■ Basic information (continued)

➤ Responses by industrial sector

- Survey 2

Agriculture	Manufacturing	Food	Marketing	Wholesale	Distribution	Foodservice	Others*	Total
31	18	26	6	13	45	26	5	170

*Others with related to the cold chain: Public Sector (1), Consultancy (1), Health (1), Business Services (1), and Transport Services (1)

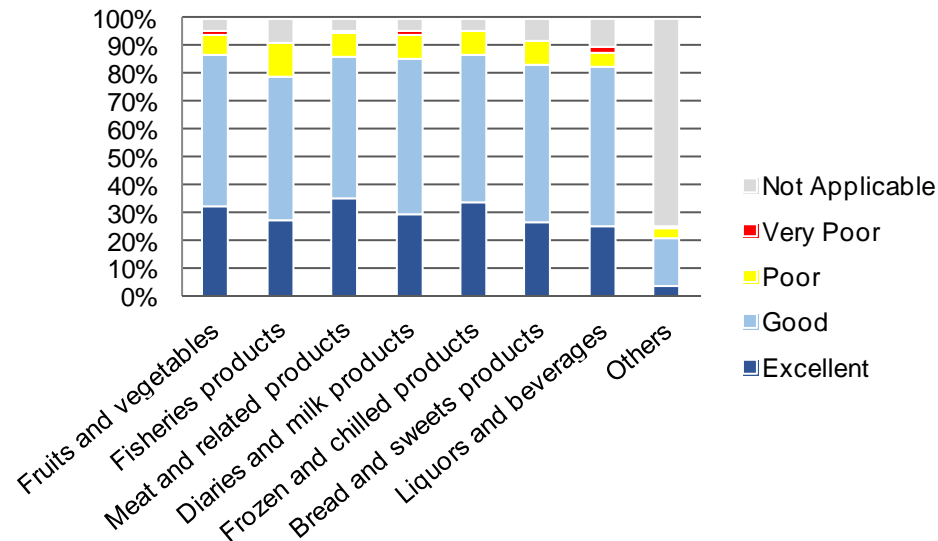
■ For the following each analysis, we expedientially separated economies into:

- Developed economies (Australia, Canada, Hong Kong, Republic of Korea, New Zealand, Singapore, Chinese Taipei and The United States,) and
- Developing economies (Chile, Indonesia, Malaysia, Mexico, Papua New Guinea, Peru, The Philippines and Thailand).

2. 2 Questionnaire Survey

■ Current situation of cold chain development

- Entire current cold chain situation in each product is as follows.

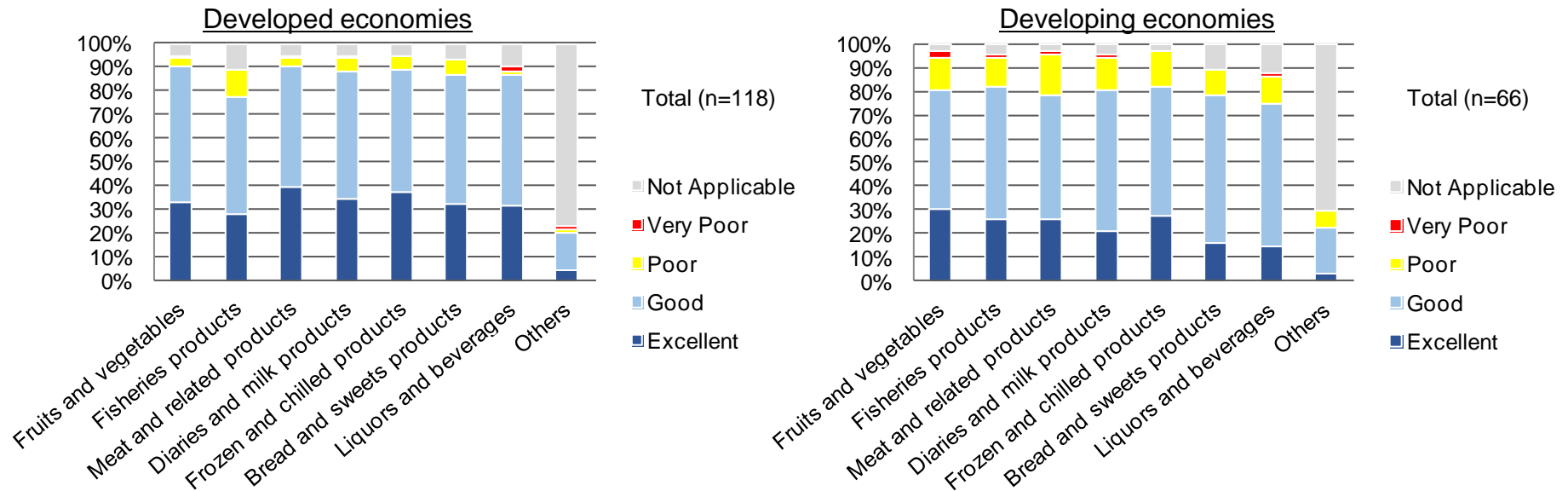


- Answers of “Excellent” and “Good” in each product are reached around 80% because the share of the United States which accounts for nearly 30% of all responses is largely influential to whole aggregate data. However, the share of “Excellent” and “Good” answers in fishery products is comparatively lower.

2. 2 Questionnaire Survey

■ Current situation of cold chain development (continued)

- Separated answers into developed and developing economies.

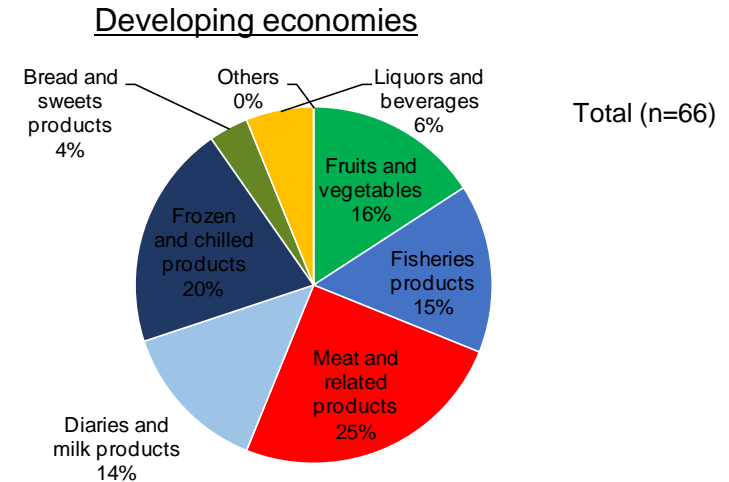
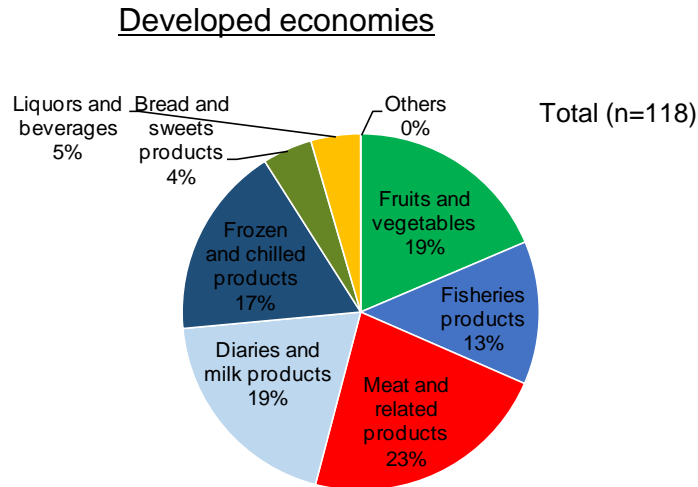


- The share of “Excellent” in each product in developed economies is higher than developing economies and the sum of “Excellent” and “Good” answers in fruit and vegetables, meat and related products and frozen and chilled products are reached around 90%. On the other hand, the shares of “Poor” in each product in developing economies are relatively higher than in developed economies.

2. 2 Questionnaire Survey

■ Most advanced products in terms of cold chain

- The following graphs show three most advanced products in terms of cold chain..

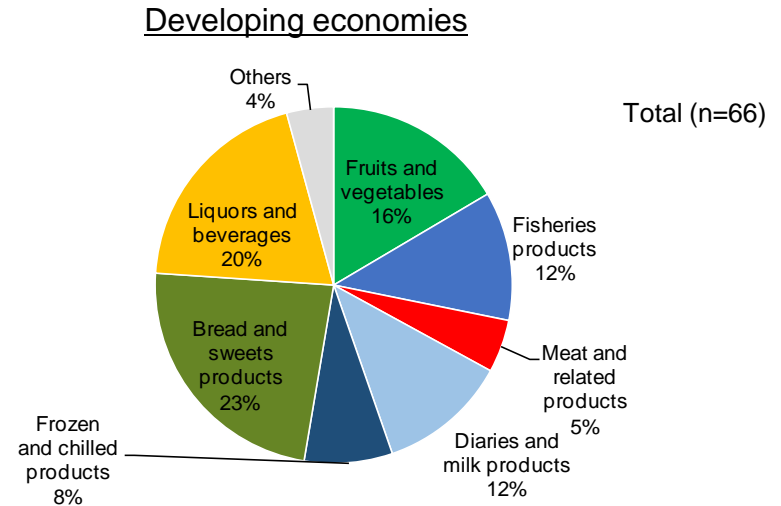
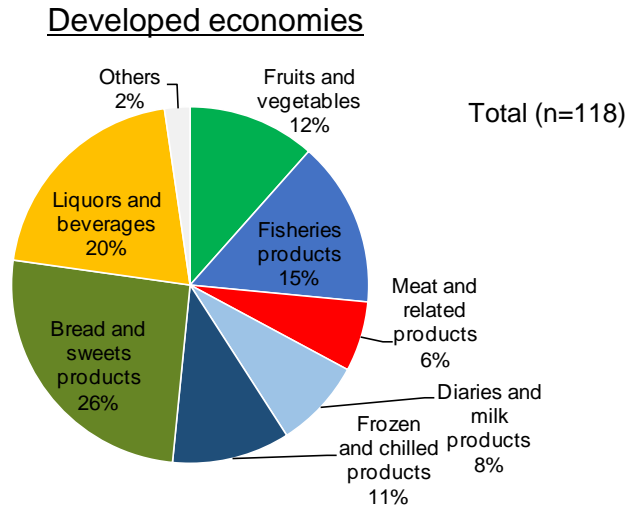


- The proportions in each product of developed and developing economies are close at this analysis and both circle graphs indicate that most people regard fruits and vegetables, fisheries products and meat and related products as most advanced products in terms of cold chain.
- It may be supposed that export and import of the above food products between economies are growing in recent decades, therefore cold chains in the relevant industries have been well developed.

2. 2 Questionnaire Survey

■ Less advanced products in terms of cold chain

- The following graphs show three less advanced products in terms of cold chain..



- The shares of bread and sweets products and liquors and beverages are relatively higher in both developed and developing economies. It seems that many respondents regard those products as conservable product which does not need cold chain facilities.

2. 2 Questionnaire Survey

■ Needs for assistance or cooperation

- Quite a number of needs were expressed by each economy. Those can be categorized as follows;

a) Facilities and financial assistance

- Cargo (Canada).
- Good cold storage system (Malaysia)
- Government should provide properly fund (Malaysia)
- More delivery trucks (New Zealand)
- Specialized, tailor designed refrigerated trucks for fruits & veggies, fish, dairies and milk products. We also need consolidation/deconsolidation depots (Papua New Guinea)
- Financial assistance thru loan or grant for construction of CC facilities in small and medium enterprises (The Philippines)
- Reefer Truck, air conditionally storage warehouse (Singapore)
- Refrigerated trucks and cold storage (The United States)
- A big cold freezer (The United States)

b) Training and knowledge sharing

- Knowledge and information exchanges (Republic of Korea)
- Training and guidance to food production and processing workers (New Zealand)
- Competency training of FBO's on the cold chain regarding control and management (The Philippines)
- Sharing of knowledge on cold chain technology and management (Singapore)

2. 2 Questionnaire Survey

■ Needs for assistance or cooperation (continued)

c) Energy conservation technology

- New technologies applicable to cold chains in order to optimize resources and product lifetime (Chile).
- Energy efficient cold storage equipment (Malaysia)
- Technologies that can help reducing energy consumption (Thailand)

d) Improvement in partnerships between stakeholders in supply chain network

- Between manufactures and distribution centers they must come up with viable solutions to keep the temps for all foods at a level that will not abuse people to get sick (The United States).
- Need to better shorten how many places products have to travel to before they are on the shelves at stores (The United States).
- Better communication between plane, truck, driver, and facility to which the products are being delivered (The United States).

e) Efforts to reduce food loss among consumers and producers

- Reducing food loss (Thailand)
- The consumer either needs to become reeducated about the continual amounts of waste in the supply chain. Growers and manufactures should have a way to sell less than picture perfect food items at local (The United States).

2. 2 Questionnaire Survey

■ Policies, strategies, laws and frameworks to promote/improve cold chain (Survey 1 only)

Economy	Main policies, strategies, laws and frameworks
Chile	<ul style="list-style-type: none"> The Ministry of Health, what should be done is: 1) Update on national regulation requirements for products in which cold is a requirement to maintain safety, 2) Promote their implementation through building plans and 3) Supervise its application throughout the food chain. In the area of fishery exports, products must maintain their storage according to the process conditions. See HPB / NT1.
Indonesia	<ul style="list-style-type: none"> Ministry of Agriculture has assisted farmer's organization on cold chain facilities, particularly those producing vegetables.
Republic of Korea	<ul style="list-style-type: none"> Law: act on distribution and price stabilization of agricultural and fishery products.
Mexico	<ul style="list-style-type: none"> National plan of Development (Plan nacional de Desarrollo): considers the national strategies to improve the national agricultural activities; <u>< Internal Rules of Secretary of Agriculture (Reglamento Interior de la SAGARPA)></u>: to establish and coordinate the national committees to improve the agriculture production, storage, processing and distribution of agricultural products <u><Law of Sustainable Rural Development (Ley de desarrollo Rural Sustentable)></u>: Points out the legal frame to do actions to improve the strategic agriculture and fishery products.
New Zealand	<ul style="list-style-type: none"> Registration of premises, transporters, stores and operators under the Food Act or the Animal Products Act. The risk based approach in this legislation requires identification of cold temperature when this is necessary for food safety and appropriate measures must be in place to ensure the food is at appropriate temperatures.
Papua New Guinea	<ul style="list-style-type: none"> A number of policies, strategies, laws and frameworks exist in to promote or improve cold chain of my economy. <ol style="list-style-type: none"> 1. PNG National Agriculture Development Plan 2. National Action Plan for the Fresh Produce Sub-sector Promotion 3. PNG Government National Strategic Development Plan 2010-2030 4. PNG National Fisheries Policy 5. PNG Rural Transport Policy 6. PNG Rural Electrification Policy 7. PNG SME Policy 8. Strategic Program Implementation Plan 2012-2020 of PNG National Agricultural Research Institute (NARI)
The Philippines	<ul style="list-style-type: none"> Department of Agriculture institutes accreditations for cold storage and warehouse on agricultural and fisheries products as well as quality of meat. The regulatory framework, policies & strategies are crafted in accordance with the internationally accepted req's of Codex.
Singapore	<ul style="list-style-type: none"> Chilled and frozen meat products are under the Wholesome Meat and Fish Transportation of Meat Products) Rules. Cold chain standards for food have been established by Singapore Standard Committee for voluntary adoption by food industry.
Chinese Taipei	<ul style="list-style-type: none"> The Certified Agricultural Standards (CAS) Taiwan Premium Agricultural Products based on the Agricultural Production and Certification Act.
Thailand	<ul style="list-style-type: none"> Agricultural zoning policy. Government's policy to make Thailand to be "Kitchen of the world". Government's policy on Food Security and Safety.

2. 2 Questionnaire Survey

■ Interesting area in cold chain (Survey 1 only)

a) Technologies and infrastructure

- Areas of interest about cold chain are mainly related to products maintenance during their transfer to commercialization; market destinations. Technologies in these areas have not evolved much. Progress has been seen in the area of maintaining refrigerated cooled products by applying a modified atmosphere. This is an area that is not extended, and would provide benefits in terms of marketing cooled refrigerated products (Chile).
- Technologies to increase the shelf lives of perishable agriculture products (Indonesia)
- Better technologies, infrastructure and financial support (Mexico)
- Building and promoting of Designated refrigerated transport and cold chain; trucks and depots for fruits and vegetable is the critical need in my economy because in the rural area where 85% of the country's population live, they produce good fruits and vegetables, but these produce do not get to consumers (market) in cities because absence of refrigerated trucks and depots (Papua New Guinea).
- Technologies that relates to upgrading of cold chain infrastructure to be more globally competitive in terms of operational efficiency and reliability (The Philippines)
- Appropriate technologies and equipment for SMEs (Thailand)
- Innovative technologies (Chinese Taipei)

b) Policies

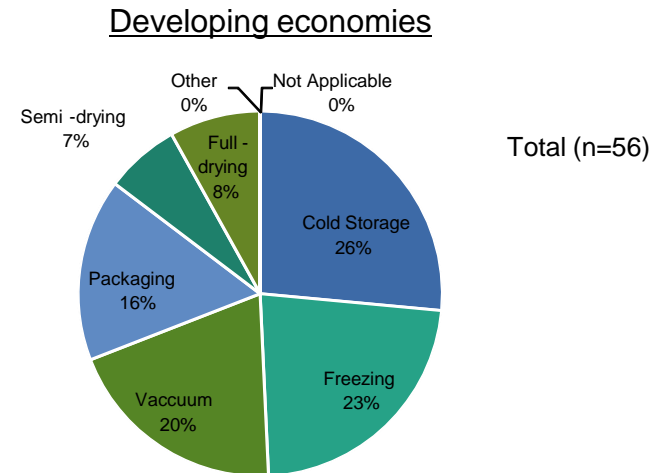
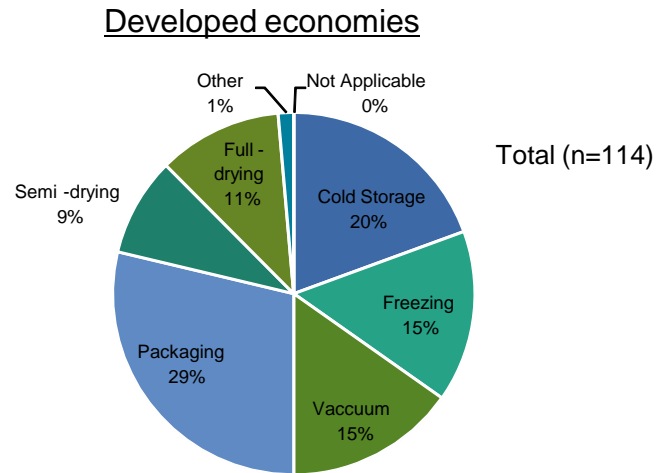
- Policies (Republic of Korea)
- Policies and infrastructure (Thailand)

c) Knowledge

- Knowledge on Cold Chain Technologies and Infrastructures (Singapore)

2. 2 Questionnaire Survey

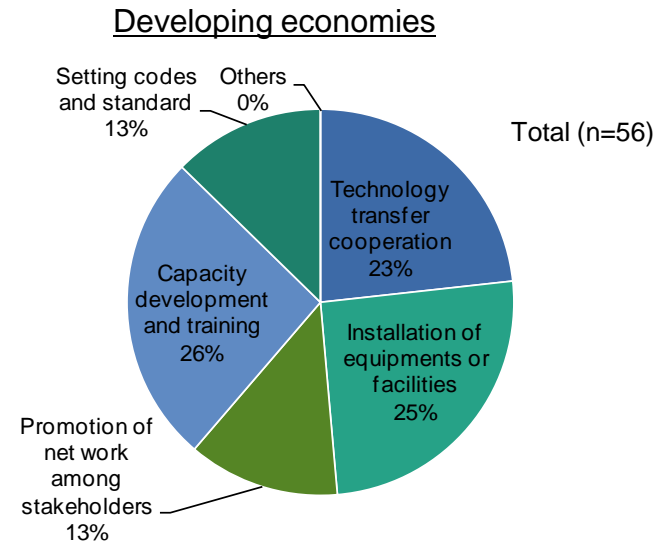
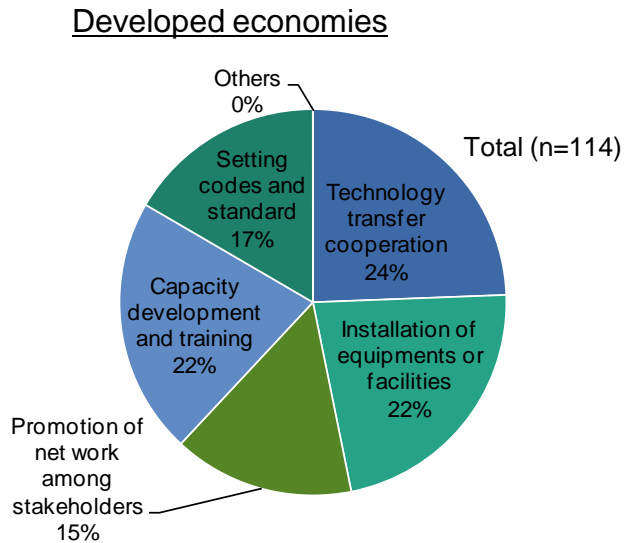
■ Cold chain technologies to be improved/updated (Survey 2 only)



- “Package” has the largest share in developed economies, on the other hand, “cold storage” has the largest share in developing economies as well as “freezing” which is the second largest.
- It is considered that technology level of refrigerating facilities namely “cold storage” and “freezing” are not adequate in developing economies. In contrast, it seems that people live in developed economies regards “packaging” as more important to be improved than “cold stage” and “freezing”

2. 2 Questionnaire Survey

■ Needs for assistance or cooperation to improve/update cold chain technologies (Survey 2 only)



- The proportions in each circle graph of developed and developing economies are close at this analysis but the type of assistance or cooperation with the largest share in each circle graph is different.
- “Technology transfer cooperation” has the largest share in developed economies, on the other hand, “Capacity development and training” has the largest in developing economies.

2. 2 Questionnaire Survey

■ Interested Japanese cold chain technology

a) Facilities

- Rapid cooling (Australia)
- Freezing cargos (Canada)
- Advance shipping cold storage (Malaysia)
- Deep sea freezing capacities and vacuum packaging (New Zealand)
- Brand-new cold storage vehicle specifically designed for shipping frozen goods (The Philippines).
- Cold storage and robotic technologies to achieve less defect of the product manufactured (The Philippines)
- Freezing, canning (The Philippines)
- Chiller and freezer made in Japan (The Philippines)
- One packaging for exporting grapes in northern Peru (Peru)

b) Information technology

- Smart sensor for intelligent temperature measurement (Chile)
- Computers, reducing shrinkage and minimizing the cost of conservation and production (Chile)
- RFID (The United States)

c) Transportation

- Transport and distribution, cold chain field (Chile)
- Yamato was using a brand-new cold storage vehicle specifically designed for shipping frozen goods. The company aims to expand its market in economies across Asia, where the demand for cold-storage is high (The Philippines)
- Cold Chain Parcel Delivery Services (Singapore)
- Home delivery (Chinese Taipei)
- Units to ship items (The United States) •DHL (The United States)

2. 2 Questionnaire Survey

■ Interested Japanese cold chain technology (continued)

d) Human resources

- In general, Chile has good technology but needs specialists therefore be better people than technology training as such (Chile)
- Freezing techniques and equipment (Mexico)
- I have little knowledge about existing technologies in Japan, but in reality depend not only on technology but also of the research conducted in the field (Mexico)

2. 3 Field Survey

- The study team conducted field visits to the Philippines and Viet Nam for the cold chain study. The reason to select these two economies are;
 - (1) The Philippines has been taking efforts to establish secure cold chain and the level is in the middle among APEC economies,
 - (2) Viet Nam is the main rice and other agricultural export economy and one of the focused economy of Global Food Value Chain Strategy Japan.

2. 3 Field Survey

The Philippines (1)

- Most of the cold chain system in the Philippines are developed and operated by retailers (superstores and convenience stores) that sell imported agri-products and foods, and major local logistics companies.
- The Cold Chain Association of the Philippines (CCAP), established in 2002, has about 100 member companies and organizations.
- About half of them are cold storage operating companies, and some of them are providing wider range of logistics services as 3/4PL.

Cold Chain Facilities of Major Logistics Companies in the Philippines

Company Name	Capital	Location	Cold Chain Facilities
Royal Cargo Inc.	Philippines	Manila	Freezing & refrigeration storage: 37,000m ³ Cold trucks: 185
Koldstor Centre Philippines Inc.	Philippines	Imus	Freezing & refrigeration storage: 4,660 MT Blast freezer: 14 MT
Igloo Supply Chain Philippines	JV (Singapore-Philippines)	Manila	Freezing & refrigeration storage: 9,400m ³ Cold trucks:25
		Davao	3 Freezing storages 37 meter long temperature controlled receiving & loading bay
Polar Bear Freezing and Storage Corp.	Philippines	Pasig, Davao, Cagayan de Oro, Bicutan	Freezing & refrigeration storage: 36,600m ³ Blast freezers
Glacier Refrigerated Services Corp.	Philippines	Manila, Quezon City	Freezing & refrigeration storage: 14,400m ³ Blast freezers
Icebox Logistics Services Inc.	JV (Philippines-US)	Manila	Reefer containers: 140 Reefer vans

2. 3 Field Survey

The Philippines (2)

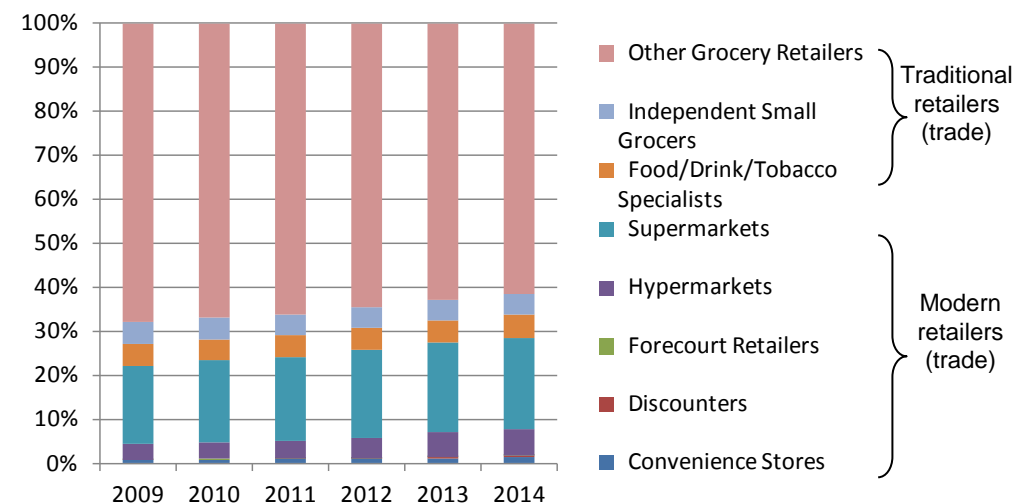
- The share of the modern retailers (modern trade) in grocery retail sales in 2014 is about 28% and the remaining 72% is occupied by traditional retailers (traditional trade), which is so-called “wet market”.
- While the sales of traditional trade has increased 18 % from 2009 to 2014, modern trade has increased 65% in the same period, thus the share of traditional trade has declined from 78% to 72%.
- However, traditional trade still keeps prevalent position over modern trade, and sari-sari stores, as the major contributor to overall figures for traditional grocery retailers, continue to influence.

Sales in Grocery Retailers by Channel: Value (2009-2014)
(billion PHP)



Source: Euromonitor

Sales in Grocery Retailers by Channel: Value Share (2009-2014)



Source: Euromonitor

2. 3 Field Survey

The Philippines (3)



“Wet market” and “trade point” (wholesale market) in the Philippines

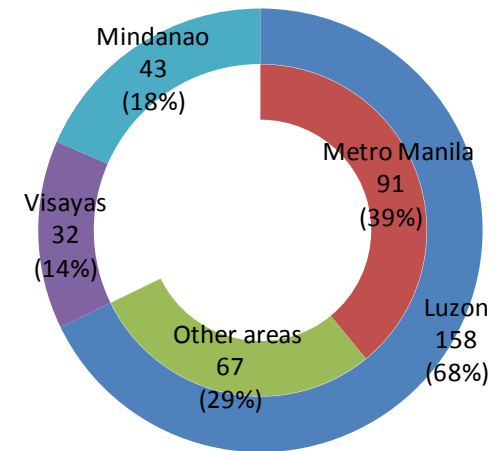


2. 3 Field Survey

The Philippines (4)

- Cold chain system concentrates in the modern trade system and is not observed in the traditional trade system. Rural areas have much less developed cold chain system, but the awareness is increasing along the penetration of the companies involved in the modern trade.
- Considering the lack of capacities of cold storages, the Philippine government has been requesting the cold storage companies to expand their capacities.
- The Department of Agriculture has introduced the mandatory accreditation of cold storage warehouses. National Meat Inspection Service (NMIS) enforces meat inspection for all the fresh, frozen and chilled meat at all meat establishments including cold storages.
- On the other hand, cold chain system has not been developed for indigenous agri-products nor by local farmers.

Number of Accredited Cold Storage Warehouse by Location (as of May, 2015)



Source: Port Calls Asia

2. 3 Field Survey

The Philippines (5)

- The Philippines government and foreign governments are conducting pilot projects in some regions, including followings:

Benguet Cold Chain Project

- Department of Agriculture and Benguet province government support farmers and traders around the city of Trinidad in Benguet province, where various highland vegetables are produced, to introduce cold storages and reefer trucks for their usage.
- The other pilot project is conducted by the Department of Agriculture to develop Benguet Agri-Pinoy Trading Complex (BAPTC) near the cold chain project site.
- Establishment of pre-cooling, packing stations and cold chain center in Benguet is also a part of the nationwide cold chain project of Department of Agriculture, which aimed to promote investment in cold chain facilities under Public-Private-Partnership (PPP).

2. 3 Field Survey

The Philippines (6)

Philippine Cold Chain Project

- With the support of USDA, value chains for vegetable, meat and fish are being developed in Caraga region in Mindanao.
- The project works on creating and strengthening producers' groups to increase agricultural production that meets international food safety requirements through provision of improved technologies, developing cold chain related markets, and improving productivity of selected high value commodities.
- CCAP supports the project in providing cold chain facilities and technologies.

2. 3 Field Survey

The Philippines (7)

- Constraints and challenges for cold chain development include:
 - high electricity price and insufficient supply of electricity
 - underdevelopment of transportation infrastructure (lack of electricity plug for reefer containers at seaports and vessels, dirt roads, etc.)
 - unorganized farmers
 - traffic regulation
 - lack of consumers' awareness of cold chain
 - heavy traffic congestion and restriction in Metro Manila

2. 3 Field Survey

Viet Nam (1)

- Most of the cold chain system in Viet Nam are developed and operated by food processing companies for export (seafood processing in particular), retailers (superstores and convenience stores) and logistics companies mainly from Japan, the United States and Republic of Korea, as well as Viet Nam. These logistics companies concentrate in the Ho Chi Minh City and its surrounding area..
- Vietnam Logistics Business Association (VLA) has about 300 members, mainly consisting of the former state-owned and privatized companies. Most of them are small and medium sized companies that only provide trucking service. Major logistics companies with cold chain facilities do not belong to VLA.

Cold Chain Facilities of Major Logistics Companies in Viet Nam

Company Name	Capital	Location	Cold Chain Facilities
Konoike Vinatrans Logistics	JV(Japan-Viet Nam)	HCMC	Freezing & refrigeration storage: 2,000m ² Cold trucks: 26
Akuruhi Logistics	Viet Nam	HCMC	Freezing & refrigeration storage: 2,000m ² Cold trucks: n.a.
Nippon Express (Vietnam)	Japan	HCMC	Freezing & refrigeration storage: 949m ² Cold trucks:7 Reefer containers : 3 (AMATA Logistics Center) Refrigeration storage: 59m ² (Vietnam Singapore Industrial Park)
Swire Cold Storage	Australia	HCMC	Freezing & refrigeration storage: 37,000 pallets
Preferred Freezer Services	United States	HCMC	Freezing & refrigeration storage: 24,000 pallets
Lotte-Sea Logistics	Rep. of Korea	HCMC	Freezing & refrigeration storage: 23,000 pallets
Hoang Lai	Viet Nam	HCMC	Freezing & refrigeration storages: 58,000t (four storages total)
Saigon Trading Group (SATRA)	Viet Nam	HCMC	Freezing & refrigeration storage: 20,000 pallets
ALFA-AG Joint Stock Company	Viet Nam	HCMC	Freezing & refrigeration storage: 20,000 pallets Cold trucks: n.a.

Source: JETRO (2014) “Study on Cold Chain in Major Countries and Regions: Viet Nam, Hanoi, Ho Chi Minh” and interview survey by MURC

2. 3 Field Survey

Viet Nam (2)

- From 2009 to 2014, Sales of the traditional grocery increased 167% and maintained overwhelming position against the modern grocery retailers. As the result, traditional retailers has kept 96% share of the total value sales of grocery retailers during the period.
- The main reasons are higher pricing strategy of the modern retailers and the consumer habit of buying from local traditional independent small grocers and other grocery retailers.

Sales in Grocery Retailers by Channel: Value (2009-2014)

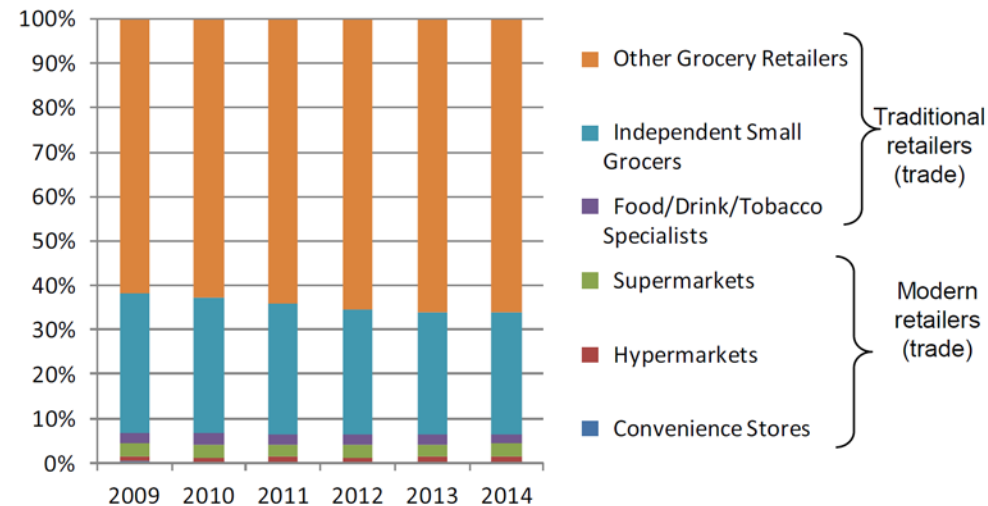
(trillion VND)



Source: Euromonitor

Sales in Grocery Retailers by Channel: Value Share

(2009-2014)



Source: Euromonitor

2. 3 Field Survey

Viet Nam (3)

- Cold chain system has been developed year after year mainly for sea food for export, meat and horticulture for domestic consumption.
- However, local logistics companies are reluctant to introduce cold chain facilities mainly due to one-way and short-range conveyance and low freight charge. On the other hand, Japanese logistics companies have started cold chain business with expecting increase of import and domestic demand of/for chilled and frozen foodstuff.
- Although Vietnamese government promulgated “Food Safety Law” and issued “Project against post-harvest losses until 2020” in 2010, there are no particular policies for cold chain development.
- Vietnam Farmers’ Union (VNFU) emphasizes the economic loss, amounting about 50 trillion VND per year, caused by price decline of agri-products which are oversupplied during limited harvest seasons.
- They recommended the Prime Minister to establish cold storages in rural areas so that farmers can provide products throughout the year at constant price. They also expect investment in cold chain facilities by private and/or foreign companies.
- There are some cases of investment in cold storages by farmers groups with financial support by provincial governments, but it is difficult to find opportunities for such cases to be extensively spread due to their financial constraint. Farmers also have constraint in technology and knowledge to operate and maintain cold storages.

2. 3 Field Survey

Viet Nam (4)

PPP in Potato Production in Thai Binh Province

- Currently, potato plays an important role in cropping systems of farmers in Viet Nam.
- Thai Binh Province has many support policies for seed potato subsidies and support to build cold storage for preservation.
- For example, they support over 114 million VND for Kien Xuong District to build Cold Storage.
- They also have a plan to increase the number of cold storage up to 280 which have equivalent storage capacity of about 8,000 to 9,000 tons of potato, meeting the demand of preservation for the whole province.
- The total budget of this project is about 1,015 billion VND, of which the people (cooperatives) and enterprises are expected to contribute 943 billion VND.

2. 3 Field Survey

Viet Nam (5)

Saigon Co-op and the VietGap

- Saigon Co-op, the largest supermarket network in Viet Nam, has signed official cooperation agreement with the Food and Agriculture Products Quality Development and Control Project (FAPQDCP) supported by Canadian International Development Agency (CIDA) in January 2011.
- It is to distribute fruits and vegetables comply with production standards such as Good Production Practices (GPPs) and VietGap.
- According to the agreement, FAPQDCP provides Saigon Co-op with technical service/advice for fruits and vegetables handling and packing and equipment/storage facilities using those standards.
- Saigon Co-op also provides technical consultancy support and periodic monitoring to many cooperatives and farmers to conform with VietGap.
- The products are collected and distributed through the fresh food distribution center of Saigon Co-op with freezing and refrigerating storage located in Song Tang Industrial Zone.

2. 3 Field Survey

Viet Nam (6)

- Constraints and challenges for cold chain development include:
 - behavior and habits of Vietnamese people in purchasing and cooking (they buy necessary foodstuff every day, many of them do not cook at home, therefore they do not use refrigerators).
 - lack of retailers' awareness and knowledge of cold chain
 - foreign investment regulation
 - traffic regulation
 - underdevelopment of transport infrastructure (road and bridge)
 - one-way and short-range conveyance
 - corruption

3. Good Practices and Pilot Projects of Cold Chains

3. 1 Literature Review

- Several common key factors in good practices conducted by APEC economies to achieve positive results are.
 - to establish value chain platform which is consisted of wide range of stakeholders from governments, private sectors, international organizations, civil societies, academics and so on.
 - to collaborate with private companies, network building between farmers and value chain stakeholders as to promote connectivity between each value chain
 - to cope with NGOs, which has strengths in agricultural value chain field, in order to have opportunities for small farmers to be involved in value chain while supporting accesses to market and credit, storage and logistics
 - to provide training courses for farmers to gather market information and plan to make an market-oriented production cycle by themselves
- In addition, FAO reports that large retailers and large processors prefer to work together with large farms. It means that the future development of small-scale farmers depends on the economic performance and development of small and medium-sized processors. Therefore, including SMEs should be one of the top priorities to establish value chain to benefit upstream producers.

3. 1 Literature Review

Economy	Good Practices of Cold Chain
The Philippines and USDA (the United States)	<p><u>The Philippines Cold Chain Project (PCCP)</u></p> <p>PCCP is a four year project funded by The United States Department of Agriculture (USDA) Food for the progress program and implemented by Winrock International along with its partners in CARAGA Region.</p> <p>PCCP's major activities involves: 1) creating new agricultural producer groups and strengthening existing ones; 2) creating new and strengthening existing trade associations; 3) developing agrodealers and other input suppliers; 4) training sanitary and phytosanitary issues; 5) providing financial services to producer association members; 6) providing grants for equipment and inputs; 7) developing new and strengthening existing buyer-seller relationships; 8) facilitating PPP; 9) developing and promoting a media and technology use plan; 10) training improved agricultural techniques; 11) training post-harvest handling and storage; 12) training post-harvest processing.</p> <p>Source: http://winrockpccp.org/html/about.php, http://winrockpccp.org/pdf/2014AnnualReport.pdf</p>
Singapore	<p><u>New Singapore Standard for Cold Chain Management of Vegetables</u></p> <p>Public-private partnership develops new standard to further ensure safety, freshness, quality, and availability of vegetables for Singapore.</p> <p>The food industry, together with AVA and SPRING Singapore, has jointly developed a new Singapore Standard (SS) for the cold chain management of vegetables. The introduction of this SS follows industry feedback as well as updates from new references and procedures adopted as best practices regionally.</p> <p>The new standard, named SS 585: 2013, is a revision of the previous technical reference (TR) for cold chain management of vegetables (TR 24: 2007). It covers major supply links starting from the farm to the packing house, transportation, distribution, wholesale centre and retail. Guidelines on the processes of harvesting, pre-cooling, processing, storing, distribution, and retailing are also included. Growers, importers, logistics providers, retailers, and seaport/airport ground handling parties are recommended to adopt this standard, which has been approved by the Singapore Standards Council.</p> <p>Source: http://www.ava.gov.sg/files/avavision/issues3-4_2013/food-security-vegetables-management.htm</p>

3. 2 Questionnaire Survey

- Some of the good practices introduced by the questionnaire survey are as follows:
 - Delivers cost-effective insulated thermal packaging solutions to protect the integrity of temperature sensitive products. (Canada)
 - Initiative of dairy farming cooperatives to coordinate collection of milk from smallholder farmers for further processing and marketing to consumers. (Indonesia)
 - Vegetable export company in Thailand utilizes modern facilities and very tight sanitation practices. (Indonesia)
 - Post-harvest management of milk under the ASEAN, Australia, New Zealand Free Trade Area (AANZFTA) Dairy Regulatory Study Programme. (New Zealand)
 - Continuing program on the provision/installation of ABF in community fish landing centers & stainless fish stalls in identified strategic location, the cold storages in fish port/fish landings including the rehabilitation of the existing operational cold chain infrastructure. Continuing consultation dialogue with the stakeholders involved in the cold chain from farm to fork. (The Philippines)
 - Public agencies are proactively co-developing guidelines with private/industry stakeholders for cold chain management of food. (Singapore)
 - Chinese Taipei has been implementing and promoting the Certified Agricultural Standards (CAS) Taiwan Premium Agricultural Products based on the Agricultural Production and Certification Act. (Chinese Taipei)
 - Public and private sectors cooperation in promoting farmers and producers to use GAP (Good Agricultural Practices) in Thai farms and to use GMP(Good Manufacturing Practices) in their plants/factories. (Thailand)
 - There is a high level of cooperation between companies working with the same cold chain necessary products. (The United States)

4. Conclusion and Policy Implication for Empowering Cold Chain in APEC Region

-
- One of the general and common obstacles on cold chain in developing economies is the financial shortage or fiscal burden for the investment for cold chain infrastructure. As the case of Japan and other developed economies, developing economies are also able to utilize the global events and opportunities to cope with international donors and NGOs. Private-Public Partnerships (PPP) is another option.
 - Another issue is lack of the human development on cold chain to enhance the cold chain management system. Most of the reason of low quality of food and processed foods comes from this shortage of know-hows and knowledge on cold chain and cold chain management. Technical transfer from developed economies to developing economies is desirable and beneficial to the both economies.
 - Introduction of cold chain in the domestic supply chain is quite limited and strong commitments and initiative from government is essential. In this situation, there might be two options to solve this issue. One is to connect private companies (retail chains or supermarkets) with agricultural production to join the cold chain in the companies supply chain. The other is to prepare for the basic and simple cold storage and enhance bargaining power to the market as supplier.
 - To establish cold value chain platform which is consisted of wide range of is also quite important. The discussion points which were talked at the platform are to be reflected into policies related to global value chain.
 - In order to enhance the small farmers' awareness in the cold chain, it might be a good option to cooperate with NGOs. To provide training courses for farmers to gather information of market and plan to make a market-oriented production cycle by themselves would be useful.