

Horticulture Crop Production -Level-IV

Based on March 2019, Version 2 Occupational standards



Module Title: Developing waste management strategies

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LG # 81

LO # 1- Determine possible options

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Reviewing results and findings of waste assessment
- Identifying all options
- Consulting and involving clients

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Review results and findings of waste assessment
- Identify all options
- Consult and involve clients

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).



Information Sheet 1- Reviewing results and findings of waste assessment

1.1. Introduction

Definition of waste

Wastes are unwanted material or substance produced by human activity, which are usually referred to as rubbish, trash, garbage or junk. Wastes can be considered, as those materials no longer required by an individual, institution or industry. Wastes are thus regarded as by-products or end products of the production and consumption process respectively.

The term “waste” is defined in the European Union legislation as “any substance or object which the holder discards or in include those driving from mining, forestry, earth moving and other sources. Waste is defined as: ‘any gas, liquid, solid or energy or a combination of wastes that is surplus to, or unwanted from, any industrial, commercial, domestic or other activity, whether or not of value.

Waste assessment

Waste assessment identifies waste generated at a facility, and purchasing and management practices; examines current waste reduction practices and assesses their effectiveness; and identifies the areas and materials in which waste reduction efforts will be most effective. Records examinations, facility walk-throughs and waste sorts are three common approaches to conducting a waste assessment.

Waste assessment results inform waste reduction activities. For example, if there is a high percentage of contamination in recycling stream, indicating the need for improved communication and education about what should go in the recycling bin? Or the results could highlight that participants are throwing out a large percentage of recyclables in the trash. After reviewing the results of the waste assessment, consider holding a team brainstorming session to identify potential waste reduction activities. List your most promising options and evaluate them in terms of feasibility and how they align with your goals. When analyzing and selecting your activities:

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- Focus first on waste prevention, which will help eliminate waste at the source, saving natural resources and energy and cutting costs.
- Evaluate recycling and composting options to manage waste that cannot be prevented.
- Implement waste reduction activities best suited for your organization.

Waste management

Waste management (or waste disposal) includes the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.

Horticultural waste

Horticultural waste refers to tree trunks and branches, plant parts and trimmings generated during the maintenance and pruning of trees and plants. Horticultural waste can be used in animal feed, composting, and vermiculture as substrate for microbial growth, to minimize environmental pollution and waste accumulation, being an excellent raw material of low cost for industries.

1.2. Sources and types of wastes

1.2.1. Types of wastes according to their sources:

1.2.1.1. Municipal wastes

Municipal wastes are composed of wastes generated by households and wastes of similar character from shops, market and offices, open areas, and treatment plant sites. Classification of materials comprising municipal solid wastes component description:

Food wastes: The animal, fruit, or vegetable residues (also called garbage) resulting from the handling, preparation, cooking and eating of foods. Because food wastes are putrescible, they will decompose rapidly, especially in warm weather.

Rubbish: Combustible and non-combustible solid wastes, excluding food wastes or putrescible materials. Typically combustible rubbish consists of materials such as paper, cardboard, plastics, textiles, rubber, leather, wood, furniture, and garden trimmings.

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Non- combustible rubbish consists of items such as glass, crockery, tin cans, aluminium cans, ferrous and non-ferrous metals, and dirt and construction material.

Ashes and residues: Materials remaining from the burning wood, coal, coke, and other combustible wastes. Ashes and residues are normally composed of fine, powdery materials, cinders, clinkers, and small amounts of burned and partially burned materials.

Demolition and construction wastes: Wastes from razed buildings and other structures are classified as demolition wastes. Wastes from the construction, remodeling, and repairing of residential, commercial, and industrial buildings and similar structures are classified as construction wastes. These wastes may include dirt, stones, concrete, bricks, plaster, lumber, shingles, and plumbing, heating, and electrical parts. They are usually of an inert nature. The main exception is asbestos, where special disposal is required.

Treatment plant wastes and dredged soil: The solid and semisolid wastes from water, sewage and industrial wastewater treatment facilities are included in this classification. Sewage sludge is a slurry of fine organic-rich particles with a highly variable chemical composition depending on the sources of the effluent and the type and efficiency of the treatment processes. Sewage sludges tend to concentrate heavy metals and water-soluble synthetic organic compounds, but they may also contain greases, oils and bacteria. Dredged materials are excavated from river estuaries, harbours and other waterways to aid navigation. It is estimated that 10% of dredged materials is contaminated by oil, heavy. Metals, nutrients and organochlorine compounds.

1.2.1.2. Industrial wastes

Industrial process wastes include a very wide range of materials and the actual composition of industrial wastes in a country will depend on the nature of the industrial base. Wastes may occur as relatively pure substances or as complex mixtures of varying composition and in varying physicochemical states. Examples of the materials which may be found under this heading are general factory rubbish, organic wastes from food processing, acids, alkalis, metallic sludge's and tarry residues. The most



important feature of industrial wastes is that a significant proportion is regarded as hazardous or potentially toxic, thus requiring special handling, treatment and disposal.

1.2.1.3. Agricultural wastes

Agricultural wastes, which may include horticultural and forestry wastes, comprise crop residues, animal manure, diseased carcasses, unwanted agrochemicals and 'empty' containers. Their composition will depend on the system of agriculture. Wastes generated from agricultural sectors such as plant residues after harvesting and cattle manure include hydrocarbons, proteins, lipids, and some other organic compounds. Recently, agricultural waste management (AWM) for ecological agriculture and sustainable development has become an issue of concern for the government. For example, almost all of these horticultural “wastes” can be easily digested. The products of the decomposition process not only provide essential nutrients for plants but also make the soil porous and improve the characteristics of the soil, especially its ability to retain water, thus contributing to clean, safe, and sustainable agriculture.

1.2.1.4. Mining and quarrying wastes

Mine tailings or spoils are the waste material that is extracted in the process of mining minerals of economic value. The waste materials may include topsoil, rock and dirt. It may be inert, such as material from china clay mining, but mine tailings from ore extraction are contaminated with metals or chemicals that have been used for mineral separation.

1.2.1.5. Energy production wastes

Fly ash from the thermal power plants is the major concern. It may be reused as a component of building material, i.e. an additive to cement. Therefore, it is not a big burden in the last decades as it was used to be.



Table 1.1. Sources of solid wastes

Source	Typical waste generators	Types of solid wastes
Residential	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g., bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes.).
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants.	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes.
Commercial	Stores, hotels, restaurants, markets, office buildings, etc.	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes.
Institutional	Schools, hospitals, prisons, government centers.	Same as commercial.
Construction and demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, etc.
Municipal services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants.	Street sweepings; landscape and tree trimmings; general wastes from parks, beaches, and other recreational areas; sludge.
Process (manufacturing, etc.)	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing.	Industrial process wastes, scrap materials, off-specification products, slay, tailings.
Agriculture	Crops, orchards, vineyards, dairies, feedlots, farms.	Spoiled food wastes, agricultural wastes, hazardous wastes (e.g.,



		pesticides).
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1.2.2. Types of wastes according to their effect:

Waste can be classified into two main categories based on their effect on human beings, animals, plants and the environment: These are general and hazardous waste.

1.2.2.1. Hazardous waste: Hazardous waste is any waste that may cause danger to health or to the environment, whether directly or when it comes into contact with other waste. A smaller component, about 10 % by mass, poses an immediate threat to human health and the natural environment and is categorized as 'Hazardous Waste'. Hazardous wastes can stem from any of the above sources. Therefore it should not be taken as a part of the classification of wastes by source, rather as a cross-cutting character for all these wastes. Hazardous characteristics of wastes include, but are not limited to human health toxicity, corrosively, infectiousness, flammability, reactivity, exclusivity and eco toxicity.

Hazardous waste includes: toxic chemicals health care wastes (medical wastes), electronic wastes, solvents and oily residues, radioactive wastes, highly reactive, corrosive or inflammable substances. As pointed out earlier, industry is the major source of hazardous wastes. The chemical and allied products industry produces 50-70% of all hazardous wastes, while around 10-15% of total industrial wastes are hazardous. These should be handled separately from the general waste stream if the quantities and risk warrant it.

1.2.2.2. General waste: The largest proportion of waste that we generate in our everyday lives is not hazardous if properly managed. This is referred to as 'General Waste'. General waste does not pose an immediate threat to people or the environment and includes household waste, builder's rubble, and garden refuse, dry industrial and commercial waste. It may, however, with decomposition and infiltration by water, produce leachate (the liquid that oozes out of waste) which may have pollution potential and is likely to have hazardous properties.



1.3. Impacts of agricultural wastes and waste disposal methods on humans and the environment

Pollution is any substance that cannot be absorbed, used or managed by the environment. For example, toxic chemicals poured into natural water systems cannot be broken down by that system and will damage all organisms within it. Where treatment, incineration and landfill are used judiciously and plant design and management are of a high standard, these methods of waste disposal can be effective in safeguarding people and the environment from any harm that wastes might cause. Where this is not the case, serious air, water and soil pollution may occur.

1.3.1. Water pollution

The infiltration of rainfall into landfill, together with the biochemical and chemical breakdown of the wastes, produces a leachate which is high in suspended solids and of varying organic and inorganic content. All household and most industrial wastes will produce leachate. If the leachate enters surface or groundwater before sufficient dilution has occurred, serious pollution incidents can occur. Agricultural manure and sewage sludge are organic materials rich in nutrients. They are widely used as fertilizers on agricultural land, but where they are applied in large quantities organic matter and nutrients can leach into rivers and groundwater causing severe pollution. Nitrate levels may be raised in groundwater making it unsuitable as a source of potable water while rivers and lakes may experience eutrophication, oxygen depletion, and destruction of most aquatic organisms.

1.3.2. Atmospheric pollution

The decomposition of solid wastes in landfill results in the production of carbon dioxide and methane ("landfill gas"), both important greenhouse gases. Seven % of methane generated by man's activities is estimated as coming from landfill. Operation of incinerators can cause nuisance and atmospheric pollution from the emission of particulates, acidic gases, unburnt waste material, heavy metals, and trace quantities of



organic compounds. One of the main greenhouse gases, methane, is produced when organic waste in landfill sites decays in the absence of oxygen. Methane is 21 to 24 times more harmful than carbon dioxide as it stores much more heat (that warms our earth, contributing to global warming) and remains in our atmosphere for hundreds of years.

1.3.3. Effects on the marine environment

The disposal of industrial wastes, sewage sludge, and dredged spoils can have diverse harmful effects on the marine environment and direct effects on human health. Ecological effects such as reduction or alteration of faunal populations have been observed in regions where waste is dumped. Excess carbon and nutrients derived from sewage sludge can lead to phytoplankton blooms, eutrophication and oxygen depletion.

1.3.4. Agricultural waste generation and environmental issues in horticulture

Staple crop residues and industrial crop residues may become waste if they are not incorporated to the soil and recycled or composted. Excessive and incorrect application of pesticides is common practice in horticultural crop production for some farmers. After using pesticides, most of the bottles and packages holding these pesticides are thrown into fields or ponds. These wastes have the potential to cause unpredictable environmental consequences such as food poisoning, unsafe food hygiene and contaminated farmland due to their potentially lasting and toxic chemicals.

If fertilizer is applied excessively and wrongly, a portion is retained in the soil, a portion enters ponds, lakes and/or rivers as a result of either rain flows or the irrigation system, resulting in the pollution of surface water, a portion enters the ground water, and a portion evaporates or becomes denitrated, causing air pollution. In terms of ecological consequences, except for the N-fertilizers that remain in the soil colloid for subsequent crops, a large amount of those excess fertilizers negatively impact agricultural production and the environment such as by food poisoning and field pollution, respectively.

Waste from livestock activities include solid waste such as manure and organic materials in the slaughterhouse; wastewater such as urine, cage wash water,

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wastewater from the bathing of animals and from maintaining sanitation in slaughterhouses; air pollutants such as H₂S and CH₄; and odors. Animal manure contains viruses, germs, multi-germs, and parasite eggs, any of which can survive for a few days or a few months in manure or wastewater, polluting soil and water while also harming human and animal health.



Self-check - 1	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

- 1. What is a waste (4pts)?
- 2. Define waste assessment (2pts)?
- 3. List the sources of waste (5pts)?
- 4. What is waste management (2pts)?
- 5. What are the horticultural wastes (2pts)?

You can ask your teacher for the copy of the correct answers.



Note: Satisfactory rating - 15 points

Unsatisfactory - below 15 points

Information Sheet 2- Identifying all options

2.1. Identifying waste management options

Following a methodical assessment of the options for each waste stream, the overall conclusion is that a variety of options will be needed to achieve sustainable agricultural waste management.

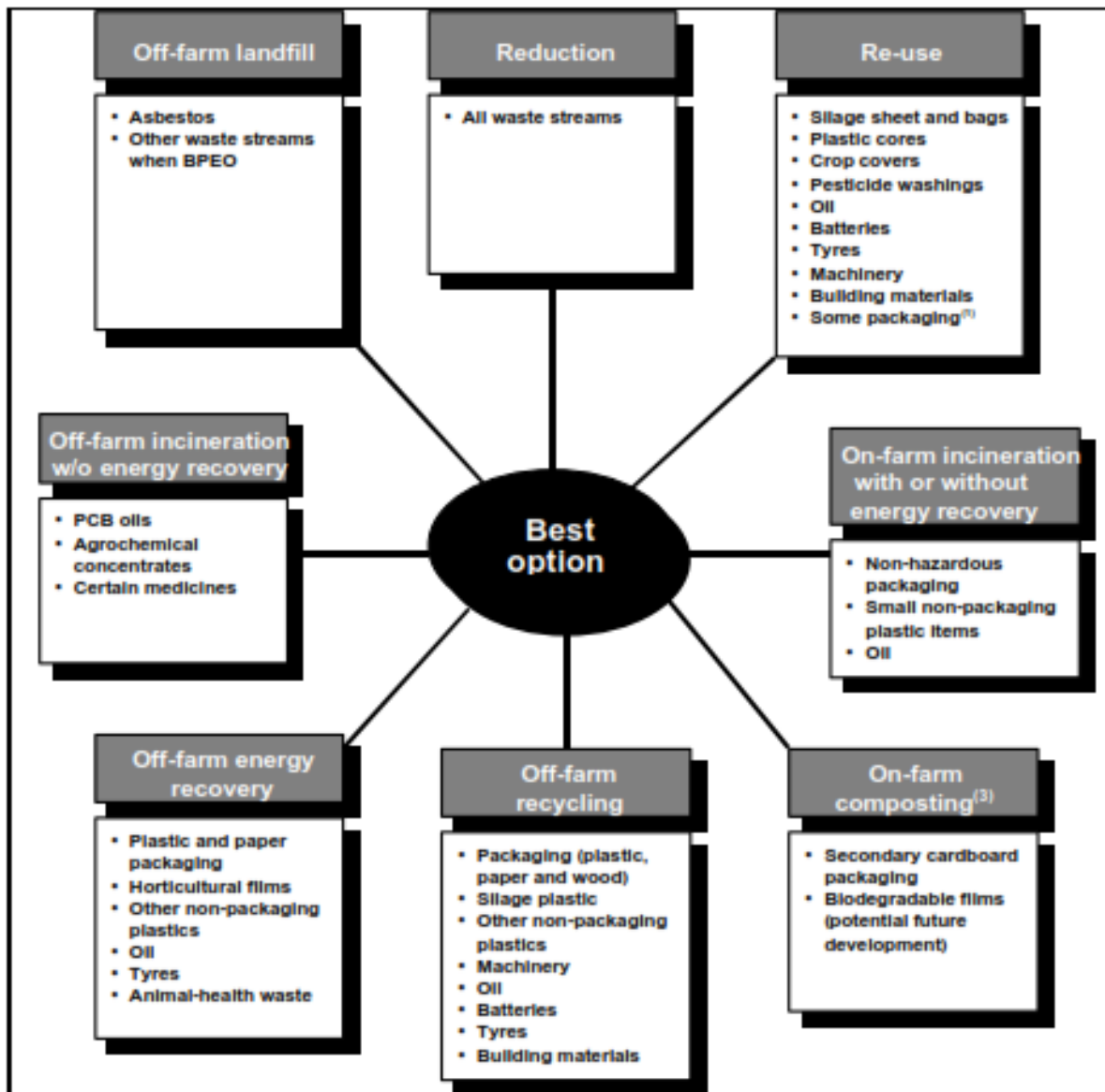




Figure 1.1. Overview of best options

Waste reduction provides the greatest overall benefits (reducing financial and environmental costs). This should therefore be at the heart of any strategy for agricultural waste management.

Re-use of waste can have significant financial and environmental benefits (although not always) and this option is potentially viable for a number of waste streams. However, the scope for increased re-use of waste on farms (that is beyond current practice) appears to be limited. In addition, technical and logistical constraints are restricting the development of re-usable agricultural packaging.

Here are some types of organic waste management to reduce its environmental impact pollution prevention and source reduction; reuse or redistribution of unwanted, surplus materials; treatment, reclamation, and recycling of materials within the waste; and disposal through incineration, treatment, or land burial.

Organic waste prevention, as the preferred option, is followed by reuse, recycling, recovery including energy recovery and as a last option, safe disposal. Among engineers, a similar hierarchy of waste management has been known as strategy: avoid, reduce, recycle, eliminate.

Recycling saves energy, helps keep materials out of landfills and incinerators, and provides raw materials for the production of new products. When waste cannot be prevented, recycling is the next best option. Recycling is more than extending the life of landfills.



Self-Check – 2	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write the options of waste management strategy (5pts)?
2. List waste minimization options (5pts).

You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating - 10 points Unsatisfactory - below 10 points



Information Sheet 3 - Consulting and involving clients

3.1. Client Consulting and involving in managing of organic waste

Client consulting and participation should be provided, describing the following:

- Description of the strategy
- Wastes arising including proposals for minimization/reuse/recycling
- Estimated cost of waste management
- Construction Plan
- Roles including training and responsibilities waste
- Record keeping procedures and
- Waste auditing protocols

The organic waste management strategy may be accompanied by additional data collection such as auditing and consultation programs. Waste management has a unique insight into the composition of waste and resource streams and various service configuration options, developed through its extensive auditing and consulting experience. Sustainable combines this knowledge to deliver a complete waste strategy and waste plan solution.

Waste avoidance, recovery and re-use in communities and industries, together with the efficient management of waste facilities and waste streams, are critical elements of sustainable development.

The need to minimize the generation of waste and harnessing the value in materials previously thought of as waste, underpins the current global approach to waste management. Functional review is a typical starting point – working with, our environmental consulting would help develop a process across a review of existing documentation and resources, enabling environmental consulting strategic services to support farm to best effect.



Self-Check – 3	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (10 %)

1. Why do you need consulting and involving of client's in waste management? (5pts)
2. Describe client consulting and participation in organic waste management (5pts)

You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating – 10 points Unsatisfactory - below 10 points

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LO # 2- Develop strategies

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Assessing feasibility of waste management options
- Prioritizing waste management options
- Developing realistic and achievable waste management strategies
- Developing the client's implementation requirements
- Reviewing the implementation of strategies

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Assess feasibility of waste management options
- Prioritize waste management options
- Develop realistic and achievable waste management strategies
- Develop the client's implementation requirements
- Review the implementation of strategies

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go



back to “Operation sheets”.

Information Sheet 1- Assessing feasibility of waste management options

1.1. Feasibility of organic waste management

Organic waste management options studies are frequently prepared for clients that include identification of options, comparative assessment, and evaluation of the potential risks and implications associated with each options implementation.

Organizations take a holistic approach when preparing options studies and feasibility assessments, considering the triple bottom line impacts (environmental, social, and financial) for stakeholders and their communities.

Examples of assessments include:

- Organics collection and processing feasibility studies
- Regional Waste Management Audit

Waste Audit “an evaluation of the manner in which an activity is carried on with a view to identifying opportunities for:

(A) preventing or minimizing the production of waste from the activity concerned or the harmfulness of any waste produced from the activity, and

(B) Recovering any waste so produced, having regard to the results of a waste audit conducted in relation to the activity.”



- Authority and comparison of waste collection and disposal system options
- Study into the generation and management of hazardous waste

Hazardous waste: - Waste listed as hazardous.

Feasibility of waste management options should involve consideration of

- Commitment
- Compliance with relevant legislation
- Cost-benefit analysis
- Costs
- Lead time
- Process constraints
- Resource requirements (including equipment, personnel)
- Resources available

Many enterprises are concerned with reducing solid waste levels, but few have the tools and necessary resources to evaluate and select among competing the feasibility of waste management options in production.

The assessment of feasibility process involves identifying the benefits, costs, and drawbacks associated with each alternative waste management. To accomplish this, each alternative is evaluated based on the impact on the program goal, technical feasibility, operational feasibility, economic feasibility, sustainability, and organizational culture feasibility.

1.2. Screening alternatives of feasibly organic waste management assessment

The process of identifying organic waste management alternatives can generate numerous options. It would be very time consuming to conduct a detailed financial and operational feasibility evaluation for each option. A quick screening process can help to rapidly identify the options worthy of full evaluation and the possible inclusion in the organic waste management. Additionally, non-effective options can be removed, saving the valuable time and money in the evaluation process. An effective screening process should be based on the original goals and at a minimum should examine:

- The expected solid waste reduction (tons per year)
- The expected startup costs
- The impact to waste removal costs



- The impact to purchasing costs
- The impact on employee moral
- The ease of implementation

1.3. Analyzing and selecting alternatives of organic waste management assessment

After reducing the list of alternatives using the screening process, the remaining alternatives should be further analyzed to determine the best fit for the organization to manage organic waste management. The analysis process will identify the benefits, costs, and drawbacks of each alternative. To accomplish this, each alternative is evaluated based on:

- The impact on the strategy
- Technical feasibility
- Operational feasibility
- Economic feasibility
- Sustainability
- Organizational culture feasibility

Alternatives should be separated into different categories to aid with this process. The categories are (based on the solid waste management hierarchy):

- Waste prevention alternatives
- Reuse alternatives
- Recycling alternatives
- Composting alternatives



Self-Check – 1	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test: Short Answer Questions (15%)

1. Write the involvements of assessment feasibility process (5pts).
2. What are the categories of the alternatives (5pts)?
3. What are the criteria for the evaluation of the alternative (5pts)?



You can ask your teacher for the copy of the correct answers

Note: Satisfactory rating – 15 points

Unsatisfactory - below 15 points

Information Sheet 2 - Prioritizing waste management options

2.1. Prioritizing organic waste management

Organic waste minimization plays an important role in sustainable organic waste management. It is the most effective method in controlling waste arising. There are some common factors that contribute to effective practicing of waste minimization in both developing and developed countries.

Waste management defines the waste management order of priority in the following manner:

1. preventing waste generation (measures to reduce the quantities of waste, including reuse of products or extending the life cycle of products),
2. preparation for reuse (means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing),
3. recycling (any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes, but not including energy recovery or the reprocessing into materials that are to be used as fuels or for backfilling),

4. Other recovery procedures, e.g. energy recovery and waste disposal.

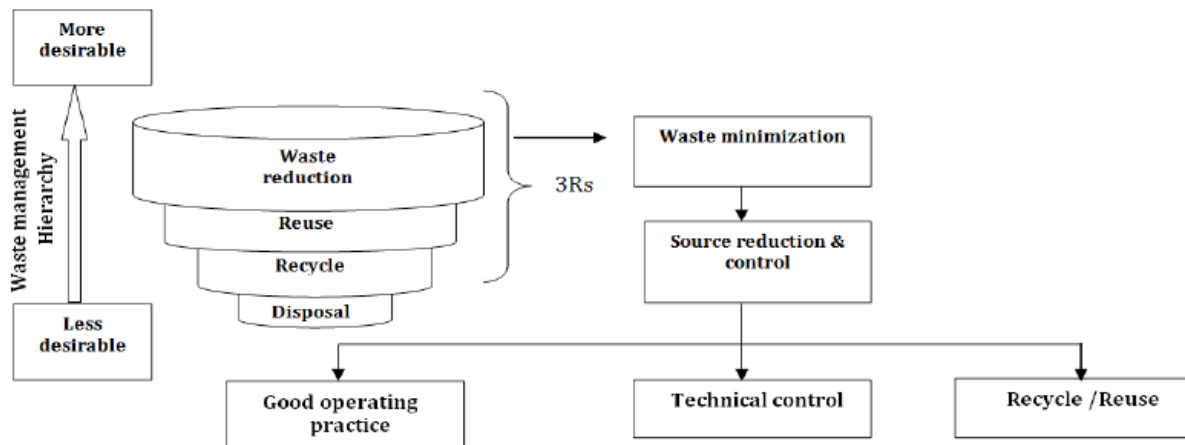


Figure 2.1. Organic waste minimization priority and strategies

Self-Check – 2	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (15 %)

1. What are the 3R's (5pts)?
2. List all the waste minimization priority and strategies (10pts).



You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating - 15 points Unsatisfactory - below 15 points

Information sheet 3 - Developing realistic and achievable waste management strategy

3.1. Organic waste management

Organic waste management deals with the whole cycle of generation of wastes, their storage, collection and transport, and their eventual treatment and disposal. In developed countries, organic waste management has changed from relatively passive management of waste arising to an active management integrating economic and environmental concerns or is required to discard”

It is also emphasized that “effective control of the generation, storage, treatment, recycling and reuse, transport, recovery and disposal of hazardous wastes is of paramount importance for proper health, environmental protection and natural resource management, and sustainable development.

3.2. Hierarchy of organic waste management

The hierarchy of organic waste management is an approach to managing waste more sustainably. Organizations and individuals who implement the hierarchy aim to avoid producing waste in the first place. They aim for zero waste wherever possible. Where waste cannot be avoided, they try to minimize it so that the least amount of waste is



sent for disposal to a landfill. The best method to deal with waste is centered on a broadly accepted “hierarchy of organic waste management” which gives a priority listing of the technical and sociological options of waste management available to the city authorities. The hierarchy gives general guidelines on relative desirability of the different management options.

The highest and most preferred rank of this integrated management hierarchy is waste prevention or waste minimization at source, which aims at reducing the amount of the waste produced. It is the most effective way to reduce the quantity of disposable waste, the cost associated with its handling and its adverse environmental impacts. Reuse, recycling and energy recovery technologies then come as moderately suitable technologies. Landfilling is the last option of the hierarchy that involves controlled interment of the residual waste which has no further use on or in the earth’s mantle. This is the most common practice in many countries. Starting with the most desirable and moving to the least favorable option, the hierarchy of options is as follows:

1. Waste minimization

- Reduction at source
- Re-use items wherever possible
- Recycle every material that can be marketed or composted

2. Recover energy from the waste

3. Treat: reduce the amount or hazardousness of waste for safer disposal

4. Dispose of items with no value in a licensed landfill (well managed, legal waste disposal site)

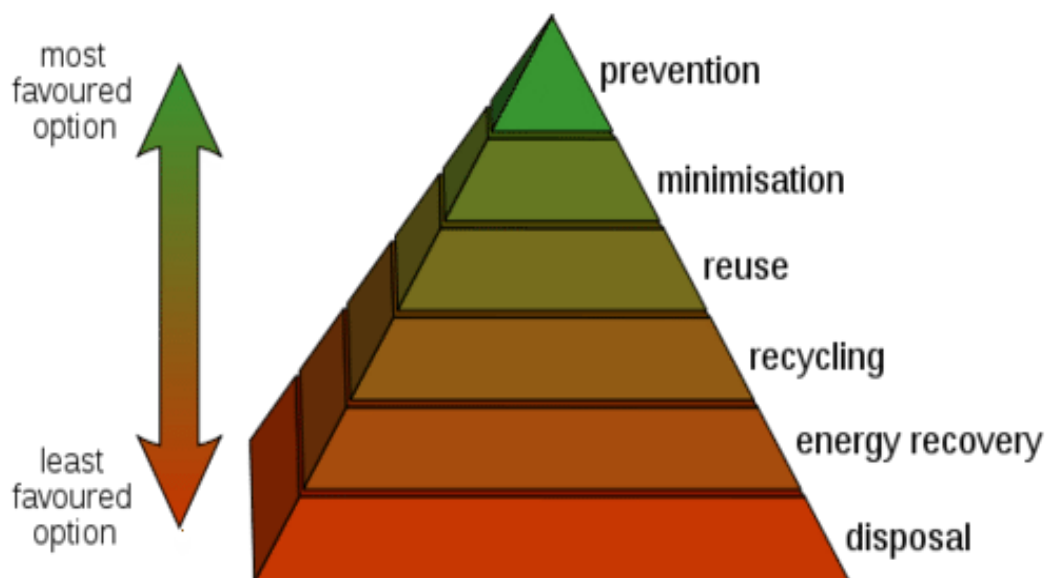


Figure 2.2. Hierarchy of organic waste management

3.2.1. Organic waste reduction or minimization

Organic waste minimization can be defined as: “preventing and/or reducing the generation of waste at the source; improving the quality of waste generated, such as reducing the hazard, and encouraging re-use, recycling, and recovery.” “Waste minimization” is a broader term than “waste prevention” in that it includes recycling and incineration with energy recovery. As discrete activities, recycling and incineration are distinct from organic waste prevention.

It is better to prevent waste being produced in the first place than to have to manage it later. A waste minimization programme considers how natural resources can be used most efficiently so as not to produce unnecessary waste. There is no standard formula for reducing waste. However a key tool in the development of a waste minimization strategy for any sector of the community is a systematic audit of the types and amounts of waste that are being generated and the current waste handling systems.

Waste Auditing

Regular scheduled visits to the site to verify that the site is designed and operated according to the required standards and the site working plan. Checks the results of monitoring. This is the first step towards instituting a waste minimization programme.



The basic role of the waste audit is to identify the ‘what, where and how’ of waste generation. The audit should include both the types and quantities of waste generated and the related cost to the company for disposal. By providing a benchmark by which to measure the success of waste minimization procedures, this exercise helps to identify opportunities for improving waste management systems. A waste audit should:

- Identify all points at which organic waste is generated
- Identify the types and quantities of organic waste generated at each point
- Identify the origin of each type of organic waste
- Establish methods of measuring the organic waste generated for monitoring purposes
- Calculate the costs of current disposal methods, including storage, handling, treatment, transport and disposal costs
- Identify all wastes which are hazardous and consider whether they can be replaced with a non-hazardous product or separated from the main waste stream
- Look at opportunities to reduce, recycle or re-use waste
- Set targets for reducing waste

Recycling

Recycling is “Using waste materials in manufacturing other products of an identical or similar nature.” The word ‘recycling’ is often incorrectly used to mean the collection of materials to be recycled, however, this is just the first stage of the recycling process.

The recycling process consists of four stages:

- Collection of materials
- Sorting and cleaning of collected materials
- Reprocessing and manufacture into new items
- Sale or use of new item

Examples of recycling include industrial melting of one-way glass bottles for use in new bottles, recycling of collected newspapers for production of sanitary paper products,

aerobic or anaerobic treatment of separately collected organic household waste to produce agricultural soil.

The benefits of recycling

- Reduces the amount of waste going into landfill sites, saving space
- Creates jobs and money for schools and organizations;
- Reduces pollution and litter
- Saves raw materials needed to make new products
- Reduces the need to import expensive raw materials
- Slows down the consumption of the world's non-renewable (oil, coal and iron) and renewable resources (trees)
- Reduces energy costs in manufacturing of containers, packaging, etc.

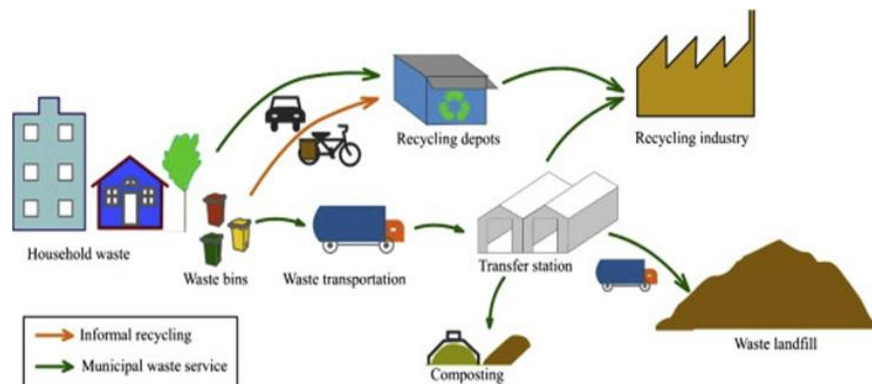


Figure 2.3. Organic waste management cycle

Composting

Composting is the recycling of animals, plants, kitchen and garden waste by allowing it to biodegrade (break down) in a warm, oxygen-rich (aerobic) environment to form a humus-rich product that can be used as a soil conditioner or mulch. Compost holds moisture and helps to improve soil fertility and condition. It reduces soil erosion, and helps to bind nutrients, preventing them from being washed out of the soil. Backyard composting of food scraps and garden trimmings as well as larger commercial composting operations can greatly reduce the amount of waste that needs to be managed or sent to the landfill site.

Managing organic wastes and developing organic waste management strategy



- Understand the legal implications of the organic waste produced in the organization by identifying the specific legislation.
- Look at your general environmental issues – what role does organic waste play in these?
- Quantify and identify organic waste. Where does it arise and how much does it cost? Undertake a walk around audit and look at the bills. Using the organic waste hierarchy, identify what currently happens to the waste as it arises.
- Identify an organic waste management champion or team to drive things forward.
- Produce an action plan for reducing organic wastes
- Get commitment from senior management for the action plan.
- Identify the possible disposal options where you cannot reduce or recycle.
- Select the organic waste carriers carefully and make sure your duty of care responsibilities are met.
- Monitor and review the achievements.
- Communicate the successes with the staff, senior managers and outside organization to interested stakeholders.

Self-check – 3	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (15 %)

1. What is composting (2pts)?
2. Write the benefits of recycling waste (5pts).
3. Write the options of minimizing waste (5pts).
4. What are the hierarchy options of organic waste management (3pts)?



You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating - 15 points Unsatisfactory - below 15 points

Information sheet 4 - Developing the client's implementation requirements

4.1. Client's implementation requirement

Organic waste management systems requires a broad engagement of clients as well as beneficiaries. A target-oriented needs assessment which is based on reliable and widely accepted data and information is the basis for merging different interests and needs. The waste management experts facilitate the communication and integration process and advice on the development of smart and resource-efficient solutions for horticultural crop production. Organic waste minimization undoubtedly needs to be a central element of corporate social responsibility, but sustainable consumption will also require considerable shifts in perception and behaviour among consumers.



Client's implementation can be achieved by:-

- Waste initiatives for and exchanges by countries stakeholders
- Continuous and dynamic exchange of ideas
- Flexible network based on voluntary contributions
- Trainings and education

The horticulture wastes are mainly organic and characterized by a high biological oxygen demand (BOD), chemical oxygen demand (COD), high water content and variations in composition. In such conditions, it is very likely that bacteria contaminate them, which is an environmental problem.



Figure 2.4. Horticultural wastes

Self-check 4	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (12 %)

1. What is the requirements of waste management strategy (5pts)?
2. Why horticultural waste is contaminated very easily by bacteria (5pts)?
3. What is horticultural waste (2pts)?



You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating – 12 points Unsatisfactory - below 12 points

Information sheet 5 - Reviewing the implementation of strategies

5.1. Implementation of organic waste management strategies

Organic waste management can deal with all materials in waste in an environmental sustainable way. In reality any organic waste management is built up of many closely related processes, integrated together. Instead of focusing on and comparing individual options, for instance, incineration versus landfill, an attempt should be made to integrate organic waste management systems that can deal with the whole waste stream, and then compare their overall performances in environmental and economic terms.

Households play a key role in the implementation of strategies. They generate the waste and already reveal different waste handling practices depending on the type of waste generated: **(i)** reuse of bottles, **(ii)** disposal of residues in household bins, **(iii)**



storage and forwarding of recyclables to a collection service, **(iv)** offer recyclables as a gift to relatives or friends; **(v)** feed organic waste to pigs or chickens, **(vi)** sale of recyclables to recycling centers.

5.2. Preparing organic waste management implementation plan

Organic waste management plan must be in place and implementation for organic waste management is a resource for horticulture crop production if it's taken seriously and properly managed by every individuals and farmers.

Below is a list of organic waste management planning activities that may provide the greatest benefit for a community that has limited resources and time to devote to planning.

a) Consult with interested stakeholders

- Which people in your community have information or resources related to various waste management-related activities? (e.g., transportation, sanitation, emergency response, environmental health, public health, public works, zoning, key industry and business leaders)
- What is each stakeholder's role and/or authority to act during an incident? (e.g., issue emergency declarations, issue permit waivers)

b) Identify potential waste streams

- What are the possible waste streams that an incident may generate in your production area, considering the industrial, agricultural, residential and commercial aspects of the community?
- Do any federal or local laws or regulations apply to the potential waste streams? Stream exit, in relative terms?
- Can the amount of potentially generated waste be reduced by means of source reduction (e.g., updating building codes for resilient building design and construction) or hazard mitigation (e.g., eliminating potential problematic wastes, such as retrofitting PCB transformers to reduce PCB-contaminated wastes) activities?



c) Evaluate the reuse and recycling program

- What reuse and recycling options (e.g., recycling facilities, end markets for reused and recycled products) currently are available to your community within and/or across jurisdictional lines?
- Can the existing reuse and recycling program be scaled up to handle disaster-related wastes?
- Does your community have green building programs, local waste management ordinances and/or building code requirements that encourage the creation and help maintain a robust reuse and recycling infrastructure?

d) Consider waste collection strategies

- How may the waste be separated into different waste streams before being removed from the site of the incident?
- Can the volume of the waste be reduced?
- How may the waste be collected and transported off-site after an incident?

e) Determine locations or criteria for waste management sites

- What locations are suitable for waste staging, storage and decontamination activities?
- Are contracts pre-negotiated for those sites?
- What criteria should be used for selecting appropriate sites for different waste streams, if locations cannot be pre-determined?

f) Select potential waste management facilities

- What reuse, composting, recycling, treatment and disposal options currently are available in your production, state or region?
- Which waste streams may each waste management facility accept?
- How much of each waste stream can each facility receive?
- Under what conditions, if at all, will specific facilities accept the waste?
- Are contracts pre-negotiated with these facilities, as well as with neighboring communities?

g) Create an organic waste management-focused community outreach plan

- How may your community be informed of organic waste management-related information, including the transportation and management of incident-related wastes in or near the community?



- What are the most effective methods of notifying your community about the risks that each waste stream may present to human health and the environment?
- Which people or groups in your community can help you spread important information?
- What are possible ways to increase public understanding and acceptance of decontaminated wastes, reused materials and recycled products made from incident-related wastes?

h) Address health and safety considerations for organic waste management operations

- What are the risks associated with the potential waste streams and the use of decontamination technologies?
- Do emergency personnel have appropriate training regarding waste handling and management?
- Is personal protective equipment (PPE) available should an incident occur?

Once the plan is prepared the following implementation for minimizing organic waste can be considered:

I. Reduction at source

Consider source reduction i.e. how to prevent the generation of waste in the first place, before any other management options for waste once it is generated. An example of source reduction is to avoid unnecessary packaging that becomes waste. This can be done by buying items in bulk, buying loose items rather than pre-packed items and choosing items with the least packaging. If you have a business that packages products, you should consider how to minimize the packaging requirements. This is not only the responsible approach but will also save money.

II. Re-use

Choose products that are designed to be used more than once. Good quality products, if maintained and repaired, are less likely to wear out or break and will not have to be thrown out or replaced as frequently. Although durable items sometimes cost more initially, their extended lifespan will offset the higher cost and may even save money in the long term. Many everyday items can be used more than once. Re-using products extends their lives and keeps them out of the waste stream longer.

III. Recycling and Composting

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When everything possible has been done to avoid producing waste, recycling and composting are the next options to consider. Recycling is “Using waste materials in manufacturing other products of an identical or similar nature.” Examples of recycling include industrial melting of one-way glass bottles for use in new bottles;

- Recycling of collected newspapers for production of sanitary paper products; aerobic or anaerobic treatment of separately collected organic household waste to produce agricultural soil.

Self-check - 5	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (13 %)

1. List all of waste management planning activities for implementation (5pts).
2. Write the implementations for minimizing waste (5Pts).
3. What are recycling and composting (3pts)?



You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Operation Sheet 1- Develop waste management Strategy

Purpose

- To develop waste management strategy

Materials, Tools and Equipment:

Wheelbarrow, waste containers, composting tools

Procedure

Step 1. Undertake waste audit and identify waste sources, types and quantities of wastes both in and outside your college.

Step 2. Determine waste management options for each waste sources according to the waste property.



Step 3. Develop waste management strategy.

Step 4. Implement waste management practice in the college and on farm.

Step 5. You may have observe a lot of thrown non-biodegradable town wastes especially plastic sheets or highland bottles in the college and around town or cultivated farm lands. What do you think its negative consequence?

LAP TEST	Performance Test
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Name..... ID..... Date.....

Time started: _____ Time finished: _____

Instructions: Given necessary tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-1. Perform developing of organic waste management strategy.



LG # 83

LO # 3- Document strategy

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Documenting waste management strategy
- Including indemnity to limit liability

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to:**

- Document waste management strategy
- Include indemnity to limit liability



Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).



Information Sheet 1 - Documenting waste management strategy

1.1. Aims of documenting strategy

- To know physical and socio-economic context in particular.
- To know the governance context of organic waste management.
- To know the various components of the solid organic waste management strategy adopted starting from awareness creation through to disposal.
- To know the views of various stakeholders involved in the process, including workers, clients and non-clients.
- To know the significance of the strategy.

1.2. Documenting organic waste management

1.2.1. Method of document

- **Secondary sources:** Internet, Corporation records, publications
- **Interview with** ward councillor, Corporation officials and workers.
- **Interview with clients:** Representatives of market management committee, representatives of the organisations / community groups / citizens groups / student groups involved, sample of residents, food related commercial establishments, non-food related commercial establishments, community establishments serving food and sampled household in the vicinity of the landfill site.
- **Focus group discussion** with workers engaged in collection of waste.
- **Field visits and observations.**

The organic waste management strategy should be documented clearly and accurately based on information available, with all relevant aspects outlined including OHS procedures Include indemnity (protection) to limit liability in accordance with accepted industry practice, company requirements and relevant legislation. Hardly any records exist that can indicate the types and volumes of different waste to help planners determine the different recycling modes and processes that can be used.



Self-Check – 1	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (15 %)

1. How waste management strategy is documented (5pts)?
2. What is the aim of documenting strategy (5pts)?
3. Write the method of organic waste management documentation (5pts).

You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating - 15 points Unsatisfactory - below 15 points



Information Sheet 2 - Including indemnity to limit liability

2.1. Considering liability issues

A risk and due diligence assessment with respect to potential risks and liability issues in any specialized goods and services procurements should be considered and completed by the division initiating the procurement as early as possible in the process.

Decisions with respect to the appropriate level of liability or indemnification that should apply to procurement or with respect of clauses to limit or exclude liability of vendor's s should be made prior to release of the applicable procurement call document.

Liability for a procurement call should:-

- Systematically asses potential risks
- Develop appropriate strategies to manage risk
- Obtain appropriate legal advice risk assessment and management advice

Organic waste management protections should include the following authorization type:-

- Waste License
- Waste Permit
- Waste Collection Permit
- Shipment Notification
- Movement of Hazardous Waste Form



Self-Check – 2	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (10 %)

1. List waste management protection authorizations? (5pts)
2. Liability for a procurement. (5pts)

You can ask you teacher for the copy of the correct answers.

Note: Satisfactory rating - 15 points Unsatisfactory - below 15 points



LG # 84

LO # 4 - Present strategy

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Presenting waste management strategy
- Explaining explain benefits and rationale of the strategy
- Allowing time for client questions and discussion

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Present waste management strategy
- Explain explain benefits and rationale of the strategy
- Allow time for client questions and discussion

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).



Information sheet 1 - Presenting waste management strategy

1.1. Presenting Ethiopian waste management strategy

In order to fully understand current waste management practices and their resulting effects it is important to examine the legal system that governs waste. Ethiopia follows a civil law pattern where laws are written by legislators instead of mandated by judges. In terms of environmental law, Ethiopia's Constitution is the most important source of environmental law. The basis for the Environmental Policy of Ethiopia are articles 92.1 and 92.2 of the Constitution of the Federal Democratic Republic of Ethiopia:

- Article 92.1: "Government shall endeavor to ensure that all Ethiopians live in a clean and healthy environment";
- Article 92.2: "Government and citizens shall have the duty to protect the environment" (Forum for Environment, 2010).

The government issues environmental proclamations that are aimed at various sectors of the environment (land, biodiversity, etc.). The major environmental body in Ethiopia is the

Environmental Protection Authority (EPA). The EPA issued the Environmental Policy of Ethiopia which refers to waste management in three different articles, either directly or indirectly:

- Article 3.7 addresses issues related to human settlement, urban environment and environmental health;
- Article 3.8 addresses issues related to the control of hazardous Materials and pollution from industrial waste; and
- Article 3.9 addresses atmospheric pollution and climate change.

The primary national policy on waste management is the Solid Waste Management Proclamation No. 513. Released in February of 2007, the proclamation's main goal is to increase community participation. The proclamation states:



- it is essential to promote community participation in order to prevent the adverse effects and to enhance the benefits resulting from solid wastes; and
- solid waste management action plans designed by, and implemented at, the lowest administrative units of urban administrations can ensure community participation (Proclamation No. 513, 2007).

The Proclamation has five parts made up of 19 articles. These articles cover topics of obligation, solid waste management planning, collection & storage, transportation, treatment, disposal, incineration, recycling, and hazardous waste. The Solid Waste Management Proclamation works hand in hand with the Environmental Pollution Control Proclamation No.300/2002 which mandates that all urban governments are obligated to devise and implement safe and effective mechanisms to handle, transport, and store municipal waste. It also states that any transporting or treatment of municipal waste can only be done with a permit from the Ethiopian Environmental Protection Agency.



Table 1. Breakdown of Solid Waste Management Proclamation No. 513 and the Environmental Pollution Control Proclamation.

Solid waste management Activity	Law or Act	Description
Source reduction/segregation - households	Solid Waste Management proclamation, Article 11.1	Households shall ensure that recyclable solid wastes are segregated
Collection and storage	Solid Waste Management proclamation, Article 11.2	Urban administration shall ensure that adequate HH solid waste collection facilities are in place to ensure the installation of marked waste bins by streets and in other public places guaranteeing the collections of solid waste from bins with sufficient frequency
Transportation	Solid Waste Management proclamation, Article 13.2	Urban administration shall set the standards to determine the skills of drivers and equipment operators and prevent overloads of solid waste
Treatment	Environmental Pollution Control Proclamation, Article 5.1	All urban administrations shall ensure the collections, transportation, and, as appropriate, the recycling, treatments or safe disposal of municipal waste through the institution of an integrated municipal waste management system
Disposal/Landfill	Solid Waste Management proclamation, Article 14,15	Construction of solid waste disposal sites and auditing existing solid waste disposal waste
Recycling and reuse	Solid Waste Management proclamation, Article 7.1	Manufacturer or importer of glass container or tin cans shall...collect and recycle glass or tins
Hazardous waste	Environmental Pollution Control Proclamation, Article 4.2	Any person engaged in the collection, recycling, transportation, treatment or disposal of any hazardous waste shall take appropriate precaution to prevent



		any damage to the environment or to human health or well-being
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1.2. Method of waste management presentation strategy

The strategy should be presented or put for discussion to all stake holders and clients with appropriate methods. Such methods may include formal presentation to appropriate personnel with aids such as Microsoft power point or overheads, informal discussion to appropriate personnel and issuing appropriate handouts. It is regular ongoing measurements of any waste and waste management activities to detect and quantify any effect on the environment, e.g. recording quantities and types of wastes; sampling and analyzing water quality in borehole downgrade of a site. Serves as an early warning system of non-compliance or negative effects.

A. Formal presentation to appropriate personnel

- Uses aids such as Microsoft PowerPoint
- Overheads, projects

B. Informal discussion to appropriate personnel

C. Issuing appropriate hand-outs

The strategies should be presented in a professional manner by including the following points: -

- Introduction about wastes
- Mentioning strategies
- Using attractive power points
- Good audience contact
- Good wearing style

1.3. Presentation strategy

There are many issues that surround reporting wastes. It is most commonly measured by size or weight, and there is a stark difference between the two. For example, organic



waste is much heavier when it is wet, and plastic or glass bottles can have different weights but be the same size. On a global scale it is difficult to report waste because countries have different definitions of waste and what falls into waste categories, as well as different ways of reporting. Despite these inconsistencies, waste reporting is still useful on a small and large scale to determine key causes and locations, and to find ways of preventing, minimizing, recovering, treating, and disposing waste.

Education and awareness in the area of waste and waste management is increasingly important from a global perspective of resource management. Local, regional, and global air pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "greenhouse" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations.

Educating and training the staff can make a huge difference. Design workshops to create employee awareness regarding industrial waste management. Conduct employee orientation and Occupational Health and Safety sessions which are an extension of your waste management objectives. If your employees are well-trained to deal with waste management, you are more likely to achieve a positive green bottom line as an organization.



Self-Check – 1	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (12 %)

1. How waste management strategy is presented? (2pts)
2. Write the presentation methods. (5pts)
3. Write a professional manner presentation strategy. (5pts)



You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating - 12 points

Unsatisfactory - below 12 points

Information sheet 2 - Explaining explain benefits and rationale of the strategy

2.1. Explaining benefits and rational of the strategy

The presenter should include points like:-

- General description about the strategy
- Strategy documentation
- Strategy implementation
- Benefits and rationale of strategies
 - ✓ Promote reuse
 - ✓ More frequent collection
 - ✓ Promote the “bring system
 - ✓ Promote the keeping of domestic animals
 - ✓ Introduce composting
 - ✓ Keeping the health and environment safe

Recycling of wastes directly conserves natural resources, reduces energy consumption and emissions generated by extraction of virgin materials and their subsequent manufacture into finished products, reduces overall energy consumption and greenhouse gas emissions that contribute to the global climate change, and reduces the incineration or landfilling of the materials that have been recycled. Moreover, recycling creates several economic benefits, including the potential to create job markets and drive growth.



Benefits of the strategy

As mentioned above, waste management involves the collection and disposal of both hazardous and non-hazardous wastes from all the sectors of society. We shall now look in detail the advantages of waste management or the benefits of proper garbage disposal.

1. Practice of revenue

The revenues generated by the waste management would top \$60 million by 2018. But, there are only a few people who sincerely consider this as an industry into various facets of waste management like recycling and reusing, and reap the benefits.

Now many companies are looking forward to associating themselves with this industry and are ready for a long term investment.

2. Keeps the environment clean and fresh

Perhaps, the greatest advantage of waste management is keeping the environment fresh and neat. These waste disposal units also make the people go disease-free as all the resultant wastes are properly disposed and taken care of.

More number of waste disposal units can be placed in all, so that the waste disposal process can be prepped up. Also a point worthy of our consideration here is that this advantage can be taken into account only if extensive and proper safety measures are implemented along with proper waste disposal techniques. There is no use in simply implementing a half-baked technique which, if no use to both the people and the environment. This is the best effects of proper waste disposal.

3. Saves the earth and conserves energy

This characteristic of waste management includes specifically the recycling aspect. As recycling of waste helps in reducing the cutting down of trees. This cutting of trees is mainly done for the production of paper. Though the paperless office is the new trend that is practiced widely but with the help of recycling we can conserve energy and lower the consumption of earthly resources.



By using this method, we can use recycled waste to make quality papers rather than relying on trees. Also, recycling needs only a minimal amount of energy for utilization and complete processing. The resultant product we obtain is a renewable source of energy and is eco-friendly.

4. Reduces environmental pollution

As explained above, waste management if done in a proper manner not only eliminates the surrounding waste but also will reduce the intensity of the greenhouse gases like methane, carbon monoxide which is emitted from the wastes accumulated.

The depth of the existing landfills and incineration will be curbed, thereby cutting down the harmful factors that affect the environment.

5. Waste management will help you earn money

Can you believe if I say that what I have said above is absolutely true? Yes, waste management earns you a few extra bucks every month. Actually, there are many companies which will pay you for your waste.

Right from old and used bottles to tin cans and e-wastes, all kinds of wastes are collected and paid. These wastes are then segregated according to the extent of pollution they cause to the environment and these wastes are recycled accordingly for various purposes. Above all, by following this method, you can create an awareness to your fellow people by earning money, which is a win-win concept.

6. Creates employment

But in all the facets of waste management, a huge amount of labor is needed. Right from the collection to the final step of segregation, every phase needs manpower and ultimately a large number of employment opportunities get opened up. This claim is evident from the labour statistics provided by the US government, according to which around 3.1 million new jobs are produced due to the waste management factor.



Self-Check – 2	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (15 %)

1. List the points to be considered in presenting the strategy. (5pts)
2. Write the benefits and rational of the strategy. (5pts)
3. What is composting? (5pts)



You can ask your teacher for the copy of the correct answers.

Note: Satisfactory rating – 15 points Unsatisfactory - below 15 points

Information sheet 3 - Allowing time for client questions and discussion

3.1. Allowing time for client's questions

The presenter should give enough time for clients to discuss on the following points:-

- All inputs and outputs
- All methods of reducing material
- Reducing emissions to the environment and saving money
- Obtaining commitment to the programme
- The hazardous nature of the waste
- The value of the waste

3.2. Framework for responding to questions

Answering questions under pressure can make you say things you shouldn't have - the nerves can force you to give an inappropriate response. In your panic you might have misinterpreted the question or given away company information that was sensitive. Use the following framework to help you respond effectively to your audience.

3.2.1. Listen to the whole question

You don't have to answer a question immediately. Pause for a few seconds, actively listen to all parts of the question and think about the best way to answer.



Frequently questions can change direction at the last moment, particularly if the questioner is thinking on their feet. This can throw you if you have already started to prepare an answer. Remember that questioners will frequently try to make a point whilst asking their question – it’s therefore important to both hear the content of the question and try to decipher the questioner’s intention.

3.2.2. Understand the context

If you are worried that you haven’t understood a question, ask them to clarify what they mean. Check for confirmation by paraphrasing the question back to the questioner - “You want me to list the improvements of X?”

3.2.3. Involve the whole audience

It is important to remember that even though you are taking a question from one member of the audience, you are still responsible for the interest of the other audience members. This is particularly important in large groups as the audience will become bored if the presentation descends into a series of one-to-one discussions.

To involve the rest of the clients, make sure the whole client has heard and understood the question by repeating it or paraphrasing it to the audience.

3.2.4. Respond concisely

When you reply to a question, direct your answer to both the questioner and other members of the audience. Try to keep your responses as focused as possible, leaving space for other questions. To avoid going into too much detail, check back with the questioner to see if you have answered their query – “Does that answer your question in enough detail?” We’ll cover different ways to respond in a later section.

3.2.5. Allow follow-up questions via email

You can also encourage your audience to ask questions after the event has finished by providing your email address. This shows a high level of respect for your audience and implies that the topic still has much further scope for enquiry.

Once you receive a question, you’ll have a few moments to think about it and reframe it in a way that makes sense to you. This will give you five choices on how to react - you can answer, reflect, deflect, defer or change the scope of the question. Once you’ve



answered concisely, you can then follow up to check if the person asking the question is satisfied and then continue with the discussion.

Self-Check – 3	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (17 %)

1. Why do you allow time for client in waste management strategy? (2pts)
2. If you have an experience in handling customer complaints, what you will do? (5pts)
3. What are the points to be discussed with the client? (5pts)
4. Discuss the framework for responding to the client questions. (5pts)



You can ask you teacher for the copy of the correct answers

Note: Satisfactory rating - 17 points

Unsatisfactory - below 17 points

Reference

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- Solid and Hazardous Waste, Chapter 21.How to develop a waste management and disposal strategy.
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