



STRATEGIC BUSINESS PLAN – ISO/TC 315

Executive summary

Cold chain logistics is a comprehensive affair and involves a broad spectrum of stakeholders including shippers, consumers and logistics service providers. Of these, shippers (that is, consignors and consignees) constitute the supply chain. Taking the food industry supply chain as an example, the flow is as follows: farmer, processed food industry, food wholesaler, retailer, and finally to consumer. Shippers may own their own vehicles and warehouses and hire drivers to build their own cold chain logistics, but the trend in recent years has been to outsource those highly specialized operations to logistics service providers. Logistics service has been growing as a large service industry, and there is a social need for reliable services. It requires safety and hygiene assurance, as well as appropriate temperature control of transported goods throughout the supply chain. This committee's work helps the logistics service providers to operate more efficiently and realize safe and reliable services, as well as reduce food loss.

Reducing food loss and waste has become a global issue, and the United Nations has set one of its Sustainable Development Goals (SDGs) as Goal 12 "Ensure sustainable consumption and production patterns". Standardized and improved cold chain logistics contribute to realize responsible production and consumption practices.

According to a survey, the market size of the global cold chain logistics is estimated to be about US\$203 billion in 2018, and will reach about US\$293.3 billion by 2023, with an annual growth rate of about 7.6%.

While this rapid growth reflects growing demand on a global scale for a wide variety of safe food, the importance of better-controlled cold chain logistics has come to bear more relevance due to the recent COVID-19 pandemic. Improved quality/hygiene control throughout the supply chain is much more needed now.

Future deliverables of this committee will respond to this demand, by covering subjects such as contactless delivery, service operations, quality control of facilities and equipment, storage and handling of refrigerated goods, to name a few.

Collaboration and coordination with other committees in ISO and IEC is indispensable for this committee's activities, for the field of cold chain logistics is multidisciplinary, with potential overlap of work programs with other committees. Communication with relevant industry organizations is also important for both the committee and the industry, to make the committee's deliverables more relevant to the actual businesses.

1. Introduction

1.1. ISO technical committees and business planning

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important measure which forms part of a major review of business. The aim is to align the ISO work programme with expressed business environment needs and trends and to allow ISO/TCs to prioritize among different projects, to identify the benefits expected from the availability of International Standards, and to ensure adequate resources for projects throughout their development.

1.2. International standardization and the role of ISO

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: [ISO](#) (International Organization for Standardization) is responsible for all sectors excluding Electrotechnical, which is the responsibility of [IEC](#) (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of [ITU](#) (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 164 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the [International Standard](#).

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its [Technical Committees](#) are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the International Workshop Agreement (IWA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

2. Business Environment of the ISO/TC

2.1. Description of the Business Environment

The following political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

2.1.1 The state of the art environment

Logistics is a foundation of economic activities and a part of social infrastructure which plays an important role in our life. Cold chain logistics, such as transportation and storage methods to keep temperature steady through the whole supply chain from production to delivery, is a technology that is a significantly effective measure to achieve safe transportation of essential goods such as foods and pharmaceutical goods (e.g., food, medicinal and healthcare, chemicals, electrical and electronic products, etc.).

2.1.2 Expected technological changes and major innovations

The cold chain logistics consists of science, technology, and process that requires to have a good understanding of the chemical and biological changes of perishable products. Cold chain logistics is not just a part of logistics, but rather a service process in which equipment, machines, processes, IT, etc. are converged with logistics including:

- Information technology: information exchange on product information and logistical requirements between shippers and transporters, web-based document exchange and visibility, appropriate refrigerated warehouses and transportation means, devices that can track product temperature history such as RFID tags or data logs, advanced technology, insulated packaging containers and the like are being developed one after another. From a technical point of view, a cold chain is a combination of the following three technologies.
- Production technology: whether it is a fresh product or a processed product, the temperature and humidity conditions in cold chain logistics depend on the characteristics of the product. This includes the characteristics of the product itself (sensitivity to temperature and humidity, conditions for maintaining temperature and humidity, etc.) and processing technology such as packaging.
- Logistics infrastructure and transportation technology: facilities (warehouse facilities, etc.) and equipment (temperature control container, truck, etc.) that can preserve quality during transportation and storage such as temperature and humidity maintenance, monitoring, and control
- Quality verification and assurance technology: operational process-related technologies such as evaluation, analysis, certification, and standardization that can verify product quality and increase reliability during the cold chain. Furthermore, as the demand for diversified patterns of delivery (e.g., contactless delivery) grows, it is also important to develop standards keeping in mind that there are new, efficient measures that can contribute to manpower saving by utilizing artificial intelligence and robots, contactless operation methods between person and person as well as between person and goods, etc.

The cold chain logistics technology and services that are being developed recently have a close relationship with the core resources of the 4th industrial revolution, such as artificial intelligence (AI), smart home, Internet of Things (IoT), autonomous vehicles, and new and renewable energy.

2.1.3 Changes in the disciplines and practices

The cold chain logistics is becoming increasingly global. As consumers' demand for fresh and safe food and medicines grows, the service and technology market for establishing a cold chain system suitable for each country is rapidly growing.

Even just a few years ago, consumers' awareness of the quality of imported fruits and vegetables was low, and in fact, there were many cases where the quality of imported fruits and vegetables fell significantly during the logistics and customs clearance process. However, it is an era in which not only fruits and even fish can be exported safely and at relatively reasonable logistics costs.

It is not at all surprising that each country's regulations are being strengthened in response to various problems that may arise in the cold chain. Even just a few years ago, the manufacturing process and product warehouse of manufacturers were subject to regulation (GMP: Good Manufacturing Practice), but the regulations on the transport process are also being strengthened. More and more countries are demanding that service providers quickly and conveniently provide reliable information on transportation time, temperature, location, etc. at the food supply chain level. In particular, in the case of pharmaceuticals, 18 of the 50 best-selling drugs in the world required cold chain in 2010, but in 2015, 8 out of 10 drugs are being transported through the cold chain.

Energy and logistics costs can be reduced through the introduction of new cold chain technology and management techniques with energy and environmental considerations and the development of electronic control technology. Various techniques such as CFC-free refrigeration system, condensing-type showcase, and LED lighting, etc., can be utilized.

2.1.4 Relevant stakeholders

Expected main stakeholders are as follows:

- Logistics service providers: enhancement of competitive strength in the market and social reliability, assurance of quality of refrigerated goods throughout the whole process of logistics.
- Manufacturers and producers: expansion of their market and assurance of the quality of goods
- Wholesalers and retailers: stabilization of supply system and logistics cost reduction with less damages to goods. Easier to identify good-quality logistics service providers.
- Consumers: improvement of quality of life and more opportunities to purchase high-quality and safe products
- Others: infection prevention and control. Achievement of SDGs such as reduction of food losses

2.1.5 Social, safety, health, environmental or cultural issues

Countries and regions in the world have been facing food poisoning and food loss problems during transportation and storage due to damages caused by inappropriate temperature control. Standardization of cold chain logistics will help improving this situation: it contributes to resolution of food loss and hygiene problems, quality improvement and expansion of sales opportunity for manufacturers and distributors. These match the United Nations' Sustainable Development Goals (SDGs) 2 and 12, especially to meet Target 2.3 (secure food producers' access to opportunities for value addition) and 12.3 (reducing food losses along supply chains).

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 12: Ensure sustainable consumption and production patterns

In addition, the volume of food products traded via E-Commerce (EC) and food delivery services has increased, especially due to behavioural changes to stay home under the COVID-19 pandemic. With the expectation that EC market of food products will grow steadily under the state of new normality and even afterwards, cold chain logistics has been becoming ever more important. Therefore, it is necessary to standardize the appropriate operation method for cold chain logistics including hygiene of persons involved in logistics activities, disinfection and

sterilization of equipment and facilities from the perspective of prevention of infectious diseases such as COVID-19.

2.1.6 Relevant international, regional or national standards or voluntary initiatives

- ISO 23412:2020 Indirect, temperature-controlled refrigerated delivery services - Land transport of parcels with intermediate transfer
- ISO/DIS 22712 'Refrigerating systems and heat pumps — Competence of personnel'. (ISO/TC 86/SC 1)
- ISO 22982-1:2021 Transport packaging — Temperature-controlled transport packages for parcel shipping — Part 1: General requirements
- ISO 22982-2:2021 Transport Packaging — Temperature controlled transport packages for parcel shipping — Part 2: General specifications of testing
- ISO/DIS 23416 General specifications and testing methods for temperature-sensitive medicinal packages in Good Distribution Practice principles
- WTO TFA article 7.9 Perishable Goods
- JSA-S1004:2020 Cold chain logistics services -Requirements for low temperature storage services and low temperature transport services
- ASEAN-Japan Guidelines on Cold Chain Logistics
- Regulation (EC) No 178/2002 “laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety”
- Regulation (EC) No 852/2004 “on the hygiene of foodstuffs”
- Regulation (EC) No 853/2004 “laying down specific hygiene rules for food of animal origin”

2.1.7 Real or potential technical barriers to trade

Internationally, there are different laws and regulations, and different temperature conditions are legally required.

In each country, the refrigeration temperature is different according to the notification or enforcement rules of the Ministry of Food and Drug Safety, the Ministry of Agriculture and Forestry, and the Ministry of Education. (Example: 0°C to 1°C for refrigerated food of the Ministry of Food and Drug Safety, 5°C or lower according to the HACCP standard of the Ministry of Food and Drug Safety, -2°C to 6°C or less according to the distribution standard of the Ministry of Agriculture and Food, and 5°C or lower according to the School Meals Act by the Ministry of Education) In the case of rapidly growing biopharmaceuticals, the normal control temperature is about 2°C to 8°C, but this varies depending on the product.

Logistical guidelines and regulations are also evolving. In 2013, Europe revised GDP (Good Distribution Practice: Code of Practice, 92/25/EEC), a guideline for the optimal distribution process for pharmaceuticals for human use, which targets manufacturers and distributors as well as regional, national, and international logistics personnel. In a similar form, the World Health Organization (WHO), EU, the US Food and Drug Administration (FDA) and each country are developing different laws or guidelines, reflecting concerns about complicated supply chains and cold chain logistics of medicines between regions and countries.

2.2. Quantitative Indicators of the Business Environment

The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the ISO/TC:

According to the most recent survey of the global cold chain logistics market (www.marketsandmarkets.com), it is estimated to be about US\$ 203 billion in 2018, but will reach

about US\$293.3 billion by 2023, an annual growth rate of about 7.6%. Equipment and services for food and beverages requiring cold storage and transportation, refrigeration and freezing were included in this survey. It is the result of reflecting the vitalization of domestic and overseas logistics of fresh food, development of storage and transportation technology, investment of companies and governments in infrastructure, and consumer demand for safe and fresh food.

On the other hand, considering that the global logistics market is expected to reach about \$15.5 trillion in 2023, the cold chain logistics market still accounts for only 2% of the size. (Source: Transparency Market Research, 2016) This indicates that the size of the logistics market affects all supply chain activities (including shipping, air, road, rail, transportation, storage, information, handling, purchasing, packaging, maintenance, etc.) and the infrastructure market. Because it is included, the size of the cold chain logistics market appears to be relatively small. The cold chain market should include not only food, but also the logistics market for products that require temperature and humidity management, such as medical, bio, chemical and material, chemical engineering, semiconductor, and precision machinery.

3. Benefits expected from the work of the ISO/TC

The boom of E-commerce causes a logical development of the transportation and storage of refrigerated goods.

We have experienced the importance of the transportation and storage of refrigerated goods during the COVID-19 pandemic. All that has generated new needs and new expectations.

There is a multiplication of potentials providers of services in this domain that has created an important demand of interoperability.

Goods transported are sensitive and processes are complex and very technical with numerous regulations depending on countries.

The benefits expected from the work of the ISO/TC 315 is to ease the development of this business by providing a framework of standard to support its development.

That will improve confidence of customers by

- bringing transparency in the processes of carriage, storage and physical handling of refrigerated goods.
- guarantying the safety of processes.
- guarantying the best service for the best conservation of the quality of transported goods.
- creating the tools for the certification of provided service.

That will facilitate trade by

- facilitating interoperability.
- facilitating the access to newcomers.
- easing agreement between stakeholders (same language).
- easing the creation of new services end to end.
- allowing the creation of new businesses.
- reducing cost because of the application of shared standards.
- facilitating the application of regulation.
- creating a framework for providers of material and furniture.
- creating tools and methods for the management and the control of the activity.
- contributing to the ability of local food producers to expand their businesses and increase their sales channels.
- Providing a guideline for refrigerated delivery service providers to support consumer safety through a total control of the cold chain while the refrigerated parcel is in the possession of the refrigerated delivery service provider. Since it is not necessary to open each refrigerated parcel to monitor the temperature of the goods, they can maintain integrity of the contents of the parcel.

4. Representation and participation in the ISO/TC

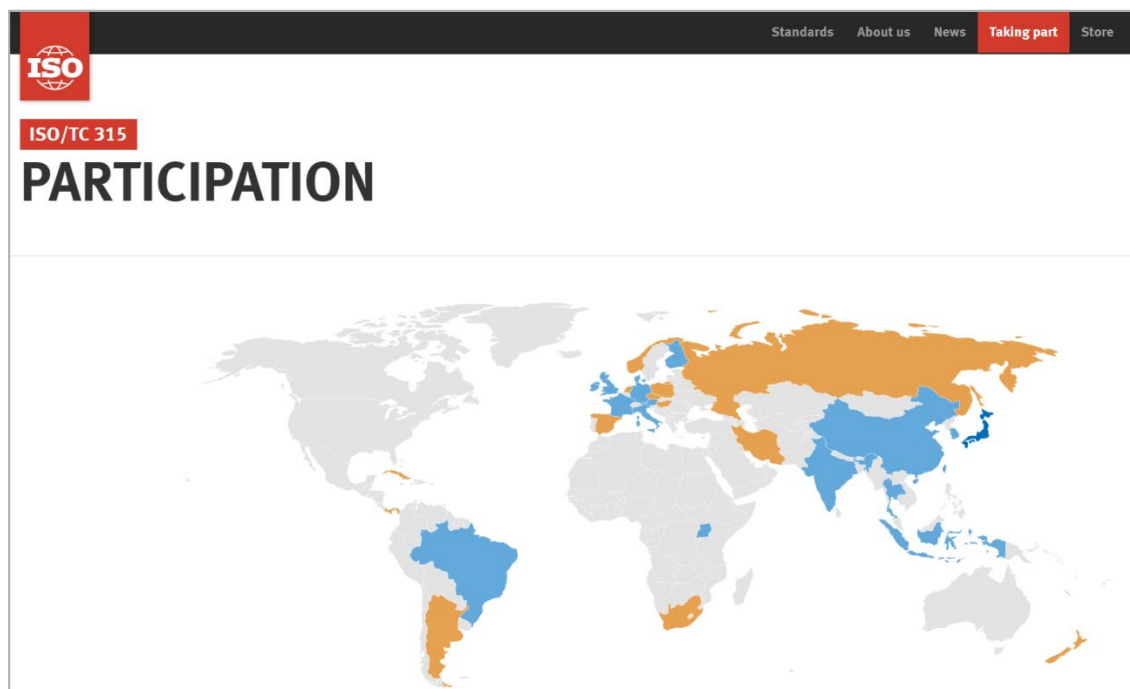
4.1. Membership

ISO member bodies that are P (participating) or O (observing) members of the ISO committee can be found here:

<https://www.iso.org/committee/6880159.html?view=participation>

Participation as of 2022-10-10

No	Participating members (18)	Observing members (14)
1	Austria	Argentina
2	Brazil	Cuba
3	China	Czech Republic
4	Denmark	Hungary
5	Finland	Iran, Islamic Republic of
6	France	Mauritius
7	Germany	Netherlands
8	India	New Zealand
9	Indonesia	Norway
10	Ireland	Panama
11	Italy	Poland
12	Japan	Russian Federation
13	Korea, Republic of	South Africa
14	<u>Malaysia (DSM)</u>	Spain
15	Singapore	
16	Thailand	
17	Uganda	
18	United Kingdom	



4.2. Analysis of the participation

Currently, ISO/TC 315 has members both from developed and developing countries, and countries with economies in transition.

In any country, there is a need to specify requirements for physical cargo handling for cold storage services and cold transport services to ensure that the cold chain is properly maintained. In order to improve the quality of cold chain logistics services, which directly affect the condition of products that require temperature control, elements such as proper physical handling of cargo, facilities and equipment are essential, along with the development of infrastructure and facilities.

However, there have been various problems caused by inadequate infrastructure such as means of transportation and storage facilities. This is particularly true for emerging countries, where steady economic growth and rising incomes have led to a diversified food and food choices, but the quality of the supply chain has not been able to keep up with the demand.

In recent years, a growing awareness and concerns for food safety and mass food waste have become a big issue which needs to be addressed on a global scale.

ISO/TC 315 will strive to encourage more participation from both developed and developing countries from around the globe. Raising awareness of food safety and quality should contribute to increased participation in ISO/TC 315. In addition, active involvement in external events and wide use of market channels should help promote the importance of standardization in the field of cold chain logistics. ISO/TC 315 tries to maintain the global relevance of its work programs through these activities.

4.3. Current/prospective liaisons

A listing is provided on relevant ISO and IEC committees and external organizations that this committee should collaborate with. ISO/TC 315 will cooperate with the committees/organizations by establishing liaison relationships where necessary.

Organization	Committee	Title	In liaison
ISO	TC 34	Food products	
	TC 51	Pallets for unit load method of materials handling	
	TC 34/SC17	Management systems for food safety	X
	TC 52	Light gauge metal containers	
	TC 86	Refrigeration and air-conditioning	
	TC 94	Personal safety -- Personal protective equipment	
	TC 96	Cranes	
	TC 104	Freight containers	
	TC 110	Industrial trucks	
	TC 111	Round steel link chains, chain slings, components and accessories	
	TC 122	Packaging	X
	TC 154	Processes, data elements and documents in commerce, industry and administration	
	TC 234	Fisheries and aquaculture	X
	TC 260	Human resource management	
	TC 283	Occupational health and safety management	
	TC 304	Healthcare organization management	
	TC 308	Chain of custody	X
TC 313	Packaging machinery		
TC 321	Transaction assurance in E-commerce	X	
UNCTAD	United Nations Conference on Trade and Development		
UNECE	United Nations Economic Commission for Europe		
WCO	World Customs Organization		
WTO	World Trade Organization		

5. Objectives of the ISO/TC and strategies for their achievement

5.1. Defined objectives of the ISO/TC

ISO/TC 315 aims to develop coherent international standards for cold chain logistics from the viewpoint of logistics service providers and to contribute to state-of-the-art cold chain management practices. The following standardization works reflect the goals of ISO's Strategic Plan. ISO/TC 315 established CAG (Chair's Advisory Group) to discuss prioritization of topics and ISO/TC 315 has identified the following work areas are of most pressing demand for standardization:

- Vocabulary
Terms and definitions related to cold chain logistics technology, services, and management for barrier-free communication between individuals, companies, institutions and countries
WG 4 (Terminology) is now in charge of developing terminology standard(s) focusing on most basic terms in the field of cold chain logistics.
- Cold chain process and service operations
A standardized and desirable cold chain logistics process and services for efficient operation between individuals, businesses, institutions, and countries. Standardization targets include cold chain logistics processes as well as individual standards that enable cold chain processes (e.g., hygiene, security, etc.).
Contactless delivery is being deliberated in WG2 (Contactless delivery), and overall service operation in the B to B sector is being discussed in WG 3 (Services between businesses).
- Cold chain validation
Validation methods for cold chain equipment to be managed in the cold chain logistical process
The NP ballot on a validation project is now open and is expected to close in November, 2022.
- Monitoring and communication
Standardization of methods of acquiring, tracking, transferring, tracing, storing, securing and reviewing information about products, devices, equipment and people for efficient and safe operation of cold chain logistics
- Maintenance and promotion of the published standard ISO23412:2020 (Indirect, temperature-controlled refrigerated delivery services — Land transport of parcels with intermediate transfer)

5.2. Identified strategies to achieve the ISO/TC's defined objectives

ISO/TC 315 plans to hold face-to-face/virtual meetings twice a year. These plenary meetings will discuss the overall strategic direction of the committee and on other important decisions. WG and TG meetings will take place when appropriate to meet their deadlines.

The committee's work program will gradually expand to include the topic areas specified in section 5.1.

5.3. Collaboration and coordination with other TCs and organizations

For effective standard development in the committee, it is important to strengthen links with other ISO/IEC technical committees and international/regional/national organizations by recognizing, respecting and involving relevant TCs and organizations.

Actions to be taken:

- to hold webinars and other information sharing including use of website in order to reach out to stakeholders and to get them involved in the work of ISO/TC 315
- Share knowledge, experience, and information on the activities with relevant organizations for improvement of the cold chain logistics industry;
- Encourage relevant organizations to take initiatives to improve the industry through adoption of standards;

Examples of relevant organizations:

No	Organization
1	Global Cold Chain Alliance
2	IATA (International Air Transport Association)
3	ISTA(International Safety Transit Association)
4	Cool Chain Association (CCA)
5	Asia-Pacific Logistics Federation
6	Korea Food Cold Chain Association
7	Japan Association of Refrigerated Warehouse
8	China Federation of Logistics & Purchasing (CFLP)
9	Global Cold Chain Europe
10	United States Cold Storage
...	(to be added)

6. Factors affecting completion and implementation of the ISO/TC work programme

6.1. General

6.1.1 Continued efforts on public relations and information sharing of ISO/TC 315 play an essential role to help ease challenges listed below:

6.1.2 While implementation and continuous use of cold chain systems is essential in the global trade of good that require temperature control, it is also challenging since the system requires higher technology, more handling capacity, quality control, facilities, and infrastructure compared to room temperature transportation, and constant temperature control is essential for all transportation and equipment from "production and processing facilities" to "sales outlets".

Cost is also a problem: a large amount of money is required at the time of introduction of the system, including the cost of equipment such as vehicles and freezers, as well as running costs such as electricity bills that are incurred after introduction. In addition, as the volume of products handled increases, large freezer warehouses will be required.

6.1.3 Cold chain is a comprehensive and multidisciplinary subject and there might be other ISO/IEC committees whose work areas are potentially overlapping with this TC.

6.2. Specific expertise

- a) Specific materials for support refrigerant system of frozen product
- b) Testing and inspecting expertise and facility
- c) Monitoring system for delivery activity
- d) Service quality management to maximize customer satisfaction

6.3. Validation

- Temperature management and monitoring in accordance with user/buyer requirements and delivery time agreement with the service provider are major subjects to be considered in this TC.
- Technologies such as RFID, sensors, cold storage, temperature-controlled vehicles are essential in providing cold chain logistics service, and the performance should be confirmed in a proper manner according to available standards and standards to be created.
- Eligibility of cold chain logistics provider should be evaluated based on the following factors:
 - (1) Validation of the cold chain infrastructure according to available standards
 - (2) Placement of authorized dispatcher
 - (3) Regular trainings for staff
 - (4) Preparation of Business Continuity Plan
 - (5) Financial soundness

6.4. Technology issues

The temperature-controlled logistics technology that is required for logistics service providers is highly dependent on the types of temperature sensitive products, since they require different temperatures (freezer, chilled and air conditioning). Freezer temperatures require higher

technology, more handling capabilities, and slightly more shipping costs due to facilities and infrastructure.

6.5. Legal/regulatory issues

Different regulatory situations in different countries may lead to the inapplicability of the new ISO standards; for countries that already have laws and national standards, harmonization with the standards developed by this TC is needed. In countries where the cold chain is not well developed, it is necessary to raise awareness of why international standards are necessary.

ISO/TC315 is a new technical committee, and the deliverables is expected to take compatibility and interoperability with different standards into consideration.

6.6. Management structure inside a country

In most Southeast Asian countries, where the cold chain logistics system is much anticipated, the regulation of high risk product is regulated by different ministries, making it difficult to develop a well-coordinated set of regulations/guidelines.

In Indonesia, for example, Ministry of Transportation manages application for food business transporters only for GPS, and its focus is on only dry food but not frozen food which monitors temperature and delivery. Food and Drug Administration is responsible for food safety factors, and food safety criteria are mandatory. Ministry of Marine Affairs and Fisheries takes care of the quality of frozen food in fisheries. Ministry of Industry regarding industrial permits, for cold chain manufacturers.

7. Structure, current projects and publications of the ISO/TC

7.1. Information on ISO online

The link below is to the TC's page on ISO's website:

<https://www.iso.org/committee/6880159.html>

Click on the tabs and links on this page to find the following information:

- About (Secretariat, Committee Manager, Chair, Date of creation, Scope, etc.)
 - Contact details
 - Structure (Subcommittees and working groups)
 - Liaisons
- <https://www.iso.org/committee/6880159.html>
- Meetings
 - Tools
 - Work programme (published standards and standards under development)
- <https://www.iso.org/committee/6880159/x/catalogue/p/1/u/0/w/0/d/0>

7.2. Reference information

[Glossary of terms and abbreviations used in ISO/TC Business Plans](#)

[General information on the principles of ISO's technical work](#)

7.3. Structure of the ISO/TC 315

Establishment of ISO/TC 315 "Cold Chain Logistics" was proposed by JISC and was officially approved in January 2021. Currently, it has one working group (WG1) disbanded, two active working groups (WG 2 and WG 3), CAG and two task groups for specific projects.

