

ASEAN-Japan Guidelines on Cold Chain Logistics

ASEAN-Japan Transport Partnership

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1. Background and purpose

- With steady economic growth and increase in income in recent years, home appliances such as refrigerators and microwave ovens have been widely used in the Association of South-East Asian Nations (ASEAN). This diversifies the demands of food, and people started to have frozen processed foods, as well as traditional foods. Moreover, as for retail distribution industries, ASEAN countries started to see the transition from traditional markets (small food stands, family-owned shops, and so on) to modern markets (convenience stores, department stores, supermarkets, and so on), even though the degrees of transition differ by country. To make these new types of eating habit and food distribution sustainable, logistics services with appropriate temperature control has been gradually needed there.
- Nevertheless, most of the current food logistics in ASEAN countries does not have so much reliable and high-quality function of temperature control. As a result, food quality and safety are often undermined. The ASEAN member states should address a variety of problems, including high rate of food loss and waste during logistics process, from the viewpoint of both economics and health. Furthermore, some countries need to raise awareness of the importance of food safety through cold chain logistics at national level.
- In light of the situation in ASEAN, the ASEAN-Japan Cold Chain Logistics Project was approved at the 15th ASEAN-Japan Transport Ministers Meeting held in Singapore in October 2017. In this project, four pillars of actions were established: formulation of ASEAN-Japan cold chain logistics guidelines, human resource development, pilot projects, and the promotion and use of logistics equipment. The ASEAN-Japan cold chain logistics guidelines describes items deemed to be important specifically from the perspective of Japanese logistics operators for carrying out cold chain logistics in the ASEAN region, on the premise that the durability of the hardware aspects such as warehouse buildings and truck freight compartments has been ensured. In more detail, these guidelines includes 1) items to be considered by logistics operators in ASEAN countries when operating transport services or warehouse services with temperature control and 2) items to be considered by governments in ASEAN countries when planning policies for improving the quality of cold chain logistics in their countries.
- In consideration of the level and characteristic of cold chain logistics services in each ASEAN countries, the guidelines will be used as a reference for the development of cold chain logistics network by governments in the ASEAN region. Therefore, the service level of logistics providers is expected to improve and the related policies will be developed along with infrastructure development.

2. Scope

2-1. Product

- In general, the target of cold chain logistics is not limited to food alone; it also includes all products generally requiring temperature-controlled environment such as pharmaceuticals, chemicals, and electronic components. However, because the demand for food requiring temperature-controlled environment is most rapidly increasing among ASEAN member states, these guidelines targets food.

2-2. Temperature classification

- The temperature ranges in which food and food products should continue to be maintained, differ according to foods and food products. The ranges are classified into the general categories of “Frozen,” “Chilled,” “Constant Temperature,” and “Normal Temperature” (**Figure 1**). In order to prevent deterioration of the quality of the food and food products in hot and humid climates in ASEAN member states, logistics operators are expected to keep food and food products in low temperature environment as needed. Therefore, as for the temperature range classification, these guidelines targets “Low Temperature,” which is divided into “Frozen,” “Chilled,” and “Constant Temperature.”

Figure 1 Temperature Classification

Temperature Classification		Temperature Range	Examples of Foods and Food Products
Low Temperature	Frozen	Less than -40C	Tuna
		-40C to -18C	Seafood, Meat, Frozen food, Ice cream, Bread dough
	Chilled	-18C to +10C	Dairy products, Pastries, Vegetables, Meat, Fresh seafood
	Constant Temperature	+5C to +18C	Mayonnaise, Chocolate Confectioneries, Beverage, Rice and other grains
Normal Temperature		-	Seasonings

Target of This Guideline

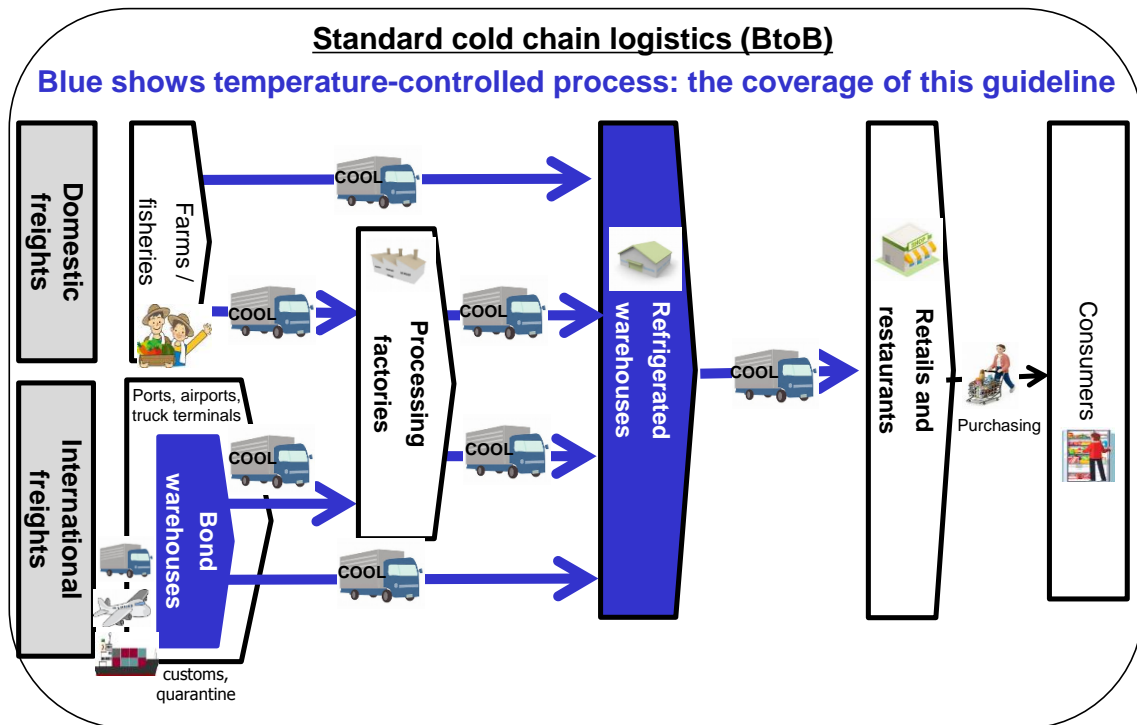
Source: “Cold chain” (Prof. Takayuki Mori et al., Koyo Shobo, 2013) and data of the Japan Association of Refrigerated Warehouses

2-3. Business model in these guidelines

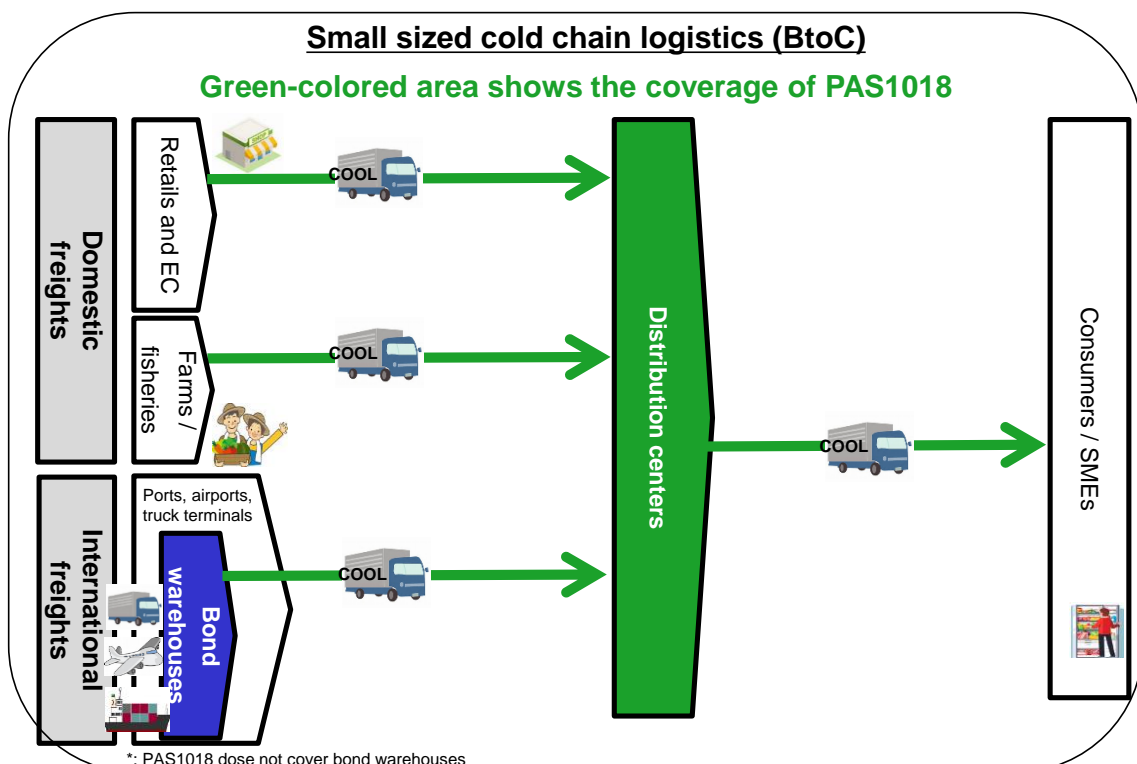
- In a general cold chain, agricultural crops or fishery products harvested by farmers or fishermen are pre-cooled at farms and fisheries as needed. At factories, food manufacturers process raw foods delivered from farmers or fishermen in a low temperature environment. Warehouse operators operate and manage cold storages at low temperature for food and food products in their refrigerated warehouses. Distributors arrange the displays of food and food products in chilled or frozen cases or shelves to enable low temperature sale, or serve dishes made from or of

transported raw food materials to consumers. Transport operators transport food and food products among farms, fisheries, factories, warehouses, retail stores and restaurants in a temperature-controlled way. In a common cold chain, temperature control is seamlessly performed during all of business-to-business (B to B) transactions among farmers, fishermen, food manufacturers, warehouse operators, transport operators, logistics operators, and sales outlets (**Figure 2**).

Figure 2 Major patterns of cold chain logistics
[B to B case]



[B to C case]



- Aside from this typical B to B cold chain, refrigerated delivery services of parcels, which have been already launched in some cities in ASEAN member states, transport small and medium parcels in a temperature-controlled way. These services are mainly offered to farms, fisheries, and distributors that would like to have their products directly transported to consumers (B to C) or to small and medium enterprises (B to SMEs).
- To make sure, these guidelines targets B to B cold chain logistics, which is composed of B to B transport and B to B warehouse operation (the blue-colored areas and arrows depicted in Figure 2), excluding transactions at firms, fisheries, processing factories, retail stores, and restaurants. It also includes basic items to be considered 1) by logistics operators (warehouse operators and transport operators) and 2) by government agencies in ASEAN member states in terms of the nationwide improvement and development of B to B cold chain logistics.
- As for refrigerated delivery services of parcels, since the British Standards Association has already issued PAS 1018 (**Figure 3**), obtaining of the certification of this standard shall be strongly encouraged and promoted.

Figure 3 Main contents of PAS 1018

- | |
|---|
| <ul style="list-style-type: none"> -Overview of refrigerated delivery services –Improvement of transport network -Handling of refrigerated parcels -Business office, cold insulated vehicle, cold store, coolant conditions -Work instructions and manuals -Staff training -Monitoring and improving the refrigerated delivery services |
|---|

Source: "PAS 1018: 2017 Indirect, temperature-controlled refrigerated delivery services – Land transport of refrigerated parcels with intermediate transfer – Specifications" (British Standards Association, February 2017)

- These guidelines does not put so much priority on discussing items related to food sanitation, which is supposed to be mainly handled by farms, fisheries, food manufacturers, retailers, and restaurants. Based on these guidelines, logistics operators should pay attention to several certifications such as Halal certification (**Figure 4**), ISO, HACCP when necessary.

Figure 4 General information on handling Halal products in cold chain logistics

- Products and services including logistics that were Halal certified by Muslim religious authorities/bodies in their respective countries worldwide must be handled properly in accordance to the requirements of the religion. The cold chain logistics is one of the vital components for the Halal Logistics.
- The organization shall implement and control the operations needed to assure that the logistics activities are handled and transported in compliance with Halal practices such as:
 - (a) Does not contain any alcohol or any part or matter of an animal (i.e. pork) that a Muslim is prohibited to consume; or that has not been slaughtered in accordance with Shariah Law;
 - (b) Does not contain anything impure and does not intoxicate according to Shariah Law.
 - (c) Does not contain any parts of a human being or its yield which are not allowed by Shariah Law;
 - (d) Is safe to be used or consumed, not poisonous or hazardous to the health;
 - (e) Has not been prepared, processed or manufactured using any instrument that was not free from anything impure according to Shariah Law;
 - (f) Has not in the course of preparation, processing or storage been in contact with, mixed, or in close proximity to any food that fails to satisfy paragraph (a) and (b).
- As an example, there are seven schemes for Halal Certification practices in Malaysia such as:
 - (1) Food/Beverages/Supplement Products;
 - (2) Hotel/Food Premises;
 - (3) Consumable Products;
 - (4) Cosmetics and Healthcare Products;
 - (5) Abattoir;
 - (6) Pharmaceutical Products; and
 - (7) Logistics.
- Compliance with Halal is defined as when food or goods or services in relation to the food or goods used in the course of trade or business is described as “Halal” or by any other expression indicating that Muslims are permitted to consume or use such food or goods or service according to Shariah Law. Halal certification is as the assurance and guarantee that the whole system of supply chain satisfies Halal requirements such as for pork and alcohol avoidance, standards of hygiene and handling, safety, “goodness,” and raw materials used in the food products.

Source: Malaysia inputs.

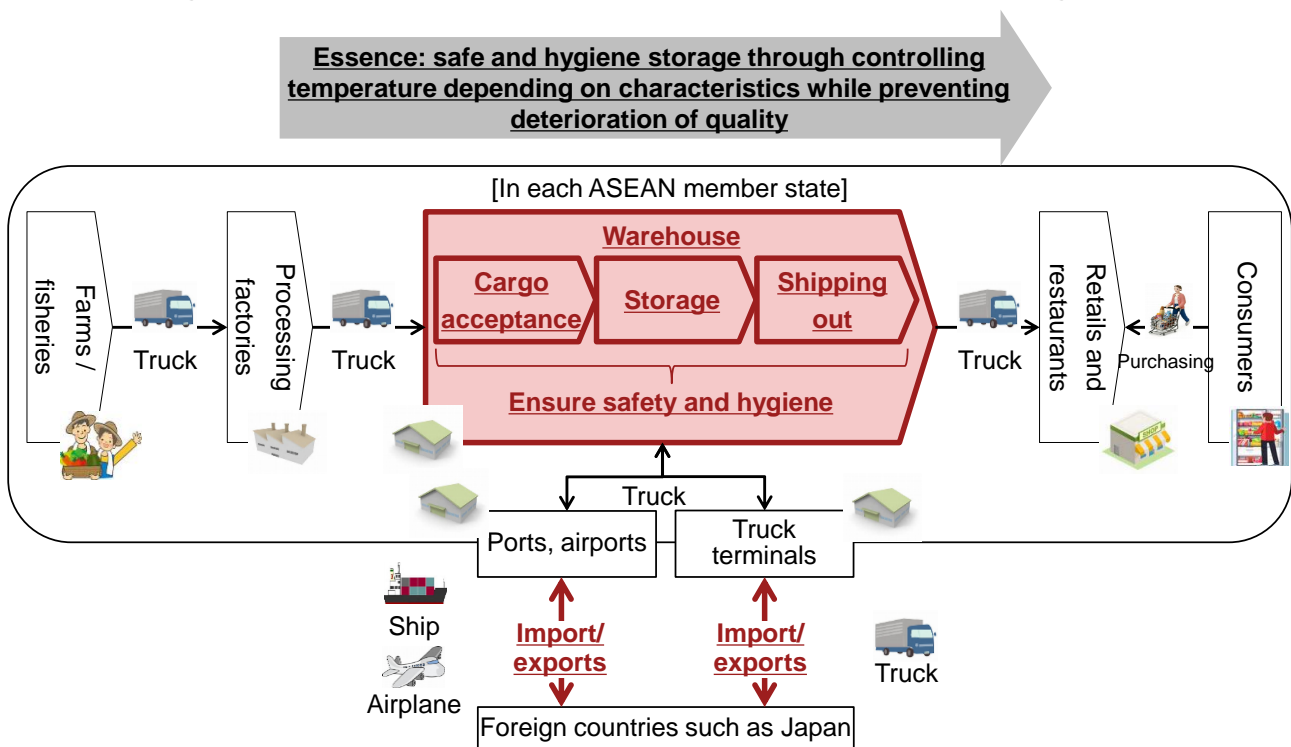
3. For logistics operators

3-1. For warehouse operators

3-1-1. Mission and challenges

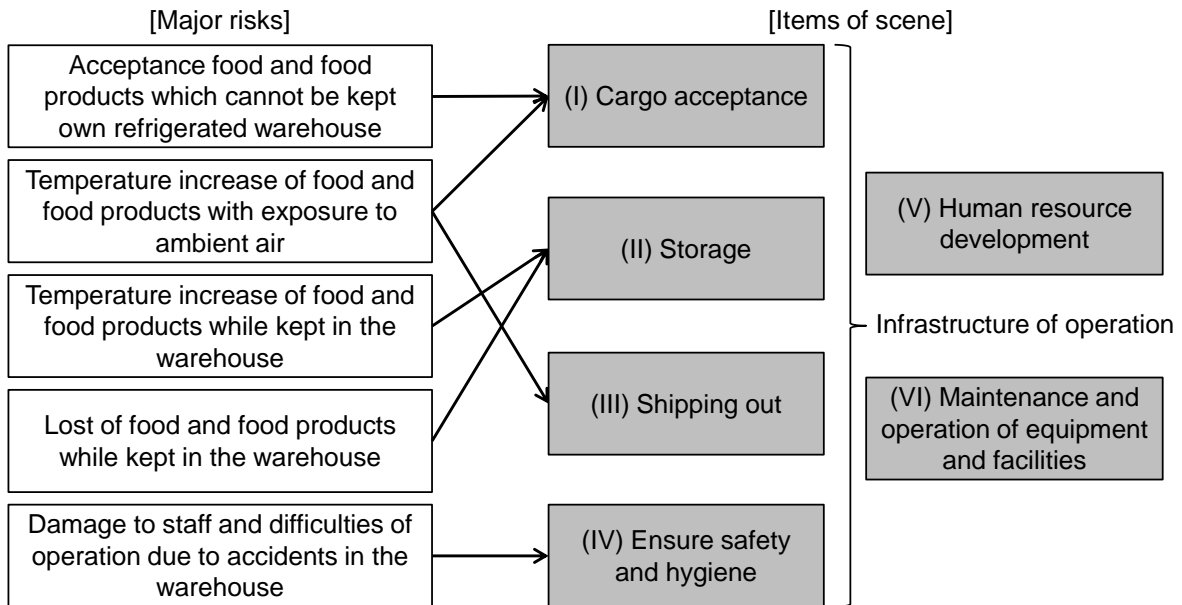
- The mission of warehouse operators is to operate their refrigerated warehouses with appropriate temperature control to prevent cold chains from being disrupted around warehouses. Warehouse operators should prevent quality deterioration of the food and food products stored in their warehouses, as well as ensuring safe and hygienic storage of the goods. They should also comply with temperature settings required by shippers and share the information about the temperature settings with transport operators (**Figure 5**).

Figure 5 Mission and tasks of warehouse operators in cold chain logistics



- To accomplish this mission, warehouse operators are required to handle each of the three tasks of refrigerated warehouse operation, 1) Cargo acceptance, 2) storage, and 3) shipping out, in a temperature-controlled way, as well as maintaining 4) the safety and hygiene of refrigerated warehouses.
- In addition, warehouse operators should also pay attention to 5) human resource development that underlies appropriate implementation of warehouse operation and 6) appropriate maintenance of equipment and facilities (**Figure 6**).

Figure 6 Major risks and scenes in the disruption of cold chain logistics for warehouse operators



- If warehouse operators do not pay attention to these items, a cold chain may be disrupted around warehouses. The quality of food and food products in warehouses will deteriorate and more foods and food products will be discarded resulting to a massive amount of food loss and waste at a nationwide level. In addition, the quality of the food and food products on wholesale or retail markets may possibly degrade and food poisoning could occur.

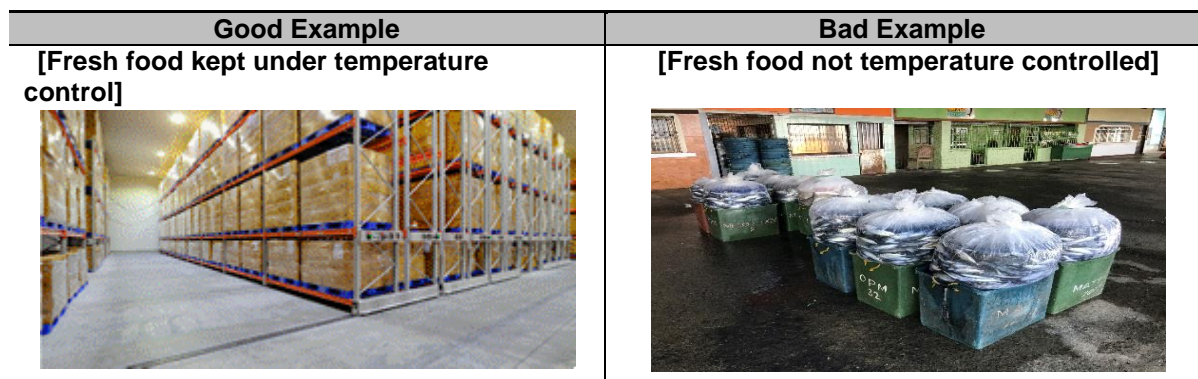
3-1-2. Actions to be taken

(I) Cargo acceptance

- Warehouse operators should consider the capacity of their warehouses and the function of the facilities in their warehouses, as well as the duration of storage requested by shippers, when requested to store food and food products from shippers.

(Example)

- Warehouse operators should not store tuna in their refrigerated warehouses if the function of temperature control of the warehouses is not qualified to properly maintain the required temperature at or below -40C.



- Before accepting food and food products from transport operators and storing them in warehouses, warehouse operators should check whether 1) the type and 2) the quantity of the goods, as well as 3) the temperature condition inside refrigerated trucks that carried the goods, is adequate according to the contracts with shippers. This should be done in a temperature controlled working areas inside the warehouses.

(Example)



- Before storing, warehouse operators should check 1) the temperature of transported goods to ensure that refrigerated materials are not frozen and that frozen materials are not melted, as well as check 2) the types, 3) the quantities, 4) the existence of damage and soiling of the goods, and 5) any seeming contamination with foreign substances.

Good Example	Bad Example
<p data-bbox="312 770 778 804">[Package conditions checked carefully]</p> 	<p data-bbox="884 770 1406 837">[Checking package conditions of task often skipped]</p> 

- When accepting food and food products and placing them in warehouses, warehouse operators should take some measures against the goods' exposure to ambient air that will trigger the increase in the temperature and the deterioration of their quality.

(Example)

- Warehouse operators should instruct their workers to load goods on pallets and promptly move them into their warehouses by using material handling equipment, such as carriages and rollers.
- Warehouse operators should also install dock shelters in their warehouses, so that refrigerated trucks can park right at the dock shelters and the transported goods will be successfully carried into the warehouses without being exposed to ambient air.



Good Example	Bad Example
<p data-bbox="263 235 821 268">[Transferring and reloading with dock shelter]</p> 	<p data-bbox="885 235 1396 302">[Transferring and reloading without dock shelter]</p> 

(II) Storage

- Warehouse operators should set appropriate temperature ranges in consultation with shippers, in light of the characteristics of food and food products that are requested to be stored in their refrigerated warehouses. Warehouse operators should also note the internal temperature of their warehouses at specific intervals.

(Example)

- Warehouse operators should install thermometers and build communication system so that they can monitor, as well as note the internal temperature of each storage in real time. Warehouse operators should build alarming systems to know any abnormalities in their warehouses, including internal temperature's substantial deviation from pre-determined ranges.
- Warehouse operators should store food and food products in their pre-cooled refrigerated warehouse at temperature ranges set in consultation with shippers, while preventing condensation by considering ambient temperature and humidity.

Good Example	Bad Example
<p data-bbox="319 1478 766 1545">[Inside the warehouse where proper temperature and humidity are kept]</p> 	<p data-bbox="877 1478 1404 1512">[Condensation seen inside the warehouse]</p> 

- Warehouse operators should keep records of locations where food and food products are specifically stored inside refrigerated warehouses and they must be clearly identified so that they can be quickly accessed.

(Example)

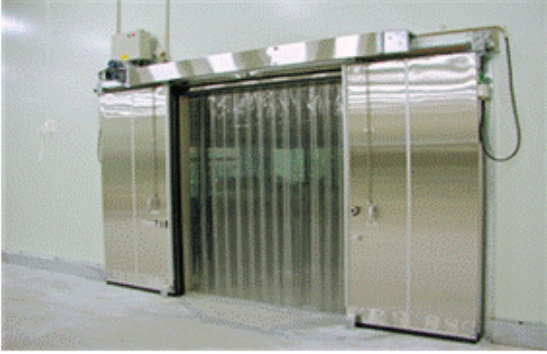

- Warehouse operators should put individual numbers to racks where food and food products are stored in each storage. Warehouse operators should record the numbers along with the locations of the storages inside their refrigerated warehouses.
- Warehouse operators should periodically inventory goods in their refrigerated warehouses, check the status of receipt and delivery of the goods utilizing radio frequency identification (RFID) tags, and inform shippers of the inventory.
- Warehouse operators should load goods onto pallets and into containers as units. Warehouse operators should carefully pile each unit of goods, considering the strength of pallets and containers, so that the space inside refrigerated warehouses can be efficiently utilized.

Good Example	Bad Example
<p data-bbox="295 913 798 945">[Well organized refrigerated warehouse]</p> 	<p data-bbox="922 913 1364 945">[Freight in disorganized warehouse]</p> 

- Warehouse operators should take some measures to prevent the inflow of ambient air that will trigger the increase in internal temperature of their warehouses and the deterioration of stored food and food products.

(Example)

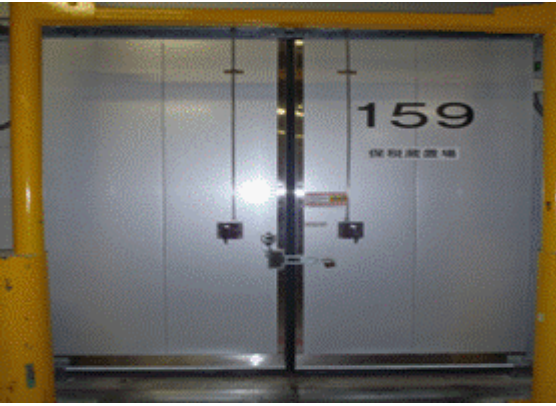

- Warehouse operators should always keep doors of their warehouses closed, except in cases where their workers carry goods in or out.
- Workers at warehouse operators should open and close doors of their warehouses promptly when they carry goods in or out.

Good Example	Bad Example
<p data-bbox="268 241 826 309">[Refrigerated warehouse with vinyl curtain to prevent incursion of outside air]</p> 	<p data-bbox="869 241 1412 309">[Refrigerated warehouse where the door is kept open]</p> 

- Warehouse operators should take some measures to prevent possible loss and theft of food and food products from their refrigerated warehouse.

(Example)

- Warehouse operators should lock doors of their warehouses, except in business hours.
- Warehouse operators should install security cameras inside their warehouses to inhibit theft.
- Warehouse operators should inspect personal belongings of each of their workers at the end of each of the working time slots, if goods are frequently lost from their warehouses.

Good Example	Bad Example
<p data-bbox="422 1218 667 1249">[Locked warehouse]</p> 	<p data-bbox="965 1218 1327 1249">[Theft due to being unlocked]</p> 



(III) Shipping out

- Before having food and food products loaded onto refrigerated trucks, warehouse operators should check whether 1) the types and 2) the quantities of the goods, as well as 3) the temperature condition inside refrigerated trucks that carried the goods, are adequate according to the contracts with shippers. This should be done in temperature controlled working areas inside the warehouses. In general, transport operators are responsible for loading food and food products onto their own refrigerated trucks, but warehouse operators are expected to assist transport operators to ensure

seamless temperature-controlled environment at intersections between warehouses and transports.

(Example)

- Before having food and food products shipped out, warehouse operators should confirm 1) the temperature of stored goods to ensure that refrigerated materials are not frozen and that frozen materials are not melted, as well as check 2) the types, 3) the quantities, 4) the existence of damage and soiling of the goods, and 5) any seeming contamination with foreign substances.

Good Example	Bad Example
<p data-bbox="376 629 715 658">[Pre-entry inspection work]</p>  A photograph showing two workers in a warehouse. One worker, wearing a green jacket and a green hard hat, is looking at a clipboard. The other worker, wearing a dark jacket and a green hard hat, is pointing at a stack of yellow crates. The crates are stacked high and have some text on them.	<p data-bbox="866 629 1422 687">[Shipment acceptance in an environment without temperature control]</p>  A photograph showing a white truck with a flatbed trailer. The trailer is loaded with produce, including green leafy vegetables. The truck is parked in an outdoor area, possibly a market or a loading dock, with a building in the background. The environment appears to be uncontrolled and not refrigerated.

(IV) Safety and hygiene

- Warehouse operators should take some measures about hygiene management for workers who handle food and food products in their refrigerated warehouses.
- Warehouse operators should clean their warehouses periodically. Warehouse operators should take some measures to protect goods from insects and pests. If insects or pests are discovered, warehouse operators should exterminate them in a manner that would not affect the goods.

(Example)



- Warehouse operators should require workers to wash and dry their hands, change into clean work clothes, wear hygiene caps, and change into floor shoes before entering their warehouses.
- Warehouse operators should clean spaces and floors of their refrigerated warehouses regularly. If mice or other pests are found, warehouse operators should exterminate them.

Good Example	Bad Example
<p data-bbox="427 190 662 224">[Clean warehouse]</p> 	<p data-bbox="933 190 1356 224">[Insufficiently cleaned warehouse]</p> 

- Warehouse operators should manage their workers' health and take safety measures for equipment and facilities in their warehouses, so that their workers can work safely inside the warehouses.

(Example)



- Warehouse operators should require workers to wear helmets, outfits for cold weather, gloves and safety shoes.
- Warehouse operators should provide break times for their workers.
- Warehouse operators should ensure that the luminance level inside their refrigerated warehouses is high enough for their workers to check the state of goods visually.
- Warehouse operators should let their workers know 1) how to communicate with people outside and 2) how to get out of their warehouses, for emergency cases in which their workers are confined inside their refrigerated warehouses.
- Warehouse operators should set a maximum time in which their workers are entitled.

Good Example	Bad Example
<p data-bbox="284 1382 810 1451">[Work environment under sufficient safety management]</p> 	<p data-bbox="879 1382 1412 1451">[Work environment with insufficient safety management]</p> 

- Warehouse operators should take some measures to operate and manage their refrigerated warehouses continuously and stably even during power outages.

(Example)



- Warehouse operators should install emergency power generators in their warehouses to ensure enough electric supply, so that they can operate and manage their refrigerated warehouses even during power outages.
- In power outages, warehouse operators should instruct workers to refrain as much as possible from opening doors and windows in their refrigerated warehouses in order to keep the insides of their warehouses cool, until power supply is restored.

Good Example	Bad Example
<p data-bbox="312 725 780 790">[Backup power source for refrigerated warehouse]</p> 	<p data-bbox="940 725 1350 757">[Dark room due to power failure]</p> 

- Warehouse operators should take some measures to prevent contamination of food and food products stored inside their refrigerated warehouses by foreign substances or objects.

(Example)

- Warehouse operators should lock the refrigerated warehouse doors outside of business hours.
- Warehouse operators should install security cameras inside their refrigerated warehouses to inhibit deliberate tampering.
- Warehouse operators should keep records of entry and exit of those who work in their

Good Example	Bad Example
<p data-bbox="403 1666 687 1697">[Entry and exit control]</p> 	<p data-bbox="863 1666 1426 1731">[Unauthorized people can go in and out of the warehouse]</p> 

- Warehouse operators should offer their warehouse services in observance of laws and regulations of countries where they operate.

(Example)

- Warehouse operators shall endeavor to obtain the latest information about laws, regulations and standards through industry associations, so that warehouse operators can understand the influence on their own businesses.
- Warehouse operators are strongly encouraged to contact appropriate and responsible government agencies, if they are concerned about their compliance with laws and regulations of countries where they operate.

(V) Human resource development

i) Training

- When temperature control in refrigerated warehouses is not properly performed, the quality of food and food products will deteriorate. This may cause problems to consumers' health, not only as problems for warehouse operators but also as problems for the whole societies. For this reason, warehouse operators should provide a variety of training programs for their involved workers to prevent inappropriate operation.

(Example)

- Warehouse operators should provide their employees with training programs to raise awareness of the importance of proper handling of goods.
- To facilitate the improvement of the employees' skill, warehouse operators should provide training programs to inform of facility overview, standard operation of equipment, and measures to ensure safety and hygiene.
- Warehouse operators should offer opportunities of "on the job training" ("OJT") to new workers; warehouse operators should have their experienced workers guide new workers while working together.
- Forwarders Association or Refrigerated Warehousing Association should provide training curriculums on management of cold chain logistics.

ii) Operations manual

- Warehouse operators should create manuals that describe facility overview, standard operation of equipment and measures to ensure safety and hygiene, in order for their workers to understand the most updated tasks regarding refrigerated warehouses and to handle food and food products appropriately. The compiled manuals must be shared by the workers.

(Example)

- Warehouse operators should create understandable manuals, with charts and pictures, about tasks at their refrigerated warehouses and circulate them at training programs to their employees.

(VI) Maintenance of equipment and facilities

- Warehouse operators should take some measures to operate equipment and facilities safely and efficiently.

(Example)

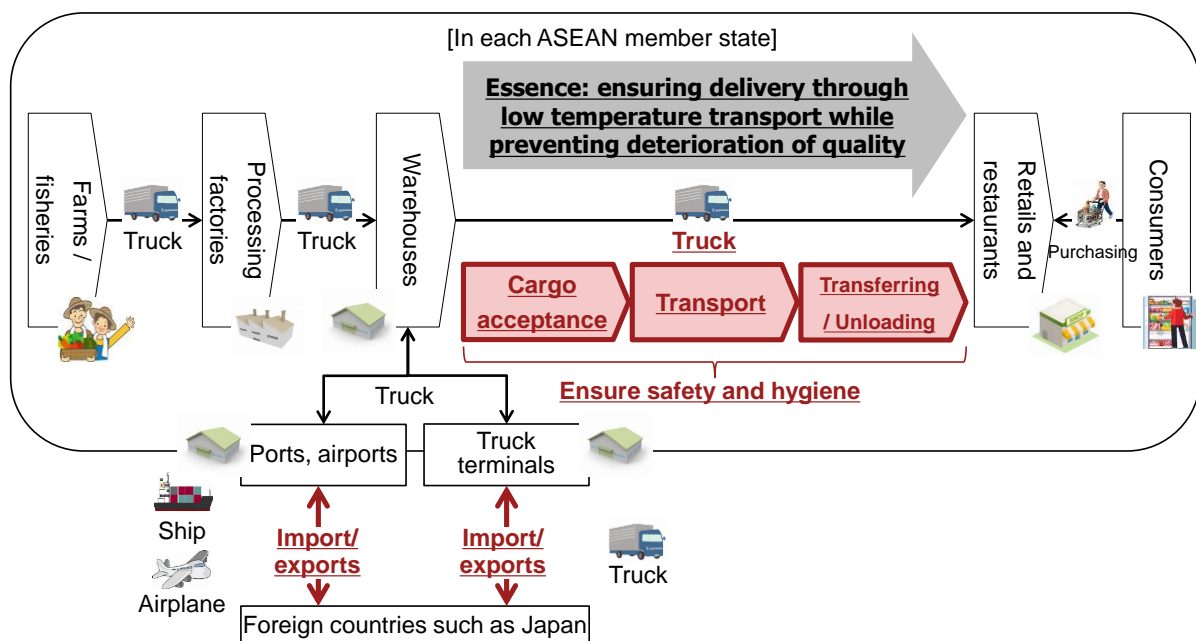
- Warehouse operators should regularly inspect equipment in their refrigerated warehouses according to regulations, standards, and their own manuals and promptly repair if defects are found.
- If any changes are observed in the internal temperature of refrigerated warehouses, warehouse operators should check whether refrigerators, freezers, doors, or any other equipment and facilities have defects.

3-2. For transport operators

3-2-1. Mission and challenges

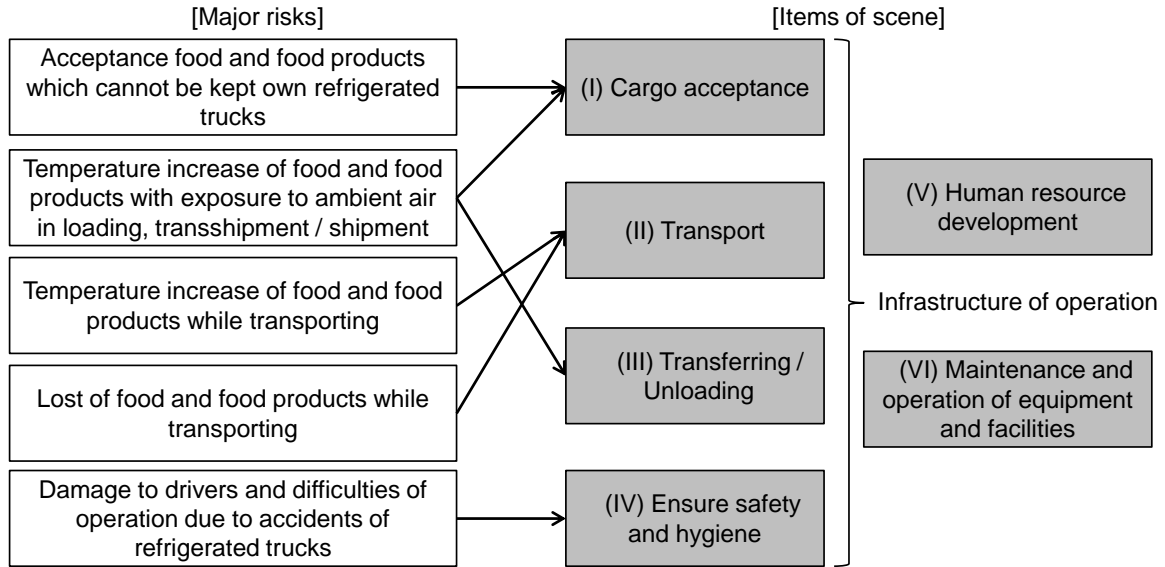
- The mission of transport operators is to transport food and food products with appropriate temperature control to prevent cold chains from being disrupted during transport. Transport operators should prevent deterioration of quality of food and food products that they transport, as well as ensuring safe and hygienic transport of the goods. They should also comply with temperature settings required by shippers (**Figure 7**).

Figure 7 Mission and tasks of transport operators in cold chain logistics



- To accomplish mission, transport operators are required to handle each of the three tasks of transport operation, 1) loading, 2) transport, 3) transferring and unloading, in a temperature-controlled way, as well as to maintain 4) safety and hygiene of refrigerated trucks.
- Just as with warehouse operators, transport operators should also pay attention to 5) human resource development that supports appropriate implementation of transport operation and 6) appropriate maintenance of equipment and facilities (**Figure 8**).
- If transport operators do not pay attention to these items, a cold chain may be disrupted during transport operation. The quality of food and food products will deteriorate and more food and food products will be discarded resulting to a massive amount of food loss and waste at a nationwide level. In addition, the quality of food and food products on wholesale or retail markets may possibly degrade, and food poisoning could occur as well.

Figure 8 Major risks and scenes in the disruption of cold chain logistics for transport operators



3-2-2. Actions to be taken

(I) Cargo acceptance

- Before accepting food and food products from warehouse operators and loading onto refrigerated trucks, transport operators should check whether 1) the type and 2) the quantity of the goods, as well as 3) temperature condition of the refrigerated warehouses, where food and food products were stored, are adequate according to the contracts with shippers. This should be done in a temperature-controlled working areas inside refrigerated warehouses.

(Example)



- When receiving goods, transport operators should check the temperature of goods to ensure that refrigerated goods are not frozen and that frozen goods are not melted.

Good Example [Pre-entry inspection work]	Bad Example [Shipment acceptance in an environment without temperature control]

- When accepting food and food products and loading onto refrigerated trucks, transport operators should take some measures against the goods' exposure to ambient air that will trigger the increase in the temperature of the goods and the deterioration of their quality.

(Example)

- Transport operators should set time limit for the exposure of food and food products to ambient air.
- Transport operators should load food and food products after checking that the inside of their refrigerated trucks are pre-cooled.
- Transport operators should promptly load food and food products into refrigerated trucks by using carriages.
- Operators of refrigerated delivery services should inhibit the temperature of parcels from rising, by using insulated boxes cooled with cooling materials.



Good Example	Bad Example
<p data-bbox="309 819 778 875">[Loading/unloading with temperature control]</p> 	<p data-bbox="938 819 1347 853">[Freight exposed to ambient air]</p> 

(II) Transport

- Transport operators should set appropriate temperature ranges in consultation with shippers and warehouse operators, in light of the characteristics of food and food products that are requested to be transported. Transport operators should note the internal temperature of cooling storages of their trucks at regular intervals.

(Example)



- Transport operators should install thermometers and build communication system so that they can monitor, as well as note the internal temperature of cooling storages of their trucks in real time. Transport operators should build alarming systems to know any abnormalities in their refrigerated trucks, including internal temperature's substantial deviation from pre-determined ranges.

Good Example	Bad Example
<p data-bbox="272 190 821 246">[Transport while recording the temperature inside the storage]</p> 	<p data-bbox="1023 190 1262 224">[Normal transport]</p> 

- Transport operators should instruct drivers of their refrigerated trucks to maintain the internal temperature of cooling storages appropriately.

(Example)

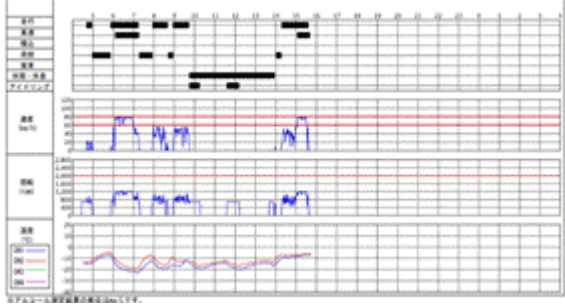

- Transport operators should thoroughly instruct drivers of the refrigerated trucks not to turn off the engines while waiting at signals.

Good Example	Bad Example
<p data-bbox="293 960 799 1016">[Internal temperature in the refrigerated truck displayed on the dashboard]</p> 	<p data-bbox="922 960 1366 994">[Stopping engine during transport]</p> 

- Transport operators should instruct drivers of their refrigerated trucks to drive in such a good manner that they can prevent food and food products inside the refrigerated trucks from perishing during transport.

(Example)



- Transport operators should install the Global Positioning System (GPS) and digital tachometers on their refrigerated trucks to manage running records. Transport operators should instruct drivers who often do sudden start, sudden braking, and sudden steering to improve their driving manners.

Good Example	Bad Example
<p data-bbox="268 190 815 246">[Digital tachometer that manages the speed of refrigerated truck]</p> 	<p data-bbox="869 190 1417 246">[Truck in which the load becomes unstable while driving]</p> 

- Transport operators should take some measures to prevent possible loss and theft of food and food products from their refrigerated trucks during transport.

(Example)

- Transport operators should lock their refrigerated trucks firmly while they are driving. Transport operators should thoroughly instruct their drivers not to open the cargo doors, except in emergencies.



Good Example	Bad Example
<p data-bbox="288 1016 799 1043">[Refrigerated truck locked while driving]</p> 	<p data-bbox="932 1016 1353 1043">[Theft due to being left unlocked]</p> 

(III) Transferring / Unloading

- When transferring food and food products between multiple refrigerated trucks at customs offices or logistics centers, transport operators should take some measures against the goods' exposure to ambient air that will trigger the increase in the temperature of the goods and the deterioration of their quality.

(Example)

- When transloading food and food products outdoors between multiple refrigerated trucks, including around customs offices, the drivers of these trucks should match each of the freight bed doors of their trucks, so that food and food products are not exposed to ambient air. Drivers should unload and load quickly and open and close the freight doors promptly.
- Transport operators should set time limit for the exposure of food and food products to ambient air.
- Operators of refrigerated delivery services should prevent the temperature of parcels from rising, by using insulated boxes cooled with cooling materials.

Good Example	Bad Example
<p data-bbox="288 967 799 1048">[Inspection of refrigerated trucks during transferring/unloading in temperature controlled facilities]</p> 	<p data-bbox="906 967 1382 1021">[Meats exposed to ambient air during transferring/unloading]</p> 

- When handing over food and food products of refrigerated trucks to distributors, drivers should check 1) the type and 2) the quantity of the goods, as well as 3) the temperature condition inside refrigerated trucks that carried the goods, are adequate according to the contracts with shippers. This should be done in the distributor's temperature-controlled areas.

(Example)

- Before unloading food and food products from the refrigerated trucks, drivers should check the temperature of transported goods to ensure that refrigerated goods are not frozen and that frozen goods are not melted.
- Drivers should not place food and food products to be delivered to distributors directly on the ground when goods are unloaded from their refrigerated trucks.



Good Example	Bad Example
<p data-bbox="427 190 662 219">[Careful handling]</p> 	<p data-bbox="906 190 1380 219">[Fruits placed directly on the ground]</p> 

(IV) Safety and hygiene

- Since drivers of refrigerated trucks handle food and food products, transport operators should take some measures for hygiene control.

(Example)



- Transport operators should require their drivers to frequently wash and dry their hands and wear clean working clothes.
- Transport operators should clean refrigerated trucks periodically.

Good Example	Bad Example
<p data-bbox="414 1030 670 1059">[Cleaning the truck]</p> 	<p data-bbox="1021 1030 1260 1059">[Unsanitary truck]</p> 

- Transport operators should determine safe and efficient transport routes in advance, so that refrigerated trucks can reliably deliver cargoes to distributors.

(Example)



- Operations managers of transport operators should decide a safe and efficient transport routes for their refrigerated trucks, considering information about weather forecasts and traffic congestion as well as past records of transport times.

Good Example	Bad Example
<p data-bbox="391 235 699 264">[Truck in efficient route]</p> 	<p data-bbox="965 235 1321 264">[Truck in traffic congestion]</p> 

- Transport operators should instruct drivers of refrigerated trucks to follow traffic rules, as well as work on improving their driving manners, to avoid traffic accidents. In addition, transport operators should consider some measures in advance in case where trucks encounter traffic accidents.

(Example)



- Transport operators should monitor driving situation by installing GPS on their refrigerated trucks, and if unexpected situations, such as a long stoppage, occur, they should contact the drivers and confirm their safety.

Good Example	Bad Example
<p data-bbox="402 1075 687 1104">[Safety certified truck]</p>  <div data-bbox="422 1361 821 1458" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>G Mark: Certification for safe driving</p> </div>	<p data-bbox="896 1075 1390 1104">[Overturned truck with crushed cargo]</p> 

- Transport operators should take some measures to prevent cargoes such as food and food products from contamination by foreign substances in the process of the transportation.

(Example)

- Transport operators should lock their refrigerated trucks firmly while they are driving. Transport operators should thoroughly instruct their drivers not to open the cargo doors, except in case of emergencies.

Good Example	Bad Example
<p data-bbox="368 188 719 219">[Truck locked while driving]</p> 	<p data-bbox="932 188 1358 219">[Theft due to being left unlocked]</p> 

- Transport operators should offer their transport services in observance of laws and regulations of countries where they operate.

(Example)

- Transport operators shall endeavor to obtain the latest information about laws, regulations and standards through industry associations, so that transport operators can understand the influence on their own businesses.
- Transport operators are strongly encouraged to contact appropriate and responsible government agencies, if they are concerned about their compliance with laws and regulations of countries where they operate.

(V) Human resource development

i) Training

- When temperature control in refrigerated trucks is not properly performed, the quality of food and food products will deteriorate. This may cause problems to consumers' health, not only as problems for transport operators but also as problems for the whole societies. For this reason, transport operators should provide a variety of training programs for their refrigerated truck drivers to prevent inappropriate operation.

(Example)

- Transport operators should provide their employees with training programs to raise awareness of the importance of proper handling of goods.
- To facilitate the improvement of employees' skill, transport operators should provide training programs in which they inform the employees of facility overview, standard operation of equipment and measures to ensure safety and hygiene.
- Transport operators should offer opportunities of "on the job training" ("OJT") to new workers; transport operators should have their experienced drivers guide new drivers while riding on refrigerated trucks together.
- Forwarders Association or Trucking Association should provide training curriculums on management of cold chain logistics.

ii) Operations manual

- Transport operators should create manuals that describe facility overview, standard operation of equipment and measures to ensure safety and hygiene, in order for their drivers to understand the most updated tasks regarding refrigerated trucks and to handle food and food products properly. The compiled manual must be shared by the workers.

(Example)

- Transport operators should create understandable manuals, with charts and pictures, about tasks of loading, transport, transferring and unloading. Transport operators should circulate the manuals at training programs to their employees.

(VI) Maintenance of equipment and facilities

- Transport operators should take some measures to operate equipment and facilities safely and efficiently.

(Example)

- Transport operators should regularly inspect the equipment of their refrigerated trucks according to regulations, standards, and their own manuals and promptly repair if defects are found.
- If any changes are observed in the internal temperature of the refrigerated trucks, transport operators should check whether refrigerators, freezers, doors or any other equipment and facilities have defects.

4. For the governments

Mission: The governments should develop an environment in which logistics operators can easily handle cold chain logistics, support the development of the logistics operators' capacity, and raise consumer awareness.

4-1. Developing an environment of cold chain logistics

4-1-1. Develop infrastructure

- Governments should take some measures to ensure a stable power supply that warehouse operators can continuously operate refrigerated warehouses that require large quantities of power.
- Governments should take some measures to improve road infrastructure. This enables transport operators to transport foods and food products efficiently. In addition, governments should also take some measures to develop ports and harbors to enable logistics operators to offer multimodal transport services, which will smoothen transports and trades of food and food products among islands.
- Governments should take some measures to provide temperature-controlled inspection sites for customs and quarantine at ports, airports, and truck terminals. This prevents the deterioration in quality of food and food products by temperature increases resulting from exposure to ambient air.
- Governments should take some measures to create food distribution centers with refrigerated warehouses at areas close to mass-consumption areas, in order to enable logistics operators to transport cargoes efficiently.
- Japanese government should introduce a variety of logistics equipment and facilities through the AJTP Information Center for logistics operators, so that logistics operators can provide high-quality services for cold chain logistics by using these equipment and facilities.

4-1-2. Institutional support

- Governments should offer financial, or other forms of, support to logistics operators, so that logistics operators can operate high-quality facilities and equipment with excellent performance and durability, which will reduce operating costs, including electricity cost, of logistics operators.

(Example)

- Governments should provide tax incentives, including additional depreciation deduction for logistics operators who intend to build refrigerated warehouses.
- Governments should provide subsidies to logistics operators who intend to introduce energy-saving equipment or facilities in their refrigerated warehouses.

- To ensure the quality of equipment in refrigerated warehouses and of refrigerated trucks used by logistics operators, governments should introduce regulations and standards 1) for maintenance and operation and 2) for performance and durability of equipment and facilities.
- Governments should implement deregulation to reduce barriers for foreign corporations that intend to

enter the warehouse and transport business markets in their countries, so that domestic logistics operators can acquire knowledge spill-over from foreign operators with abundant experience and expertise in cold chain logistics.

(Example)

- Governments should soften restrictions on foreign company investment in warehousing and transport industries.
- Governments should review restrictions on “line of business,” where one entity is prohibited from doing both warehousing and trucking business.
- Governments should allow and promote mutual passage for vehicles among multiple countries.
- Governments should establish tax incentives for foreign companies that intend to build new refrigerated warehouses, to bring in new refrigerated trucks, and to employ domestic workers and drivers.

- Governments should take some measures to harmonize and simplify procedures in ASEAN countries for customs clearance and quarantine of food and food products that require temperature-controlled environment. This will prevent deterioration in food quality and the loss of food due to delays in customs clearance and quarantine. Governments should also take some measures to develop refrigerated warehouses in which food and food products could be temporarily stored during customs control at quarantine stations, at airports and marine ports.

4-2. Capacity development

- Governments should establish guidelines or manuals in their own countries in reference to these guidelines to ensure the quality of cold chain logistics services. These guidelines or manuals are expected to establish standard business processes, operating methods of refrigerated warehouses or trucks, and other standards according to the current status of respective logistics operators, as well as to demonstrate the necessity of implementing cold chain logistics to logistics operators. These guidelines and manuals should also be written in such a straightforward and practical manner that they can be easily introduced to small and medium enterprises, which have limits on human and financial resources.

(Example)

- Governments are expected to establish guidelines and manuals for each country in consultation with the local logistics operators or logistics associations.

- Governments should assist logistics operators or logistics operator’s associations in offering training programs to workers and drivers in logistics industries, so that logistics operators are able to offer logistics services in a qualified manner.

(Example)

- Warehouse industry associations should provide training programs for managers of refrigerated warehouses.

- Based on the guidelines or manuals of each country, governments should establish the system to certify managers of warehouse operators and transport operators who have expertise and skills related to cold chain logistics, for the purpose of ensuring the quality of cold chain logistics service provided by warehouse and transport operators, as well as promoting such efforts.

(Example)

- The Warehouse Business Act requires warehouse operators to appoint a chief of warehouse management, who is responsible for ensuring proper maintenance of buildings of warehouses, proper operation and management of warehouses and education or supervision of onsite workers.

4-3. Consumer awareness

- Governments should educate general consumers to raise awareness about the necessity of having highly nutritious, safe, fresh, refrigerated, and frozen food and food products, as well as reducing food loss and waste, so that general consumers can recognize the importance of cold chain logistics.

(Example)

- Governments should publish, in consultation with experts, an official document that claims the importance of cold chain logistics and the necessity of logistics operators' effort.
- Governments should encourage schools to conduct field trips to fresh food markets to show the efforts made by logistics operators as a part of corporate social responsibility (CSR). Governments should also provide consumers with opportunities to learn about the importance of reliable cold chain logistics by, for example, using widely used social media.

4-4. Cooperation of related government agencies

- As shown in **Figure 2**, cold chain logistics involves a variety of players, including producers (farmers and fishermen, food manufacturers), warehouse operators, transport operators, and distributors (retail shops and restaurants), and consumers. For this reason, the items noted under (1) ~ (3) should be implemented by related government agencies such as ministries of transport, ministries of agriculture, ministries of commerce and industry, and ministries of health collaboratively.

(Example)

- Related government such as ministry of transport, ministry of agriculture, ministry of commerce and industry should consider to establish the platform of cooperation, such as setting up the committee to oversee the cold chain logistics matters and to tackle resolving the matter in a cooperative way.