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# VALUE CREATION AND JOB GENERATION

*The Potential of the Solid Waste  
Management Sector*



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## I. Overview of the Solid Waste Management Sector

### 1.1 What is Waste Management?

Solid waste management is just one component of the overarching waste management industry, an industry described by Cedefop (2022) in its Policy Brief entitled *Too good to waste: Tapping the potential of vocational education and training in the waste management sector* as encompassing “activities linked to the collection, transport, processing, recycling, and disposal of different waste types”. Waste management includes the processes and actions involved in waste management from generation to final disposal.

Waste management, in general, is therefore linked to the Circular Economy provided that waste is a by product of the current production and consumption mechanisms. The Labor Market Intelligence Report of the Technical Education and Skills Development Authority (TESDA) on Circular Economy highlighted three main principles of Circular Economy: (1) Elimination of waste and pollution through the circulating the materials used such as by reusing, repairing, remanufacturing, and recycling; (2) Circulation of products and materials; and (3) Regeneration of nature - a shift from extraction to regeneration (Technical Education and Skills Development Authority, 2022). Consequently, treating waste as a resource in a circular economy (i.e return it to the production processes so long as possible).

Waste management (including recycling) will be increasingly important to the green transition, as nearly all activities in the sector are directly linked with environmental protection. With the shift to circular economy, it is expected that waste management, in particular solid waste management, will advance the circular economy, mitigate climate change, protect the ecosystems, and avoid, if not, minimize pollution.

Besides the circular economy, the following are the other drivers of change according to Cedefop (2022):

- Policy and legislation changes (e.g. recycling targets)
- Consumption pattern changes (Rise in eco-friendly consumers)
- Pollution control
- Increased cost of raw materials
- Mainstreaming (in sectors, society) the circular economy concept
- Automation and Digitalisation (including increased use of sensors to detect different waste types)
- Improved recycling technology
- More waste processing-based energy production
- Adaptation to EU policy priorities and transposition of EU Legislation
- Citizens’ awareness of and demand for more efficient and effective waste management
- Redesign of products to reduce waste
- Recycling and recovery of scarce high-value materials

In a skills forecast from the European Green Deal (Cedefop, 2021 as cited in Cedefop, 2022), an increased demand for workers at all skill levels (low, medium, and high) is anticipated, although “the employment expansion is more pronounced for highly skilled non-manual occupations”.

## 1.2 Waste Value Chain

Figure 1 shows the different processes involved in waste management from generation (manufacturing) to transforming waste into value through waste recycling. The presented figure also highlights the different actors involved: Manufacturers, Distributors, End Users, and the Disposal/Recycling Facilities.

**Figure 1**

*An overview of forward supply chain and waste management processes*



Source: Blockchain-Based Forward Supply Chain and Waste Management for COVID-19 Medical Equipment and Supplies (Ahmad et. al, 2021).

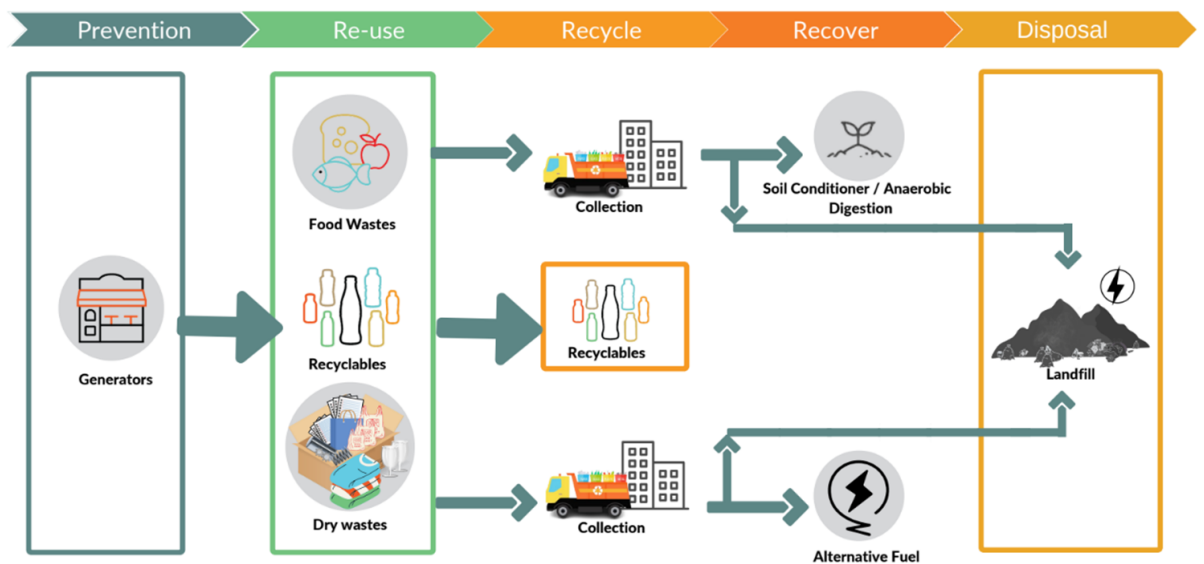
On the other hand, Figure 2 presents the value chain based on the compilation of wastes subject to the Waste Analysis and Characterization Studies which focuses on five main components:

1. **Prevention** starts with the generators (i.e manufacturers);
2. **Re-use** is on the side of the consumers (i.e food waste, recyclables, etc.) as a by-product of waste generation;
3. **Recycle** involved the areas of collection and waste transportation;

4. **Recover** involves waste segregation and sorting as well as waste treatment; and
5. **Disposal** is before wastes generated end up in waste disposal facilities including landfills.

**Figure 2**

*Solid waste value chain*



Source: Coca-Cola Philippines

For both of the presented value chains, the idea, however, is for the process to be transformed to a circular process. That means that after consumption from the end users and following the proper waste management procedures, so called wastes will get back to the manufacturing for upcycling, recycling, etc. for value creation.

### 1.3 Employment Opportunities, Emerging Jobs, and Skills Requirements

The Cedefop (2022) have listed various waste management jobs accessible via technical-vocational training including those listed in the figure below.

**Figure 3**

*Examples of waste management jobs accessible to vocational education and training*



Additionally, other emerging jobs and requirements include (Cedefop, 2022)

- Waste managers and coordinators
- Waste valorisation professionals
- Waste sorting process optimisation professionals
- Material extraction, recycling and reuse specialists/experts
- Quality assurance managers
- Energy experts
- Strategic waste managers
- Waste industrial mechanics
- Designers of industrial plants for the circular economy
- Technical engineers (e.g design recyclable products)
- Logistics managers, data analysts
- Waste management trainers

For instance, manufacturers will have changes in the sustainability of their products from design to waste disposal. Further, as highlighted previously, jobs will transition to focus more on managerial, service-oriented, and highly skilled non-manual jobs that would require workers not only to possess technical skills but more so transversal and soft skills. By 2030, transferable skills such as communication, data analysis, and Information Technology (IT) is anticipated to have higher demands.

## 1.4 Relevant Philippine Policies

There are two main policies that are critical in the solid waste management industry in the country. First is the Republic Act No. 9003 also known as the Ecological Solid Waste Management Act of 2000 which stipulates in Section 2 (Declaration of Policies, item j) the need to “Strengthen the integration of ecological solid waste management and resource conservation and recovery topics into the academic curricula of formal and non-formal education in order to promote environmental awareness and action among the citizenry” (Republic Act No. 9003).

Additionally, Section 55 of the Republic Act (Public Education and Information) specifically mentioned TESDA as one of the agencies needed in the conduct of a continuing education and information campaign on solid waste management. The Implementing Rules and Regulations of RA No. 9003 also specified in Part VI, Rule 21, Section 2 the “strengthening of the waste management content in the curricula”.

Since it has been decades since the law was passed, amendments were made to institutionalize Extended Producers Responsibility (EPR) in the waste management process. The Republic Act No. 11898 or the Extended Producers Responsibility Act of 2022 calls on the producers to take responsibility for the recovery, processing, and disposal of their products which includes plastic containers and packaging materials. In the updated version of the RA No. 9003, TESDA is no longer included as part of the National Solid Waste Management Commission (Section 4). Yet, TESDA’s critical role in information, education, and training still remains.

The EPR Law of 2022 also included target for the recovery of plastic product footprint generated as follows:

- December 31, 2023: 20% recovery
- December 31, 2023: 40%
- Increments of 10% from 2025 to 2028
- 2028 and every year thereafter: 80%

Provided this, large-scale companies will need to “establish a mechanism for the recovery of their plastic packaging” (Allanigue, 2023). Allanigue (2023) added: “companies are obliged to have the responsibility for the proper and effective recovery, treatment, recycling or disposal of their products after they have been sold and used by consumers”.

Other policies being finalized include the Philippine Action Plan for Sustainable Consumption and Production (National Economic and Development Authority) and the Sustainable Science and Technology for Solid Waste Management Road Map (Department of Science and Technology).



## 1.5 Current Situation in the Philippines and TESDA Initiative

Solid waste management (SWM) is a challenge especially in the urban areas with the primary concerns on inadequate number of disposal facilities, inept waste disposal, and inefficient waste collection (European Chamber of Commerce of the Philippines, 2022). And in SWM, plastic pollution is one of the greatest contributors to the environmental concerns. In a McKinsey (2015) report the Philippines recorded 2.7 million metric tons of produced plastic waste per year, with 600,000 metric tons recorded for Metro Manila alone. Engel et. al (2016) further noted that out of the collected wastes, 17% of the plastics are lost “into the marine ecosystem after collection because of illegal dumping and poor landfill siting and operating practices”.

As such, the collaboration between the public and private sector is crucial in minimizing waste segregation, tackling packaging waste, and generally having a sense of shared responsibility and accountability.

In March 2022, TESDA and Coca-Cola Philippines partnered to implement the Barangay Solid Waste Management Training Program (BSWMTP) for a World Without Waste under the banner program of Trash-Free Pilipinas. This is part of the Coca-Cola Company’s global World Without Waste (WWW) program which envisions to create litter-free communities in all markets they are present in, including the Philippines.

Following this, the TESDA - Green Technology Center and Coca-Cola PH teams developed the draft Competency-Based Curriculum and Learning Materials and were piloted in Angono, Rizal. The program has just been concluded last October 2022 participated in by representatives from all ten (10) component barangays. A total of 29 learners completed the course.

Based on the results of the Angono pilot project, it is important to know what types of wastes are produced and how much is generated to identify the proper interventions to make. Moreover, there is a cited potential to have income generating activities at the local level from a proper waste management process. The Coca-Cola Philippines intends to extend the program run to 10 additional Local Government Units (LGUs) in the Philippines.

Preparing the workforce will be critical specifically as infrastructure and investments are made in the recovery, disposal, and recycling/upcycling of the solid wastes, the demand for specific skill requirements and job generated may be expected. Consequently, preparing the workforce is not just TESDA’s responsibility. As highlighted during the National Program Management Team (NPMT) Planning Workshop last 12-13 January 2023 participated by TESDA, Coca-Cola Philippines, DENR, and DILG, participatory governance towards waste management is essential.

## II. Identification of the Industry Requirements

In response to preparing the needed talent supply, one of the methodologies used in the identification of the industry requirements is through the conduct of an industry consultation. Following the skills mapping process (i.e. identification of requirements based on secondary research), a sectoral consultation is conducted.

The industry consultation intends to establish and strengthen industry collaboration and linkages and provide a forum for the relevant stakeholders (e.g. industry representatives, government agencies) to identify specific skills requirements needed, concerns within the industry, and recommendations.

### 2.1 Objectives

The industry consultation intends to collect validated information on the current situation of the Solid Waste Management (SWM) sector in order to determine the necessary training-related support and programs for the sector. Specifically, it intends to:

- (1) Determine the challenges and opportunities;
- (2) Present and validate the skills map;
- (3) Determine the priority skills requirements for the sector; and
- (4) Recommend appropriate action and ways forward

### 2.2 Methodology

The identification and prioritization of the skills requirements for the SWM Sector, which would lead to the development of TESDA programs, is an integral component of the TFPP-WWW Initiative. Thus, the Technical Education and Skills Development Authority (TESDA) with the assistance of the Coca-Cola Philippines' team have convened industry players to validate the skills requirements of the industry.

Prior to the consultation, a questionnaire was coursed through the Coca-Cola Philippines and was rolled out offline (i.e. editable file filled out by the respondents). The respondents were categorized into Private Companies/Organizations and Local Government Units (LGU) provided the criticality of planning and implementing SWM initiatives at the local level in accordance with the RA No. 9003, and the role of the private sector as a separate potential employer and third party contractor.

The first deployment of the survey was sent to the organizations as determined by the Coca-Cola Philippines' team to represent the sectors that have a stake in the SWM in the Philippines, covering the value chain from the collection, hauling, transportation, landfill maintenance, to recycling and aggregation. Some facilities, like the Geogcycle are in the collection of waste materials used as fuel for Holcim cements.

**Table 1**

*List of target respondents*

<b>Category</b>	<b>Respondents</b>
Private	<ul style="list-style-type: none"><li>● Geogycle Philippines</li><li>● Phil Ecology Systems Corporation</li><li>● Leonel Waste Management Corporation</li><li>● Basic Environmental Systems &amp; Technologies, Inc. (BEST)</li><li>● IPM Construction and Development Corporation</li></ul>
LGU	<ul style="list-style-type: none"><li>● Municipality of Angono, Rizal</li><li>● City of Mandaluyong</li></ul>

For the first deployment, 60% responded to the survey for the private sector. However, since there were no response received from the LGU at the time of data processing, a second deployment will be facilitated focusing on the LGUs. For the second deployment, the National Program Management Team (NPMT) of the TFPP-WWW Initiative identified 10 LGUs across the Philippines in consideration of the following criteria:

- Within the Manila Bay Coastal Areas;
- Regions with the most number of Manufacturing establishments based on the Philippine Statistics Authority's Annual Survey on Philippine Business and Industry;
- Area-based skills requirements of the province/region;
- Availability of recycling facilities;
- Existing projects/programs/initiatives relative to solid waste management; and
- Implementing Rules and Regulations of the Republic Act No. 11898 (Extended Producer Responsibility Act of 2022).

Based on the set criteria, the following LGUs have been shortlisted:

1. Balanga, Bataan
2. Santiago City, Isabela
3. Calapan City, Oriental Mindoro
4. General Trias City, Cavite
5. Mandaluyong City, NCR
6. Quezon City, NCR
7. Bacolod City, Negros Occidental
8. Cebu City
9. Davao City
10. Tagum City, Davao del Norte

After processing the survey results, a validation workshop was conducted on 10 March 2023 at the TESDA PEVOTI ATVERC Library representing the different sectors in the value chain.

However, provided the limitations of the responses received from the first deployment, the results found on the succeeding sections will only cover the private sector.

Moreover, relevant government agencies such as the Department of Interior and Local Government (DILG) - Bureau of Local Government Supervision, DILG - National Barangay Operations Office, the Environmental Management Bureau (EMB) - Solid Waste Management Division, and the EMB - Environmental Education and Information Division were invited in the consultation. However, all of these agencies were unable to provide representatives during the consultation.

### III. Highlights of the Industry Consultation

#### 3.1 Challenges and Opportunities

The SWM Industry in the Philippines faces several challenges and opportunities for growth and development, with the following critical areas as determined by the key stakeholders:

**Table 2**

*Challenges and Opportunities for the SWM Industry*

Area	Challenges	Opportunities
Economic	Limited LGU budget for waste management programs	<ul style="list-style-type: none"> <li>Partnership and collaboration between private and government sectors. This may help LGUs save on the cost of waste disposal.</li> <li>Channeling of funds through EPR Law implementation</li> </ul>
	High cost of materials, waste disposal, pilferage	
	Logistics: slow turn around of trucks due to distance of disposal facilities	
	The Informal Waste Sector does not benefit.	
	Increase in volume means increase in the volume of waste	More business opportunities and more jobs
	System to recovery of waste specially plastic wastes	System improvement (includes new ideas and systems, for instance in reengineered waste collection)

Area	Challenges	Opportunities
Employment	Lack/limited budget for hiring and low paying jobs. Less opportunities for LGU employment (e.g. employees for IEC, collection, and sorting of waste)	
	Low Employee morale and commitment of existing workers (e.g. drivers, helpers)	<ul style="list-style-type: none"> <li>● Online self-help resources</li> <li>● Job satisfaction from private and government support</li> </ul>
	Unmet Health & Safety Standards	
		<ul style="list-style-type: none"> <li>● Opening more waste recycling business</li> <li>● Job opportunities even for undergraduates</li> <li>● More innovative ideas and solutions from business engaged on waste</li> </ul>
Education	Solid waste management is not yet incorporated into the curriculum.	<ul style="list-style-type: none"> <li>● Include SWM in the curriculum of elementary and highschool students</li> <li>● Oblige schools to implement projects which involve actual SWM practices in the school and at home</li> </ul>
	Lack of training and information regarding SWM and the long-term impact of improper SWM	Develop more IEC, education materials, and conduct of seminars on waste for various stakeholders
	Need for continuous skills upgrading of waste collection crew	<ul style="list-style-type: none"> <li>● Improvement of knowledge, skills and attitude</li> <li>● Ongoing TESDA programs</li> </ul>
	Compliance with government rules and regulations	
	Lack of focus on training needs of waste	

Discussion and analysis on the key challenges and opportunities:

#### Economic

- In relation to the challenges for the economic sector, the increase in the volume of waste may be addressed through the implementation of the Extended Producer Responsibility (EPR) Law. Fiscal incentives may be utilized by companies who will adhere to the provisions stated in the law.
- Additionally, the volume of waste generated and end up in landfills may be managed through improving existing systems. This will also encourage planning and innovation on solid waste management.

- As with the limited budget of the LGU, one of the opportunities is on maximizing partnership and collaboration with the private sector who has more capacity to develop and implement solid waste management programs. As Engel, et. al (2016) pointed out in a McKinsey article, involving the private sector as a form of public-private partnerships, specifically waste operators has become the default solution as this “can take away some of the financial pressure and inject much-needed expertise into local waste-management systems”.
- Based on the consultation, the private sector noted that the LGUs are focused on waste disposal and collection while the private companies are being contracted by the LGUs. Private companies like Geocycle, for instance, may be contracted to collect waste and they do so as long as waste is properly segregated. However, limited LGU budget also affects the LGUs capacity to segregate and sort wastes. Still, it should be noted that proper segregation as part of waste management, ideally should start at the household level.
- The respondents also mentioned that whatever the waste generators do affect the efficiency of the rest of the value chain.

### Employment

- The low employee morale and the lack of commitment from the existing workers may possibly be related to the jobs being low paying as well. As shared during the industry consultation, the case of low paying jobs is not the same if compared to other countries. As Cedefop (2022) indicated in its policy brief, jobs in the waste management industry are usually considered precarious and poorly paid; therefore unattractive. This may be especially true for low-skilled occupations. There is a recommendation from the industry to also consider finding an alternative job/occupation title to the TRs to make it more appealing.
- LGUs may have limited budget to hire additional workers for the industry but private sectors have this ability especially as large companies invest in the waste recycling industry, for instance. The opening of more waste recycling business is expected to generate employment.
- Additionally, in terms of employment, as shared during the NPMT Planning Workshop, various income streams may be explored in the solid waste management system including junkshop, recycling, and sustainable fashion. This is consistent with the report highlighting the need to “focus on value creation” (Engel et. al, 2016).
- There is a particular TESDA Training Regulation that was mentioned: Garbage Collection NC I. According to the participants, the TR may need to be updated due to the impact of the EPR Law. The EPR Law is also expected to cause the development of new jobs (i.e. emerging jobs).
- In terms of programs, ideally it should start first with the Generators to benefit the rest of the value chain.

## Education

- With the need for continuous skills upgrading, industry, the academe, and educational institutions like TESDA shall continuously review existing standards and develop new programs that will lead to the development of new entrants and the upskilling and reskilling of existing workers in the SWM sector.
- The lack of information and training, on the other hand, will be addressed through the development of various information and education campaigns/materials.
- During the validation, the industry clarified that the waste management or solid waste management, in particular, are already part of the existing curriculum but it only deals with the basics. There is still a need for a more in-depth knowledge, skills, and attitude development. As Cedefop (2022) puts it, one of the challenges experienced by the sector is having “delayed responses of curricula to technological innovation”; keeping in mind the developments in the sector and in reference to its relationship with the circular economy.
- Waste management skills may be included as part of the basic or common competencies for SWM-related programs.

### 3.2 Technical Skills Requirements

The full list of requirements identified for the SWM sector can be found on Table 3. The requirements also include some of those in the informal SWM sector, as shared by the participants such as waste collectors and segregators.

**Table 3**

*Full list of skills identified in the skills map*

<b>Value Chain</b>	<b>Technical Requirements (Job/Skill/Qualification)</b>
<b>Planning and Data Processing</b>	
Managerial	<ul style="list-style-type: none"><li>• Solid Waste Manager</li><li>• Waste Management Engineer</li><li>• Waste Management Specialist</li><li>• Waste Management Supervisor</li></ul>
Prevention	<ul style="list-style-type: none"><li>• Document Controller</li><li>• Community Relations Officer</li><li>• Environment, Safety, &amp; Health Officers</li><li>• Admin Aide</li></ul>
Reuse, Recycle, Recover,	<ul style="list-style-type: none"><li>• Quality Control Supervisors/Engineers -</li></ul>

Value Chain	Technical Requirements (Job/Skill/Qualification)
and Disposal	Monitoring <ul style="list-style-type: none"> <li>● Sanitation Engineer</li> <li>● Contract &amp; Commercial Management Specialists</li> <li>● Landfill Supervisors</li> <li>● Admin Aide</li> <li>● Safety Assistants</li> <li>● Quantity Surveyors</li> <li>● Cost Engineers</li> <li>● Procurement &amp; Materials Management Officer</li> <li>● Material Inventory Assistants/Warehouse</li> <li>● Toolkeepers</li> <li>● Equipment Supervisors</li> <li>● Maintenance Technician</li> <li>● Equipment/Truck Dispatchers</li> <li>● Leachate Supervisor</li> <li>● Business Development Manager</li> <li>● Document Controller</li> </ul>
<b>Implementation</b>	
Reuse, Recycle, Recover, and Disposal	<ul style="list-style-type: none"> <li>● Waste Collector</li> <li>● Waste Segregator</li> <li>● Leachate Monitor Staff</li> <li>● Composter</li> <li>● Biodegradable Waste Collector</li> <li>● Palero</li> <li>● Biodigester Staff</li> <li>● Facility Disinfector</li> <li>● Equipment/Truck Dispatchers</li> <li>● Monitoring</li> <li>● Volume Checker</li> <li>● Sweepers</li> <li>● Fuel Tender</li> </ul>
<b>Equipment (Operators and Maintenance)</b>	
Reuse, Recycle, Recover, and Disposal	<ul style="list-style-type: none"> <li>● Garbage Truck Drivers</li> <li>● Baler Operator</li> <li>● Forklift Driver</li> <li>● Sanitary Landfill Operator</li> <li>● Backhoe Operator</li> <li>● Loader Operator</li> <li>● Bulldozer Operator</li> <li>● Service Vehicle Driver</li> <li>● Water Truck Driver</li> </ul>



Value Chain	Technical Requirements (Job/Skill/Qualification)
	<ul style="list-style-type: none"> <li>● Water Truck Pump Operator</li> <li>● Biodigester Operator</li> <li>● Compactor Operators</li> <li>● Equipment Maintenance Supervisors</li> <li>● Equipment Technicians</li> <li>● Equipment Tool Keepers</li> <li>● Truck Dispatchers</li> <li>● Spotters</li> <li>● Riggers</li> <li>● Welders</li> <li>● Racial Drivers</li> <li>● Chief Mechanic</li> <li>● Maintenance and Repair Personnel</li> <li>● Warehouse Personnel</li> <li>● Preventive Maintenance Personnel</li> <li>● Industrial Electrician/Utility</li> </ul>
Corporate/Head Office Support	
Reuse, Recycle, Recover, and Disposal	<ul style="list-style-type: none"> <li>● Procurement Staff</li> <li>● Accounting Staff</li> <li>● Cost Planning &amp; Control</li> <li>● Tender Planning &amp; Estimating Staff</li> <li>● Treasury Staff</li> <li>● Billing &amp; Collection Staff</li> <li>● Human Resource Staff</li> <li>● Logistics &amp; Support Staff</li> <li>● Motorpool Staff</li> <li>● Messenger</li> <li>● First Aider</li> <li>● Encoder</li> <li>● IT Staff</li> <li>● Liaison Staff</li> </ul>

Besides the following technical skills requirements, Pollution Control Officer, Public Safety, and Occupational Safety Officer were the additional qualifications mentioned during the consultation.

### 3.3 Soft Skills

In addition to the technical skills, below are the soft and essential skills/attributes that the respondents are looking for in the SWM workers.

- Forward thinking

- Hard working
- Leadership
- Optimism
- PPP expertise
- Practicality
- Team dynamics
- Team player
- Aggressiveness
- Financial literacy
- Focused
- Value formation
- Able to adapt to changes (flexibility/adaptability)
- Communication skills to help in IEC or work management
- Creative problem solving with concern and heart to environment
- Environmental impact of their work's positive contribution

Moreover, additional requirements and training needs per specific value chain were identified as follows:

**Table 4**

*Additional skills and training requirements per specific value chain*

Implementation Process	<ul style="list-style-type: none"> <li>● SWM and segregation training</li> <li>● Technical and safety training</li> </ul>
Planning and Data Processing	<ul style="list-style-type: none"> <li>● Leadership</li> <li>● Interpersonal skills</li> <li>● Sustainability</li> </ul>
Equipment (Operation and Maintenance)	<ul style="list-style-type: none"> <li>● Health and safety training</li> </ul>

### 3.4 Emerging Skills Related to the Fourth Industrial Revolution (4IR)

Specific examples of emerging requirements and occupation related to the fourth industrial revolution (4IR) as provided by the respondents are:

- ASM Global app for waste management companies (reflects delivered volume of waste, customer portal)
- Programming skills (i.e. to digitize Solid Waste Management Processes)
- Data analytics
- Data presentation skills (i.e. for stakeholder beneficiary)
- New technologies, innovations, and new inventions needed in changing world on waste management
- Systems analyst
- Feasibility study experts
- Waste to Energy experts

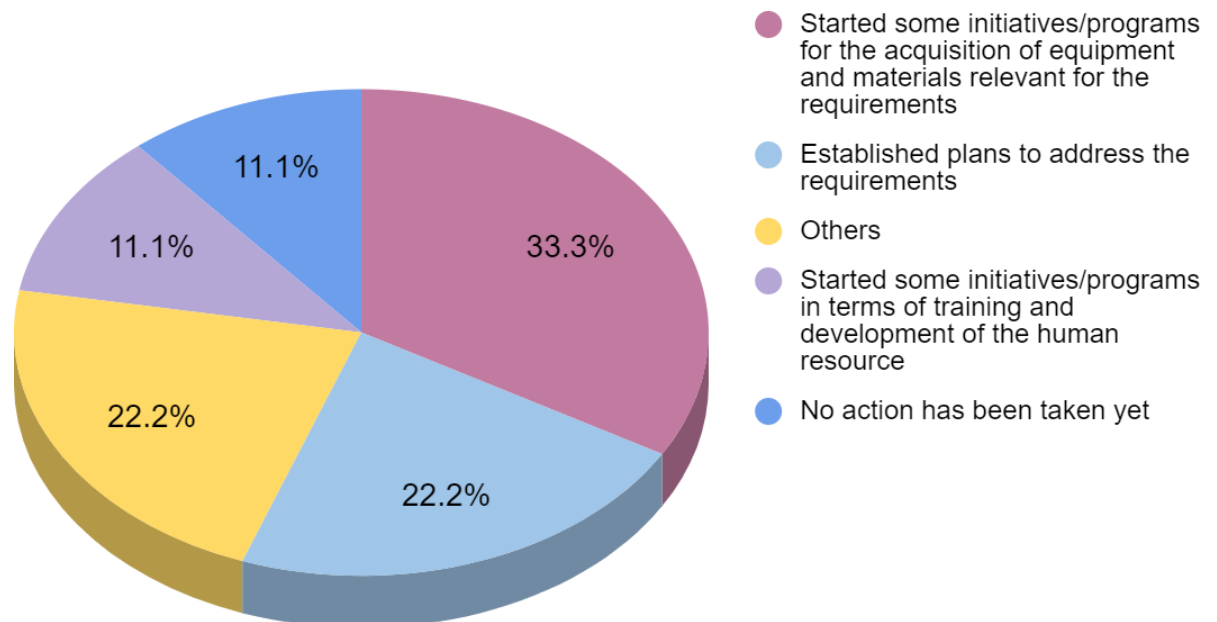
### 3.5 Readiness of the SWM Sector for 4IR

Based on the identified emerging skills in the SWM industry/sector relevant to the 4IR, all of the private companies/associations who responded to the survey mentioned that they are ready for the emerging skills.

In terms of the action made, the highest percentage (33.33%) accounted for facilities that have started some initiatives/programs for the acquisition of equipment and materials relevant for the requirements. The lowest percentage (11.1%) either have started some initiatives/programs in terms of training and development of human resources or have not yet taken any action. Those that responded “others” did not specifically mention what other initiatives have been implemented.

**Figure 4**

*Readiness of the private sector for the emerging skills*



### 3.6 Possible Providers of the Program

The participants were also asked about the possible training providers specifically to strengthen the infrastructure of the available TESDA programs and as preparation for the implementation of the programs that will be developed.

- Technical Education and Skills Development Authority
- Department of Environment and Natural Resources - Environmental Management Bureau
- National Solid Waste Commission

- Department of Science and Technology
- Rizal Environment and Natural Resources Office
- Philippine Women's University - Environmental Management Department
- UP College of Engineering - Environmental and Energy Engineering Group
- Youmanitarian (e.g with projects on mushroom cultivation from biodegradable waste)
- GIZ
- Non-profit environmental organization (e.g. Pure Oceans, Plastic Bank)
- Members of the Coalition of Solid Waste Management Providers
- Solid Waste Management Association of the Philippines (SWAPP)

### 3.7 Sub-Industry Employment

Solid waste management is cross-cutting among several sectors and industries, particularly Manufacturing industry. Fast Moving Consumer Goods (FMCG) and cement companies are some of the specific sectors mentioned under the manufacturing industry.

Additionally, SWM is critical in the energy sector, logistics, real estate and establishments, and industries with sustainability programs. For the energy sector, for instance, Waste Collection Workers are needed in the Electric Vehicle (EV) Afterlife Management under the EV Scapping subsector, while Waste Treatment Machine Operator has been identified under EV Retrofitting during the consultation conducted for the EV industry.

Moreover, recycling, waste treaters, and treatment, storage, and disposal (TSD) sectors will be greatly affected by SWM.

#### IV. Priority Skills Requirements

The list of requirements identified in Table 3 have been prioritized based on the following criteria:

- (1) Insights on the reasons, constraints, and recommended actions – whether the requirements would be addressed by a TVET program;
- (2) Urgency – whether the requirement is needed in the next 1-3 years or 3-5 years; and
- (3) Demand/Shortage of workers – whether the requirement has a shortage of below 100 workers (low), 101-499 workers (medium), or 500 or more workers (high)

Relative to this criteria, a decision matrix has been developed to identify whether the qualification will be recommended for Competency Standards or Training Regulation development.

**Table 5**

*Decision matrix for Competency Standards (CS) and Training Regulation development*

<b>Assessing the shortage of workers</b>	<b>Years the job/skills are immediately needed</b>	
	<b>Needed in the next 1-3 years</b>	<b>Needed in the next 3-5 years</b>
Low (100 or less workers)	CS	CS
Medium (100-500 workers)	CS	CS
High (500 or more workers)	TR	TR

Following the criteria and the decision matrix, below are the priority requirements for the SWM sector according to the industry consultation results:

**Table 6**

*Priority skills and recommended actions from the survey*

Value Chain	Jobs/Skills/ Qualifications (Technical Requirements)	Urgency		Shortage of Workers in Filling-Up the Skills Requirements			Reasons/Constraints in Filling-Up the Requirement	Recommended Action
		1-3 years	3-5 years	Low	Medium	High		
Managerial	Solid Waste Manager	66.67	33.33	0.00	0.00	100.00	Name of industry not appealing as career path Least priority of LGU's	Annual training Need to push LGU's on importance
	Waste Management Supervisor	100.00	0.00	0.00	0.00	100.00	No funding	Annual training Make it less political
Reuse Recycle Recover Disposal	Equipment/Truck Dispatchers	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Monitoring	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Preventive Maintenance Personnel	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Volume Checker	100.00	0.00	0.00	0.00	100.00	Contractual	Annual training Need to hand hold LGU's
	Sweepers	100.00	0.00	0.00	0.00	100.00	Contractual	Annual training

Value Chain	Jobs/Skills/ Qualifications (Technical Requirements)	Urgency		Shortage of Workers in Filling-Up the Skills Requirements			Reasons/Constraints in Filling-Up the Requirement	Recommended Action
		1-3 years	3-5 years	Low	Medium	High		
								Need to hand hold LGU's
	Fuel Tenders	100.00	0.00	0.00	0.00	100.00	Contractual	Annual training Need to hand hold LGU's
	Palero	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Maintenance and Repair Personnel	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Equipment Technician	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Equipment Maintenance Supervisors	33.33	66.67	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Waste Segregator	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Leachate Monitor Staff	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Composter	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Biodigester Staff	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training

Value Chain	Jobs/Skills/ Qualifications (Technical Requirements)	Urgency		Shortage of Workers in Filling-Up the Skills Requirements			Reasons/Constraints in Filling-Up the Requirement	Recommended Action
		1-3 years	3-5 years	Low	Medium	High		
								Need to hand hold LGU's
	Facility Disinfecter	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Biodegradable Waste Collector	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Garbage Truck Drivers	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Forklift Driver	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Backhoe Operator	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Loader Operator	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Service Vehicle Driver	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
Prevention	Environment, Safety, & Health Officer	100.00	0.00	0.00	50.00	50.00	No qualified personnel	Annual training
	Community Relations Officer	33.33	66.67	0.00	50.00	50.00	No qualified personnel	Annual training



On the recommended actions, the participants noted during the consultation that annual training refers to capability building programs that are needed to be conducted on an annual basis by the LGUs or relevant government agencies such as DENR or DILG. Continuous training is necessary for the specific qualifications with this type of recommended action.

Consequently, LGUs should be handholded by the mentioned agencies. As such, collaboration between TESDA, DILG, and DENR is necessary to ensure that the requirements of the sector will be addressed effectively and the programs to be developed are consistent with the existing policies.

## V. Mapping of Skills Requirements vis-a-vis Existing TR

Some of the priority technical jobs/skills requirements of the industry already have existing Training Regulations summarized as follows; the rest do not have equivalent TESDA programs.

**Table 7**

*Equivalent qualifications for the job/skills in the SWM Industry*

<b>Value Chain</b>	<b>Qualification</b>	<b>Equivalent TVET Program</b>	
Reuse	Palero	Garbage Collection NC I	
Recycle Recover Disposal	Maintenance and Repair Personnel	Heavy Equipment Servicing (Mechanical) NC II	
	Equipment Technician	Heavy Equipment Servicing (Mechanical) NC II	
	Biodegradable Waste Collector	Garbage Collection NC I	
	Garbage Truck Drivers	Driving (Passenger Bus/Straight Truck) NC III	
	Forklift Driver	HEO (Forklift) NC II	
	Backhoe Operator	HEO (Backhoe Loader) NC II	
	Loader Operator		HEO (Wheel Loader) NC II
			HEO (Backhoe Loader) NC II
Service Vehicle Driver		Driving NC II	

## VI. TVET Capacity and Infrastructure

Based on the mapping on the preceding table, Table 8 shows the total number of enrolled, graduated, assessed, and certified (EGAC) from 2020 to 2022 by qualification with training regulation (WTR). On the other hand, Table 9 shows the existing TVET infrastructure for the identified qualifications.

**Table 8.** Total number of Enrolled, Graduated, Assessed, and Certified by Qualification (WTR), 2020-2022

Training Regulation	Coverage (2020)				Coverage (2021)				Coverage (2022)			
	Enrolled	Graduated	Assessed	Certified	Enrolled	Graduated	Assessed	Certified	Enrolled	Graduated	Assessed	Certified
Garbage Collection NC I			30	26	0	0	0	0	0	0	0	0
Heavy Equipment Servicing (Mechanical) NC II	145	46	51	51	0	25	136	127	168	24	335	321
Driving (Passenger Bus/Straight Truck) NC III	711	518	2,239	2,148	236	130	3,950	3,716	951	1,028	5,990	5,679
Heavy Equipment Operation (Forklift) NC II	2,291	2,235	3,382	3,190	1,137	758	6,579	6,157	1,794	1,959	11,266	10,736
Heavy Equipment Operation (Backhoe Loader) NC II	2,842	3,042	1,109	1,097	1,367	740	2,981	2,878	1,341	1,639	2,579	2,371
Heavy Equipment Operation (Wheel Loader) NC II	2,668	2,500	1,510	1,483	1,267	1,033	3,169	3,017	2,062	2,438	3,681	3,491
Driving NC II	43,433	40,939	28,365	21,616	20,188	15,064	54,414	50,707	52,223	54,850	67,981	64,258

Source: Information and Communications Technology Office

**Table 9**

Total number of Assessment Centers, Competency Assessors, Registered Programs, and NTCC Holders (as of 1st Quarter 2023).

Training Regulation	Infrastructure (As of December 2022)			
	Registered Programs	Trainers (NTTC Holder)	Assessment Centers	Competency Assessors
Garbage Collection NC I	0	0	0	2
Heavy Equipment Servicing (Mechanical) NC II	4	21	8	12
Driving (Passenger Bus/Straight Truck) NC III	35	195	80	127
HEO (Forklift) NC II	53	198	72	130
HEO (Backhoe Loader) NC II	61	132	44	56
HEO (Wheel Loader) NC II	78	196	75	93
Driving NC II	677	2,060	355	745

Source. Certification Office

## VII. Way Forward

Following the results of the skills mapping and validation process with the key stakeholders, and in consideration of the presented labor market information, listed are the recommended action items to help prepare the needed talent supply for the Solid Waste Management Sector.

- **Prioritization of the Identified Priority Requirements**

Following the criteria and decision matrix stipulated in TESDA Circular No. 001 series of 2023 or the Implementing Guidelines on the Prioritization in the Development and Review of Training Regulations/Competency Standards, the following qualifications are recommended for development:

**Table 10**

*List of Skills Requirements for Program Development*

Value Chain	Training Regulations Development	
	Priority 1	Priority 2
<b>Managerial</b>	Solid Waste Manager	
	Waste Management Supervisor	
<b>Reuse</b>	Equipment/ Truck Dispatchers	Equipment Maintenance Supervisors
	Monitoring	
<b>Recycle</b>	Preventive Maintenance Personnel	
	Volume Checker	
<b>Recover</b>	Sweepers	
	Fuel Tenders	
Value Chain	For Competency Standards Development	
	Priority 1	Priority 2
<b>Prevention</b>	Environment, Safety & Health Officer	Community Relations Officer
	Waste segregator	
<b>Reuse</b>	Leachate monitor staff	
	Composter	
<b>Recycle</b>	Biodigester staff	
	Facility Disinfectant	
<b>Recover</b>		
<b>Disposal</b>		

The Qualifications and Standards Office (QSO) shall use as reference the list provided in Table 10 as basis for the development of the Competency Standards. As highlighted during the consultation, emerging jobs in sector are highly-skilled non-manual occupations. Among the list, some of the qualifications highlighted were Solid Waste Manager, Waste Segregator, and Environment, Safety, & Health Officer.

Moreover, the QSO may explore the possibility of further categorizing the programs for development based on intended program recipients. For instance, it was shared during the consultation that what happens in reality is that some of the garbage truck drivers informally hire additional garbage collectors, highlighting the presence of informal workers. There is also a need to further probe on which requirements would require some form of higher level education.

During the development of the program, QSO may also use as reference the curriculum used by TESDA - GTC and the Coca-Cola Philippines team in the

Angono Pilot Project.

On the other hand, the Planning Office shall be in charge of working with the identified industry champion to assist in the presentation of the identified programs for Training Regulations development to the TESDA Board - Direction Setting Committee.

- **Consideration for the Scholarship Provision**

The identified skills requirements are recommended to be considered by the Regional Operations and Management Office (ROMO) in the prioritization of scholarship allocation including the qualifications with equivalent Training Regulations and programs that will be developed following the results of the consultation.

Additionally, in view of the Tulong Trabaho Scholarship Program, the Planning Office shall consider the priorities for the SWM sector in the updating of the 2023 Selected Training Programs (STPs).

- **Review and Enhancement of Existing Training Regulations**

TESDA recognizes the importance of constant updating and upgrading of the Training Regulations (TR) alongside industry experts and practitioners. In view of the priority requirements and the mapping of the available TESDA programs in Section V, Table 7, the industry noted the need to review and update Garbage Collection NC I. The recommendation is in consideration of the impact of the EPR Law which is expected to cause the development of new jobs.

Likewise, the review of the two other related programs namely Sanitary Landfill Operations NC II and NC III may be considered for review. The results of the Training Regulation (TR) Evaluation Study revealed that both TRs are considered as priority 1 in the list of qualifications recommended for review.

Besides the inclusion and impact of the EPR Law, the industry recommends finding an alternative job/occupation title as specified in Section 1 of the TR to make it more appealing, especially for formal workers.

- **Strengthening the TVET Capacity and Infrastructure of Existing Training Regulations**

Although Garbage Collection NC I has been promulgated in 2015, there is currently no registered program for this, making it unutilized. The Certification Office shall take the lead in developing the infrastructure for the identified priority program.

Further, it was pointed out during the consultation that the recognition and support of the private sector, relevant government agencies, and the LGUs to the implementation of the program and its graduates will be critical.

TESDA is also advocating the continuous building and strengthening of the infrastructure for the existing TRs that are currently unutilized; to which, the commitment of the private sector and involved key stakeholders were sought.

- **Incorporating Soft Skills and Emerging Skills in the Program**

According to the labor market information, jobs in the SWM sector will transition to focus more on managerial, service-oriented, and highly skilled non-manual jobs. This transition will prompt workers to possess not only technical skills but also transversal and soft skills. Communication, data analysis, and IT skills are expected to be part of transferable skills for the sector. These are the same set of skills that the industry mentioned to be in demand in the next five years.

Provided this, the Qualifications and Standards Office (QSO) shall also consider the soft skills and emerging skills identified in this report to serve as reference in the development of the Competency Standards and Training Regulations for the sector.

Moreover, to strengthen the value creation side, the inclusion of entrepreneurship/entrepreneurial skills in the programs for review and development is recommended.

- **Extension of the Prioritization Process for the Local Government Units**

As specified in the methodology, the results of this survey and the consultation only covered the responses from the private sector. Thus, the Planning Office, in partnership with the Coca-Cola Philippines' team shall replicate the same process to cover the requirements of the LGUs.

To serve as survey respondents, the NPMT has identified 10 target LGUs namely Bataan, Isabela, Oriental Mindoro, Cavite, Mandaluyong City, Quezon City, Negros Occidental, Cebu City, Davao City, and Davao del Norte.

The Planning Office shall also ensure the participation of the DENR and DILG to also get their inputs and commitment which are crucial in the development and implementation of the programs.

- **Link to Other Relevant Government Agencies**

According to the industry, there is a need for a more in-depth knowledge, skills, and attitude development as SWM is only covered partially in existing curriculum, especially in basic education. In Section 2 of the Republic Act No. 9003 the role of education and training sector was clearly laid out; to integrate "ecological solid waste management and resource conservation and recovery topics into the academic curricula of formal and non-formal education".

On the other hand, the inclusion of waste management in the labor employment plan of the Department of Labor and Employment is also recommended to cover the needs of the sector in view of the recent policy changes and industry developments.

### VIII. Annex

**Annex A.** Complete list of skills requirements for the SWM Industry with corresponding urgency, demand, reasons/constraints, and recommended action

VALUE CHAIN	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)		
<b>Planning and Data Processing</b>								
Managerial	Solid Waste Manager	66.67	33.33	0.00	0.00	100.00	Name of industry not appealing as career path Least priority of LGU's	Annual training Need to push LGU's on importance
	Waste Management Engineer	50.00	50.00	0.00	0.00	100.00	Least priority of LGU's	
	Waste Management Specialist	100.00	0.00	0.00	0.00	100.00	Contractual	
	Waste Management Supervisor	100.00	0.00	0.00	0.00	100.00	No funding	Annual training make it less political
Prevention	Document Controller	50.00	50.00	0.00	0.00	100.00	Contractual	
	Community Relations Officer	33.33	66.67	0.00	50.00	50.00	No qualified personnel	Annual training

	Environment, Safety & Health Officers	100.00	0.00	0.00	50.00	50.00	No qualified personnel	Annual training
	Admin Aide	50.00	50.00	50.00	0.00	50.00	Contractual	Need for training
Reuse Recycle Recover Disposal	Quality Control Supervisors/Engineers - Monitoring	0.00	100.00	0.00	50.00	50.00	Mostly Contractual	Provide Plantilla
	Sanitation Engineer	100.00	0.00	0.00	50.00	50.00	Mostly Informal	Need to hand hold LGU's
	Contract & Commercial Management Specialists	50.00	50.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
	Landfill Supervisors	100.00	0.00	0.00	0.00	100.00	Contractual	Need to hand hold LGU's
	Admin Aide	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Safety Assistants	100.00	0.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Quantity Surveyors	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Cost Engineers	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Procurement & Materials Management Officer	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Material Inventory Assistants / Warehouse	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's



	Toolkeepers	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Equipment Supervisors	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Maintenance Technician	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Equipment/ Truck Dispatchers	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Leachate Supervisor	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Business development manager	50.00	50.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
	Document Controller	50.00	50.00	0.00	0.00	100.00	Contractual	Need to hand hold LGU's
<b>Implementation</b>								
Reuse Recycle Recover Disposal	Waste collector	50.00	50.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
	Waste segregator	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Leachate monitor staff	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Composter	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's

	Biodegradable Waste Collector	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Palero	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Biodigester staff	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Facility Disinfectors	100.00	0.00	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Equipment/ Truck Dispatchers	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Monitoring	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Volume Checker	100.00	0.00	0.00	0.00	100.00	Contractual	Annual training Need to hand hold LGU's
	Sweepers	100.00	0.00	0.00	0.00	100.00	Contractual	Annual training Need to hand hold LGU's
	Fuel Tender	100.00	0.00	0.00	0.00	100.00	Contractual	Annual training Need to hand hold LGU's

Equipment (Operators and Maintenance)								
Reuse Recycle Recover Disposal	Garbage Truck Drivers	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Baler Operator	100.00	0.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
	Fork lift driver	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Sanitary Landfill Operator	100.00	0.00	0.00	0.00	100.00	Contractual	Need to hand hold LGU's
	Backhoe operator	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Loader operator	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Bulldozer operator	50.00	50.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
	Service Vehicle driver	66.67	33.33	0.00	50.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Water truck driver	50.00	50.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
	Water truck pump operator	50.00	50.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
Biodigester Operator	100.00	0.00	0.00	0.00	100.00	Contractual	Need to hand hold LGU's	

Compactor Operators	50.00	50.00	0.00	50.00	50.00	Contractual	Need to hand hold LGU's
Equipment Maintenance Supervisors	33.33	66.67	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
Equipment Technicians	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
Equipment Tool Keepers	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
Truck Dispatchers	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
Spotters	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
Riggers	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
Welders	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
Racal Drivers	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
Chief Mechanic	0.00	100.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
Maintenance and Repair Personnel	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
Warehouse Personnel	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's

	Preventive maintenance personnel	66.67	33.33	50.00	0.00	50.00	Contractual	Annual training Need to hand hold LGU's
	Industrial Electrician/Utility	33.33	66.67	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
<b>Corporate/Head Office Support</b>								
Reuse Recycle Recover Disposal	Procurement Staff	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Accounting Staff	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Cost Planning & Control	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Tender Planning & Estimating Staff	33.33	66.67	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Treasury Staff	33.33	66.67	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Billing & Collection Staff	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Human Resource Staff	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Logistics & Support Staff	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Motorpool staff	50.00	50.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Messenger	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	First Aider	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold

								LGU's
	Encoder	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	IT staff	100.00	0.00	50.00	0.00	50.00	Contractual	Need to hand hold LGU's
	Liaison Staff	66.67	33.33	50.00	0.00	50.00	Contractual	Need to hand hold LGU's

## Annex B. Technical Skills vis-a-vis Existing TR, Soft Skills, and Emerging Skills across the Solid Waste Management Sector

<sup>1</sup> Skills/Jobs with TESDA Training Regulation /CS

<sup>2</sup> Industry Priority

<sup>3</sup> Ongoing Program Development



Soft Skills							
Forward thinking	Leadership	Practicality	Team Dynamics	Financial Literacy	Focused	Flexibility/Adaptability	Creative Problem Solving
Hard working	Optimism	PPP Expertise	Team player	Aggressiveness	Value Formation	Communication Skill	Environmental Impact

Emerging Skills							
Data Analytics	Systems Analyst	Waste to Energy Experts	Programming for Digitalizing SWM Processes	Health and Safety Training	Sustainability		
Data Presentation	Feasibility Study Experts	ASM Global App	New Technologies, Innovations, and New Inventions	SWM and Segregation Training			

## IX. References

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