Preparing the Talent Supply: Cold Chain Industry for Energy Efficiency

LABOR MARKET INFORMATION | 2023

TABLE OF CONTENTS

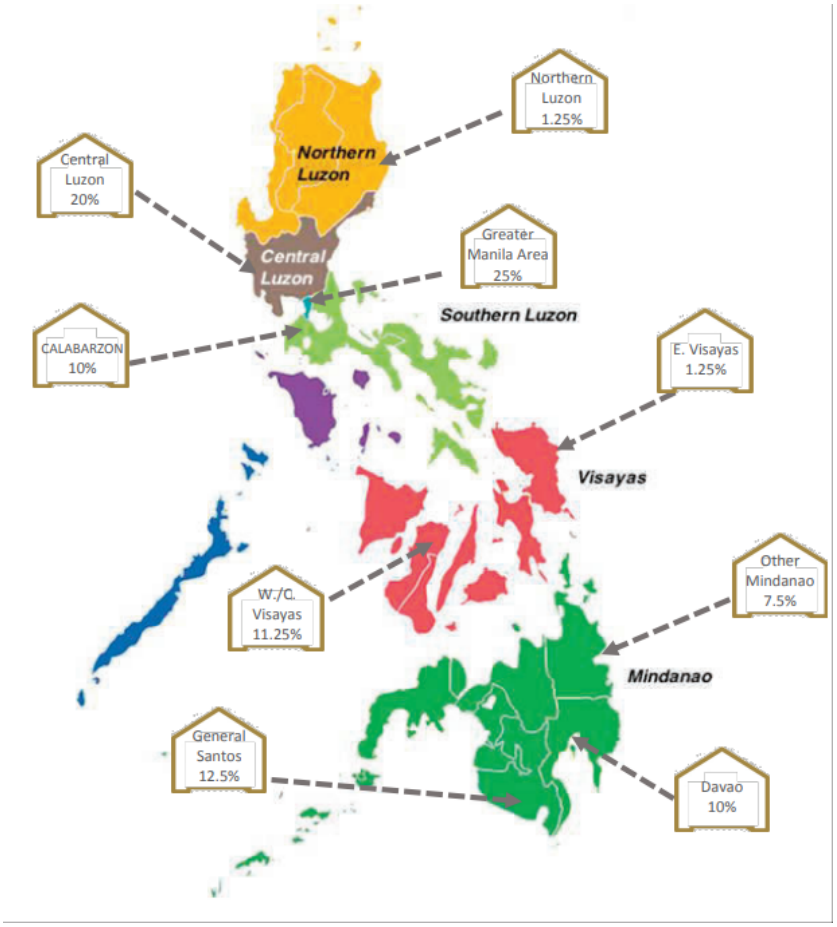
I. Background

Global trade, through recent years, has dramatically jumped in terms of advances in technology and practices. However, issues still need to be addressed, such as preserving the quality of the cargo products being transported from one point to another. One problem that businesses deal with while transporting products, especially perishable commodities, is their diminishing quality with time due to chemical interactions. Most pharmaceutical, medical, and food companies increasingly rely on the cold chain industry (Rodrigue,2020).

To serve as the industry's blueprint, the Department of Industry's Board of Investments (DTI-BOI) launched in 2021 the Cold Chain Industry Roadmap with their respective stakeholders. The press release highlighted the industry's crucial role in maintaining the efficacy of the COVID-19 vaccines; the roadmap also lays out a "blueprint for industry expansion towards the new norma" adept in coping with health emergencies" (DTI, 2021).

Prior to the release of the roadmap, a 2018 report of the Global Cold Chain Alliance (GCCA) estimated that there are 120 facilities in the Philippines with a storage capacity of 2 million (M) cubic meters (cu.m.) and an average of 16,667 cu.m at about 5,500 pallets. The report also noted that warehouse capacity strongly correlates with economic activity. In terms of cold chain capacity, a large portion is located in the Greater Manila Area, with 25 percent (Figure 1).

Figure 1. Spatial Concentration of Cold Chain Facilities by Area by Capacity.



Source: Philippine Cold Chain Industry Roadmap

As of November 2019, there are 151 Department of Agriculture (DA)-Accredited cold storage warehouses (CSWs), primarily located in the *NCR* (45), *Central Luzon* (30), *CALABARZON* (24), *Central Visayas* (13), and *Davao* (8). Most meat processors have cold storage facilities; other players are sardine canneries and banana exporters.

A large portion of cold storage demand is allocated for imported meat products, while local production usually goes directly to wet markets and supermarkets. In NCR, 40 percent of demand is occupied by meat, 30 percent by fish/aqua products, 20 percent by fruit and vegetables, and 10 percent by other products such as flour and other bakery products.

Figure 2. NCR Cold Storage demand by percent share

Source: Philippine Cold Chain Industry Roadmap

This percent share representation is likewise reflected in other regions (North Luzon, South Luzon, Visayas, and Mindanao), where meats represent most of the share.

The roadmap's publication comes on the heels of the conclusion of the **Philippine Cold Chain Project (PCCP)**; this plan is a joint initiative between the Philippine government and the United States Agency for International Development (USAID) that essentially improves the country's Cold chain infrastructure for perishable goods.

Through the Global Partnership for Improving the Food Cold Chain in the Philippines (FCC) project implemented by the United Nations Industrial Development Organization (UNIDO), the Technical Education and Skills Development Authority (TESDA), the Department of Environment and Natural Resources (DENR), and Shecco, the Cold Chain Innovation Hub (CCI Hub) was officially launched on 29 June 2022. This techno-hub was a " one-stop shop for technology transfer and other functions" and showcased the most up-to-date systems and components in the Cold Chain Industry (DENR,2022). The facilities include a workshop and exhibit area, training rooms, and a cold storage room for technology displays. The CCI Hub will play a key role in TESDA's upskilling of the labor force in green industries and green jobs in the commercial and industrial refrigeration sectors. The Hub is a venue for global partnership among

the public and private sectors and technology providers to promote the best available low-carbon and energy-efficient design technologies and practices.

The Cold Chain Innovation (CCI) Hub has partnered with various organizations to execute its regional projects. These project partners include

1. Global Environmental Facility (GEF);
2. The Department of Environment and Natural Resources (DENR);
3. The Technical Education and Skills Development Authority (TESDA);
4. The United Nations Industrial Development Organization (UNIDO); and
5. Shecco

The Department of Labor and Employment (DOLE) has also identified the logistics sector, of which the cold chain is a sub-industry, as one of the key job generators. TESDA, as the authority in technical education and skills development in the Philippines, ensures that it addresses the needs of the industries in developing its program and standards. The CCI Hub, TESDA, and various industry associations in the cold chain industry intend to work together to assess current and future skills and initiate training programs to develop skills requirements needed by the cold chain sector.

II. Objectives

The consultation intends to collect information on the current situation of the Cold Chain Industry to determine the necessary training-related support and programs for the sector. Specifically, it intends to:

- Determine the challenges and opportunities;
- Present and validate the skills map;
- Discuss the relevance of the existing Training Regulations; and
- Determine the priority skill requirements for the sector.

III. Attendees

The Planning Office invited the following organization/agencies to the Industry Consultation:

- The Technical Education and Skills Development Authority (TESDA)
    - Planning Office (PO)
    - Qualifications and Standards Office (QSO)

    - National Institute for Technical Education and Skills Development (NITESD)
- Department of Trade and Industry - Philippine Trade Training Center
- Cold Chain Industry Hub (CCI Hub)
- Met's Logistics
- South Alps Cold Storage
- Koppel, Inc.
- Kilojoule Consultants Int'l. Co.
- San Miguel Integrated Logistics Services
- Maxicool

IV. The Highlight of the Results

4.1 Presentation of the Industry Situationer

Cold Chain Industry in the Philippines: History

By the early 1900s, the Insular Ice Plant & Cold Storage in Liwasang Bonifacio was the oldest facility that produced block ice and stored unpasteurized San Miguel Draft beer. San Miguel Brewery had been using ammonia (R-717) as a refrigerant since its operation in 1890. By the 1940s, ammonia was the only refrigerant used in all Block Ice operations. It should be emphasized that Koppel Inc., the oldest refrigeration firm in the Philippines, primarily constructed the plants.

Koppel, Inc. utilized Frick's refrigeration technology for its ice plant, cold storage, brewing process, and food processing and used reciprocating compressors with low speeds of 300 to 400 RPM. The Luz Ice Plant, also known as TP Marcelo, is the oldest ice plant in the Philippines that still uses these compressors.

Due to inadequate maintenance and the use of ammonia refrigerant with a purity below 99.95% pure (refrigerant grade), ammonia leaks are expected at the Old Ice Plant. Accidents are typically caused by untrained plant personnel in ammonia safety. It also occurs when manually purging air from refrigeration systems. In 1978, the San Miguel Polo Brewery's Brewery Cellar Cooling System leaked liquid ammonia, causing the most severe ammonia accident. Three engineers perished in the accident mentioned above. The

issue is essentially improper refrigeration maintenance and the use of low-grade ammonia refrigerant.

In the TP Marcelo Ice Plant incident, 96 people were hospitalized due to ammonia fumes, and two employees perished due to probable metal failure caused by ammonium hydroxide, a corrosive chemical generated when ammonia is mixed with water. This is because refrigerant-grade ammonia (99.95% purity) is not commonly used.

More recently, the failure of a single pressure relief valve due to corrosive ammonium hydroxide led to the disaster at the Magsimpan Ice Plant. The reason is similar to that of the TP Marcelo Ice Plant incident, where refrigerant-grade ammonia (99.95% purity) was not used. ANSI/IIAR Standard 2-2008 requires a Dual type for the Pressure Relief Valve.

Today, the country has over 250 cold storage facilities with a total capacity of 450,000 metric tons, with ammonia (R717) being used as a refrigerant in 90% of these facilities. Due to operational savings, breweries in the Philippines employ ammonia as their refrigerant of choice. Ammonia is the preferred refrigerant in large meat and poultry processing plants, abattoirs, and commissary facilities.

Despite the wide use of the ammonia refrigerant, there are currently no certified ammonia refrigeration operators and technicians in the Philippines. No BFP HAZMAT team can manage R-717 leaks/accidents. Most refrigeration facilities do not have at least two sets of SCADA for maintenance and operations employees.

With the lack of certified workers, the industry also mentioned of the enacted Republic Act No. 11285 also known as "Energy Efficiency and Conservation Act". In the said law, TESDA is instructed to implement skills training, assessment, and certification programs for mechanics, technicians, installers, as well as operators of energy efficient and renewable energy systems. Under these law, TESDA shall focus on preparing the talent supply for skills/jobs/qualification that deal with energy operation and maintenance.

Figure 3. Refrigerants and their Global Warming Potential equivalents

Refrigerant		ODP	GWP
HCFC	HCFC-22	0.055	1700
	HCFC-123	0.02	93
HFC	HFC-134a	0	1300
	HFC-404a	0	3780
	HFC-407c	0	1650
	HFC-410a	0	1980
	HFC-507	0	3850
Natural Refrigerants	Ammonia (R-717)	0	0
	Propane (R-290)	0	3
	Isobutane (R-600a)	0	3
	CO_2 (R-744)	0	1
	Air (R-729)	0	0
	Steam (R-718)	0	0

In terms of effects on the environment, natural refrigerators have a lower GWP or Global Warming Potential; this is used to describe the relative potency of a greenhouse gas, taking into account how long it remains active in the atmosphere. It is seen in Figure 3 that all natural gases have a low GWP rating compared with other chemical refrigerants.

Essentially, the Philippine Cold Chain Industry is expanding due to globalization and the shift of the new administration's focus on agriculture. As this industry expands, so does the need to increase the number of technical workers in its facilities.

4.2 Challenges and Opportunities

Based on the discussions made during the Industry consultation on Skills Requirements in the Cold Chain Industry, the following were the challenges and opportunities they currently face, as described by the expert. These were divided into several Aspects: Economic, Employment, Education, and Others.

Although there are challenges in different aspects listed here, TESDA can only address the challenges under its mandate, specifically, the one related to the nonexistent certification of refrigeration technicians specializing in ammonia. Whereas the other concerns can be addressed by the collaboration of different cold chain companies/associations with the agency mandated under that specific concern

Table 1. Summary of Challenges and Opportunities

Areas	Challenges	Opportunities
ECONOMIC	• High Cost of Electricity in country • High Cost of Equipment makes it challenging for small and medium-sized enterprises (SMEs) to enter the industry • Limited Market Size due to the country's warm climate and the predominance of traditional markets that do not require refrigeration • Inefficient Government Policies leading to delays in the delivery of goods • Weak Infrastructure in terms of transportation, storage, and communication, which can hinder the efficient and reliable operation of the cold chain system • High Inflation of the Philippine Economy • Lack of Skilled	• Increased Demand for Frozen and Chilled Foods especially among urban consumers • Rising Consumer Awareness of food safety and the importance of maintaining the quality and freshness of perishable goods • Export Opportunities of agricultural products • Increased Post-harvest facilities • Government recognition and support • Technological Advancement • Increase foreign investment in the industry

	Workforce in the Country	
EMPLOYMENT	• Lack of technicians, specialist and industry experts • Most skills workers migrate abroad • Low Salary pay in the Industry, especially for technicians • Better opportunities in other sector/industries • Unattractive night shifts	• Recent increase in applicant quality • Gender equality in the industry • Increase in skilled worker demand due to big companies business expansion • High potential career & professional growth
EDUCATION	• Outdated Courses for refrigeration • Lack of training programs for industrial refrigeration • Low enrollment in RAC specialized courses. • Need for courses and programs for training Technicians in the cold chain industry • Lack of Training Facilities	• Big Companies provide training to newly hired personnel • Involvement of private companies in terms of having training facilities • High demand of technical skills in the cold chain industry • Government Support in the Education Sector
Others	• Accessibility of Work to Home (vice versa)	• Improvements of Transportation

With the return to normalcy from the COVID-19 pandemic and the subsequent policy shift to agriculture, the cold chain companies see an opportunity for the industry to grow but are hampered by other aspects. For example, the representative from Koppel noted that Filipinos are more inclined to buy produce at the wet market, and most have a negative perception that anything frozen is not fresh; thus contributing to a more limited market share. However, there is also an observed opportunity in expanding the market. As shared during the consultation, young Filipinos move to cities for better employment opportunities, thus adding to the "Urban Society." People in the city do primarily source their meals via

supermarkets that sell "frozen." Another challenge is that some farmers do not practice proper storage of agri-produce, which can be properly addressed by the use of cold storage units.

Other attendees emphasized the opportunity that the increased number of post-harvest facilities provide to the industry. A post-harvest facility in Sarrat, Ilocos Sur, for example, can increase the reach of northern food items with the use of cold storage units. According to the participants, the shortage of fruit and vegetable storage units in the country can lead to problems, specifically if there is an abundance of food produced but no cold storage unit to keep it. An example of this was the dumping of the excess tomatoes in Nueva Vizcaya which circulated in the news February 2023. One of the participants shared that having cold storages and post-harvest facilities could have prevented this occurrence.

Furthermore, a rise in cold storage facilities would raise the demand for labor. Because the facilities operate around the clock, most staff work around the clock as well; hence, corporations utilize a 2-3 day shift for key workers, such as technicians. The participants said that for small cold storage facilities, they would require roughly 6 refrigeration technicians, while big facilities would require around 20.

Another opportunity, as mentioned by a representative from the Cold Chain Industry (CCI) Hub, is to strengthen the government's information and education campaigns to raise awareness of frozen products. These can help to alleviate the unfavorable preconceptions that consumers have about frozen foods.

Part of raising consumer's awareness, likewise addressing the demand of the industry is through public-private partnership. An example of this is the establishment of the CCI Hub, whose project partners include the DENR and TESDA as well as the United Nations Industrial Development Organization. Another opportunity is the upskilling and reskilling policy by the Department of Trade and Industry (DTI).

4.3 Technical Skills Requirements

The list of requirements identified by the Cold Chain Industry can be seen in Table 2. These were identified from the initial consultation with the Philippine Cold Chain Industry Roadmap as a reference.

Table 2. The List of the Requirements for the Cold Chain Industry

Value Chain (Cold Storage)	Technical Requirements (Job/Skill/Qualification)
Inbound Logistics	• Administrative Assistant • Cold Chain Operations Administration • Dock and Door Technicians (Inbound) • Inventory Clerk (Inbound) • Material Handling Equipment Operator • Material Labeler • Storage Handlers (Inbound) • Warehouse Personnel (Inbound) • Forklift Operators (Inbound) • Palletizer Operators (Inbound)
Storage	• Air-conditioning Mechanic • Air-conditioning Technician • Electrician • Refrigeration Mechanic • Refrigeration Technician (Ammonia System) • Refrigeration Technician (Carbon Dioxide System) • Quality Assurance Associate • Health, Safety and Environmental Officer
Outbound Logistics	• Inventory Clerk (Outbound) • Storage Handlers (Outbound) • Warehouse Personnel (Outbound) • Packagers and Sealers • Assembly line Workers • Dock and Door Technicians (Outbound)

These job/skills/priorities were considered in Question 2 of the industry consultation questionnaire, where the respondents were asked to review and identify each listed skill as needed by the industry.

4.4 Identified Priority

The submitted responses were then processed to identify the industry's priorities. Table 3 shows the summary results of the survey.

Table 3. Summary of Identified Priorities by the Cold Chain Industry

VALUE CHAIN SEGMENT	JOBS/SKILLS/ QUALIFICATIONS (TECHNICAL SKILLS)	JOBS/SKILLS IMMEDIATELY NEEDED (% Share)		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS *(% Share)*			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for the conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
STORAGE	Air-conditioning Mechanic	50.00	50.00	50.00	0.00	50.00	• No Certifications • Most of the experience refrigeration mechanics/techni can are working overseas	Training and Certification
	Air-conditioning Technician	66.66	33.33	66.66	0.00	33.33	• No Certifications • Most of the experience refrigeration mechanics/techni can are working overseas	Training and Certification
	Electrician	75.00	25.00	75.00	25.00	0.00	• No Certifications • skills do not match the requirements • Need to be trained in house	Training and Certification
	Refrigeration Mechanic	100.00	0.00	66.66	0.00	33.33	• No Certifications • Most of the experienced refrigeration mechanics/techni can are working overseas	Training and Certification
	Refrigeration Technician (Ammonia System)	85.71	14.29	100.00	0.00	0.00	• Required to have experience to handle Ammonia Refrigerants and	Training and Certification

VALUE CHAIN SEGMENT	JOBS/SKILLS/ QUALIFICATIONS (TECHNICAL SKILLS)	JOBS/SKILLS IMMEDIATELY NEEDED (% Share)		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS (% Share)			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for the conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
							Equipments • No Qualified Applicants	
	Refrigeration Technician (Carbon Dioxide System)	50.00	50.00	75.00	0.00	25.00	• Required to have experience to handle CO2 Refrigerants and Equipments • Most of the experience refrigeration mechanics/techni can are working overseas	Training and Certification
	Quality Assurance Associate	100.00	0.00	66.66	33.33	0.00	• No Certifications	Training and Certification
	Health, Safety and Environmental Officer	40.00	60.00	80.00	20.00	0.00	• No Certifications • work schedule - some positions require night shift • No Qualified Applicants	Training and Certification

Based on the priority skills, the majority of respondents prioritized technical abilities in the cold chain storage area. The majority of these critical skills are related to industrial refrigeration operation and maintenance. The panelists further stressed that industrial refrigeration operation and industrial refrigeration maintenance are typically just a one-man work (i.e. worker should be knowledgeable for both operation and maintenance). There is also a focus on the specialty, especially for ammonia and carbon dioxide refrigerant refrigeration technicians.

Two of the priority skills are concerned with the quality and safety of the products stored; this also indicates the industry's need for specialized safety and quality checking personnel at the facility.

Most of the reasons why there are constraints in hiring the needed workers are the lack of certifications and no qualified applicants, and most respondents agreed that to address these constraints, there should be training and equivalent certification.

4.5 Soft Skills and Skills Related to the 4IR

In addition to the technical skills, the industry also identified soft skills needed by workers about performing jobs. The soft skills relevant to the cold chain industry are communication skills, adaptability, teamwork, problem-solving skills, attention to detail skills, logistics and supply chain management knowledge, quality control, assurance knowledge, and inventory management.

Soft/ essential skills needed explicitly in the cold chain industry in the next 1-5 years, as identified by the survey results in the skills map validation, are:

- Temperature Control Knowledge
- Knowledge and Understanding of Refrigeration Operation and Maintenance
- Knowledge of Industry Safety Practices
- Ability to work with flexible time
- Hazard analysis and critical control points (HACCP) knowledge
- Knowledge in Cloud storage systems and Information solutions
- Knowledge in Schematic Diagram

The respondent companies were also asked about skills in the industry that specifically emerged from the new technology of the 4th Industrial Revolution. The cold chain industry anticipated the following emerging skills:

- EC Motors Installation
- Artificial Intelligence
- Data Analytics
- Efficient Compressor designs
- Improved/Efficient Insulation Materials
- Knowledge of leading software in cold room inventory management

- Programmable Logic Controls (PLC) Operation or Automation
- Robotics Technology
- SCADA knowledge
- Used of Multiple compressors for system
- Variable frequency driven compressors
- Ventilation technology for Disease control
- Wireless system for Communication

According to the validation, EC motor installation was one of the emerging skills required in the industry; moreover, according to Mr. Lim of Kilojoule Consultants International Co., EC (Electronically Communicated) motors have been used in various cold chain facilities in the Philippines.

4.6 Possible Training Provider

- Mr. Lim from the Kilojoule Consultants International Co., was tapped as the expert by the Cold Chain Industry (CCI) Hub and was instructed to coordinate the cold chain industry representatives to be part of the industry consultations.
- Some of the respondents said that they can train their refrigeration technicians, but these companies stressed that most of the trained workers have no nationally recognized certificates.
- The Cold Chain Industry (CCI) Hub had a training session on the topic of refrigeration where the attendees were trainers, thus making these trainers eligible after proper assessment.

Table 4. Possible Training Providers and Venues

Possible Training Providers	Training Venue Location
Company (In-House)	
METS Logistics Cold Storage & Food Processing Plant	Cavite Cebu Cagayab De Oro Bulacan
Purefoods Hormel Company Meat Processing & Cold Storage	Gen Trias, Cavite

Possible Training Providers	Training Venue Location
Magnolia Corporation BMC & Ice Cream Plant	Gen Trias, Cavite Sta. Rosa, Laguna
Great Foods Solution	Sta. Rosa, Laguna
San Miguel Integrated Logistics Services, Inc. Cold Storage Plants	Sta. Rosa, Laguna Ulas, Davao
San Miguel Brewery Inc.	San Fernando in Pampanga Polo Brewery in Valenzuela Sta Rosa in Laguna Bacolod City, Mandaue City, Cagayan de Oro City Darong in Davao
Destileria Bago, Inc.	Bago City, Negros Occidental
External Consultants	
Kilojoule Consultants Int'l. Co.	Richville Corporate Tower 1107 Alabang Zapote Road, Madrigal Business Park, Ayala Alabang, Muntinlupa
Refrigeration Suppliers and Contractors	
GNQ Industrial and Contracting Corp.	Paranaque
Koppel, Inc.	Ortigas Canlubang
Snowman Philippines	San Juan City
Government	
TESDA NCR Regional Training Center (RTC)	Taguig City

Because the CCI Hub is physically located of the NCR Regional Training Center, the NCR Regional Office was mentioned as one of the potential training providers, specifically for the new programs that will be developed resulting from this consultation. Additionally, Mr. Lim, said that there are trainers that have attended the training conducted in CCI-Hub, that can be possible trainers as well.

4.7 Other Sectors/Sub Industries that will be affected

The value chain of the cold chain industry cuts across various other sectors, specifically those that have products that need storage and logistical processes; these sector/industries are:

- Aerospace Industry
- Agriculture, Forestry, and Fishery
- Automotive and Land Transportation
- Biotech Industry
- Chemical Industry
- Chemicals/Plastics/Petrochemicals
- Construction
- Creative
- Electrical and Electronics
- Electronics Industry
- Heating,Ventilation, Air-conditioning Refrigeration
- Human Health/Health Care
- Information and Communication Technology
- Logistics
- Maritime
- Metals and Engineering
- Pharmaceutical Industry
- Processed Food and Beverages
- Tourism (Hotel and Restaurant)
- Transport and Logistics
- TVET
- Utilities
- Wholesale and Retail Trading

V. Mapping of Skills

Table 5 shows the available Training Regulations for each of the identified priority requirements in the Cold Chain Industry.

Table 5. Equivalent Qualifications (WTR) for Identified Priority Requirements in the Cold Chain Industry

Skills/ Job	Qualification (WTR)
Air-conditioning Mechanic	No Equivalent TR
Air-conditioning Technician	Commercial Air-Conditioning Installation and Servicing NC III
Electrician	Electrical Installation and Maintenance NC II
Refrigeration Mechanic	Commercial Refrigeration Installation and Servicing NC III
Refrigeration Technician (Ammonia System)	No Equivalent TR

Skills/ Job	Qualification (WTR)
Refrigeration Technician (Carbon Dioxide System)	No Equivalent TR
Quality Assurance Associate	No Equivalent TR
Health, Safety and Environmental Officer	No Equivalent TR

It can be noted that in the validation as well as in the initial consultation, Ice Plant Refrigeration Servicing NC III was identified to have some core competencies that are related to Refrigeration Technician (Ammonia and/or Carbon Dioxide).

VI. TVET Capacity

Table 6. Total Number of Enrolled, Graduated, Assessed, and Certified (WTR), 2020-2022

Training Regulation	Coverage (2020)				Coverage (2021)				Coverage (2022)			
	Enrolled	Graduated	Assessed	Certified	Enrolled	Graduated	Assessed	Certified	Enrolled	Graduated	Assessed	Certified
Commercial Air-Conditioning Installation and Servicing NC III	0	0	0	0	0	0	0	0	15	15	38	38
Commercial Refrigeration Installation and Servicing NC III	0	0	0	0	0	0	0	0	0	0	0	0
Electrical Installation and Maintenance NC II	23,926	23,275	25,725	23,755	15,388	13,874	30,742	28,039	25,830	26,958	42,191	39,054
Ice Plant Refrigeration Servicing NC III	0	0	0	0	0	0	0	0	0	0	0	0

Source. Information and Communications Technology Office

Electrical Installation and Maintenance NC II is the only Training regulation with data of Enrolled, Graduated, Assessed and Certified across the years 2020, 2021 and 2022, while Ice Plant Refrigeration Servicing NC III and Commercial Refrigeration Installation and Servicing NC III have no data across the EGAC of the said years.

VII. Way Forward

The representatives from the Private Companies, the Industry expert, and TESDA agreed on providing the proper training and certification for the technical workers needed in the cold storage facilities. As a result, the Cold Chain Industry (CCI) have included the development of a standard in their 2023 Project Proposal as well as the collaboration of Mr. Lim from the Kilojoule Consultants International Co., as their expert. The following are the recommended action items:

- **Prioritization of Cold Chain Industry Skills**

  As seen from the results of the validation meeting, there is an opportunity to formulate full-blown Training Regulations for jobs. The skill requirements, as needed in the 1-3 years and 3-5 years that are in demand in the assessment of the worker shortages, are recommended for the development of a full-blown TR as follows:

  - Priority 1
    - Refrigeration Technician (Ammonia)
    - Refrigeration Technician (Carbon Dioxide)
    - Air-conditioning Mechanic
    - Quality Assurance Associate
  - Priority 2
    - Health, Safety, and Environmental Officer

  Relative to this and as part of the prioritization process, the Planning Office shall assist the determined industry champion in preparing for the presentation to the TESDA Board - Direction Setting Committee (TB-DSC).

  Whereas, while waiting for the presentation to the TB-DSC and its approval, the development of a Competency Standard may be done as a parallel activity to support industry demand, specifically for Industrial Refrigeration Technicians. During the facilitation of the Qualification and Standards Office (QSO) for the functional analysis, QSO could further determine if Refrigeration Technician (Ammonia) and Refrigeration Technician (Carbon Dioxide) will be made as two separate programs or may be combined in one general

program (i.e. Refrigeration Technician (Natural Refrigerant).

Further, in the development of the standards, Ice Plant Refrigeration Servicing NC III has been identified by the industry to serve as a baseline reference material. QSO, then, can consider prior industry partners and technical experts who were involved in the creation of Ice Plant Refrigeration Servicing NC III in the process of developing the proposed new standards.

- **Review the Existing TRs**

As discussed in the initial consultation and industry validation, the industry noted that the TR, Ice Plant Refrigeration Servicing NC III, which was promulgated in 2006, has compatible core competencies with the proposed programs for Refrigeration Technician (Ammonia and Carbon Dioxide).

Further, the industry recommended that instead of updating the TR to include the need of the refrigeration technicians (Natural Refrigerants), a new program shall be developed instead. Relative to this, the Qualifications and Standards Office is recommended to evaluate whether there is a need to review the Ice Plant Refrigeration Servicing NC III based on the results of the evaluation.

- **Scholarship Allocation for the Identified Industry Requirements**

The Regional Operations and Management Office shall consider the following for the allocation of various scholarship programs relevant to the Cold Chain industry:

  - Existing Training Regulations that correspond to the identified skills requirements, namely:
    - Commercial Air-Conditioning Installation and Servicing NC III
    - Commercial Refrigeration Installation and Servicing NC III
    - Electrical Installation and Maintenance NC II
  - Programs that will be prioritized subject to the approval of the TESDA Board and Competency Standards for emerging skills.

However, the Regional Operations Management Office (ROMO) shall note that for the Ice Plant Refrigeration Servicing NC III, there will be further clarification with the industry if this will be recommended to be placed under a temporary moratorium. The industry mentioned that the TR no longer corresponds to the needs of the industry, at least in the industrial set-up.

Moreover, the consultation results shall serve as the Planning Office's reference in updating the 2023 Selected Training Programs as the basis for the provision of the Tulong Trabaho Scholarship Program.

- **Enhance the TVET Capacity on Existing Training Regulations**

The TESDA Certification Office shall take note of the TVET capacity of the identified equivalent Training Regulation for industry priorities to determine what would need to be further strengthened or developed. As seen in Table 7, there are several related Training Regulations that need improvement in terms of the number of Assessment Centers, Competency Assessors, registered programs, and NTTC holders. Among the four (4) identified TRs, Commercial Air-Conditioning Installation and Servicing NC III and Commercial Refrigeration Installation and Servicing NC III currently do not have any registered programs.

Table 7. Summary of the number of Assessment Centers, Competency Assessors, Registered Programs, and NTTC Holder per Qualification (WTR), F.Y. Q1 2023

Qualifications (WTR)	No. of Assessment Centers	No. of Competency Assessors	No. Registered Programs	No. of NTTC Holder
Commercial Air-Conditioning Installation and Servicing NC III	5	9	2	9
Commercial Refrigeration Installation and Servicing NC III	0	0	0	0
Electrical Installation and Maintenance NC II	252	498	486	1,385
Ice Plant Refrigeration Servicing NC III	0	0	0	0

Source: TESDA Certification Office

- **Inclusion of the Soft Skills and Emerging in the Program**

  As indicated in the validation meeting, all participants agreed that soft and emerging skills are crucial for workers in the cold chain industry, as is proper knowledge of new technologies. Thus, integration of the needed skills in the TESDA program is recommended.

VIII. Annex

Table 8. Summary of results based on the prioritization process for the Cold Chain Industry

VALUE CHAIN SEGMENT	JOBS/SKILLS/ QUALIFICATIONS (TECHNICAL SKILLS)	JOBS/SKILLS IMMEDIATELY NEEDED (% Share)		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS (% Share)			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
Storage	**INBOUND**							
	Administrative Assistant	50.00	50.00	50.00	50.00	0.00	need to provide focussed jobs training courses	
	Cold Chain Operations Administration	50.00	50.00	50.00	50.00	0.00	place of residence far from workplace	
	Dock and Door Technicians (Inbound)	100	0.00	0.00	50.00	50.00	New technology of dock doors and shelter needs higher technical knowledge such as PLC and instrumentation	
	Inventory Clerk (Inbound)	100.00	0.00	50.00	50.00	0.00		
	Material Handling Equipment Operator	100.00	0.00	50.00	50.00	0.00		
	Material Labeler	50.00	50.00	50.00	50.00	0.00		
	Storage Handlers (Inbound)	100.00	0.00	50.00	50.00	0.00		
	Warehouse Personnel (Inbound)	100.00	0.00	50.00	50.00	0.00		
	Forklift Operators (Inbound)	100.00	0.00	100.00	0.00	0.00		
	Palletizer Operators (Inbound)	50.00	50.00	50.00	50.00	0.00		

VALUE CHAIN SEGMENT	JOBS/SKILLS/ QUALIFICATIONS (TECHNICAL SKILLS)	JOBS/SKILLS IMMEDIATELY NEEDED (% Share)		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS (% Share)			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
	STORAGE							
	Air-conditioning Mechanic	50.00	50.00	50.00	0.00	50.00	No Certifications Most of the experience refrigeration mechanics/technican are working overseas	Training and Certification
	Air-conditioning Technician	66.66	33.33	66.66	0.00	33.33	No Certifications Most of the experience refrigeration mechanics/technician are working overseas	Training and Certification
	Electrician	75.00	25.00	75.00	25.00	0.00	No Certifications skills do not match requirement. Need to be trained in house	Training and Certification
	Refrigeration Mechanic	100.00	0.00	66.66	0.00	33.33	No Certifications Most of the experience refrigeration mechanics/technician are working overseas	Training and Certification
	Refrigeration Technician (Ammonia System)	85.71	14.29	100.00	0.00	0.00	Required to have experience to handle Ammonia Refrigerants and Equipments No Qualified Applicants	Training and Certification
	Refrigeration Technician (Carbon Dioxide System)	50.00	50.00	75.00	0.00	25.00	Required to have experience to handle CO2 Refrigerants and Equipments	Training and Certification

VALUE CHAIN SEGMENT	JOBS/SKILLS/ QUALIFICATIONS (TECHNICAL SKILLS)	JOBS/SKILLS IMMEDIATELY NEEDED (% Share)		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS (% Share)			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
							Most of the experience refrigeration mechanics/technician are working overseas	
	Quality Assurance Associate	100.00	0.00	66.66	33.33	0.00	No Certifications	Training and Certification
	Health, Safety and Environmental Officer	40.00	60.00	80.00	20.00	0.00	No Certifications work schedule - some positions require night shift No Qualified Applicants	Training and Certification
	OUTBOUND							
	Inventory Clerk (Outbound)	50.00	50.00	50.00	50.00	0.00		
	Storage Handlers (Outbound)	50.00	50.00	50.00	50.00	0.00		
	Warehouse Personnel (Outbound)	50.00	50.00	50.00	50.00	0.00		
	Packagers and Sealers	50.00	50.00	50.00	50.00	0.00		
	Assembly line Workers	50.00	50.00	50.00	50.00	0.00		
	Dock and Door Technicians (Outbound)	50.00	50.00	50.00	0.00	50.00		

VALUE CHAIN SEGMENT	JOBS/SKILLS/ QUALIFICATIONS (TECHNICAL SKILLS)	JOBS/SKILLS IMMEDIATELY NEEDED (% Share)		ASSESS THE SHORTAGE OF WORKERS IN FILLING-UP THE SKILLS REQUIREMENTS (% Share)			REASONS/CONSTRAINTS IN FILLING-UP THE SKILLS REQUIREMENTS (e.g. no qualified applicants, prefer to work abroad, seek higher pay, work schedule)	RECOMMENDED ACTION (e.g. need for conduct of training, standardization, certification)
		In the next 1-3 years	In the next 3-5 years	Low (below 100)	Medium (100-500)	High (above 500)		
	EMERGING SKILL							
	Balancing Imports and Proper Programming	50.00	50.00	50.00	50.00	0.00		
	Delivery Scheduling	50.00	50.00	50.00	50.00	0.00		
	Food Safety Education	75.00	25.00	75.00	25.00	0.00		
	Production Scheduling	75.00	25.00	75.00	25.00	0.00		
	Value-Added Services	60.00	40.00	66.66	33.33	0.00		

IX. References

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TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY

Office of the Deputy Director-General for Policies and Planning

Planning Office - Labor Market Information Division

TESDA Complex, East Service Road, South Superhighway,
Fort Bonifacio, Taguig City, 1630

www.tesda.gov.ph | 8817-2675

Contributors

Oliver Francis Mejorada
Marinela P. Lantin
Katherine Amor A. Zarsadias