CBET

STANDARD LECTURE NOTES

ALL DIPLOMA COURSES – LEVEL 6

ENVIRONMENTAL LITERACY

ENVIRONMENTAL LITERACY

Unit Description

This unit describes the competencies required to control environmental hazard, control environmental pollution, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, identify environmental legislations/conventions for environmental concerns, implement specific environmental programs, monitor activities on environmental protection/programs, analyze resource use and develop resource conservation plans.

1. **Control environmental hazard**
   Purposes and content of Environmental Management and Coordination Act 1999
   Storage methods for environmentally hazardous materials
   Disposal methods of hazardous wastes
   Types and uses of PPE in line with environmental regulations
   Occupational Safety and Health Standards (OSHS)

2. **Control environmental Pollution control**
   Types of pollution
   Environmental pollution control measures
   Types of solid wastes
   Procedures for solid waste management
   Different types of noise pollution
   Methods for minimizing noise pollution

3. **Demonstrate sustainable resource use**
   Types of resources
   Techniques in measuring current usage of resources
   Calculating current usage of resources
   Methods for minimizing wastage
   Waste management procedures
   Principles of 3Rs (Reduce, Reuse, Recycle)
   Methods for economizing or reducing resource consumption

4. **Evaluate current practices in relation to resource usage**
   Collection of information on environmental and resource efficiency systems and procedures, Measurement and recording of current resource usage
   Analysis and recording of current purchasing strategies.
   Analysis of current work processes to access information and data
   Identification of areas for improvement

Environmental Literacy Is an individual's understanding, skills and motivation to make responsible decisions that considers his or her relationships to natural systems, communities and future generations.

Environmental Literacy is the desired outcome of environmental education which strives to provide learners with:

- Sound scientific information
- Skills for critical thinking
- Creative and strategic problem solving
- Decision-making

The National Science Foundation's Advisory Committee for Environmental Research and Education noted that *"Creating a scientifically informed citizenry requires a concerted, systematic approach to environmental education."*

CHAPTER 1

Control environmental hazard

Environmental Management

Environmental management involves processes that minimise humanity's impact on its surroundings. The main objective is to create and maintain conditions in which society and nature coexist.

Since its formal recognition in the 1970s, it has become a mandatory practice for governments and organisations, with individuals earning professional qualifications to ensure its successful implementation.

Importance of Environmental Management

The environment comprises all living and non-living components necessary for your survival. Therefore, it is important to maintain the integrity of your

surroundings to ensure that they can support and sustain current and future generations.

Environmental management helps you identify degradation factors and implement strategies to mitigate them. It also helps you predict future impacts of environmental degradation and initiate processes to minimise the effects

The various benefits and importance of environmental management are as follows:

- Environmental management reduces the chances of risks of environmental incidents like oil spills in oceans or forest fires, or the blowing up of coal mines, thereby ensuring environmental protection.
- It improves company's reputation by promoting their brand image as eco-friendly and helps secure the market, which further helps them gather clients and lower their operating costs.
- Environmental management helps improve public health and the overall health of the ecosystem by minimizing the harm done due to the negligence of big companies and promoting environmental protection.
- Increases the workforce's knowledge about the impact of careless business policies on the environment and focuses their attention on adopting ways that will help reduce environmental depletion.
- Environmental management and protection help in the reduction of waste produced by companies as by-products during manufacturing.
- It helps with new business ideas using waste by-products to create new products. The by-products of petroleum are used to manufacture Vaseline, LPG, gasoline, paraffin wax petrochemicals, etc.
- It will help us to combat all main types of pollution i.e., air, water, land, thermal, radiation, and noise pollution.
- It helps to set objectives and different frameworks for training to achieve optimum results.
- Achieving optimum utilization of resources by following proper order and maintaining consistency throughout the process.

Coordination Act 1999

The Environmental Management and Coordination Act (EMCA), 1999, is the framework law on environmental management and conservation. EMCA establishes among others the following institutions; National Environment Management Authority, Public Complaints Committee, National Environment Tribunal, National Environment Action Plan Committees, and County

Environment Committees. The National Environment Management Authority (NEMA) was established as the principal instrument of government charged with the implementation of all policies relating to the environment, and to exercise general supervision and coordination over all matters relating to the environment. In consultation with the lead agencies, NEMA is empowered to develop regulations, prescribe measures and standards and, issue guidelines for the management and conservation of natural resources and the environment. The Act provides for environmental protection through;

- Environmental impact assessment
- Environmental audit and monitoring
- Environmental restoration orders, conservation orders, and easements.

NEMA is also the Designated National Authority for certain Multilateral Environmental Agreements.

Environmental hazard

Environmental hazards creates numerous effects on adverse health events. This hazard faces some factors such as physical, chemical and also some biological which can be natural and manmade. In addition, examples of **environmental hazards** such as Air, water, and soil pollution from transportation, agriculture, industry, and other sources such as: "Chemicals, Toxic waste, Radiation". Another type of hazard such as "hazard resulting from chemical, biological, or physical agents either from ongoing or previous human activity". Natural hazards also include some difficulties such as earthquakes, volcanic eruptions and flooding. Environmental hazards also cause diverse effects on the working field and also on employees. There are numerous categories of environmental hazards such as

- **Physical hazards**
  Circumstance that can cause harm with contact. They can be classified as type of occupational hazard or environmental hazard. Physical hazards include ergonomic hazards, radiation, heat and cold stress, vibration hazards, and noise hazardsPhysical hazards are a common source of injuries in many industries
- **Biological hazards**

Employees with roles that involve interacting with other people, animals, or contagious conditions are prime candidates for exposure to biological hazards. These risks include animal droppings, fungi, viruses, blood, and mold.

At construction sites, encountering biological hazards is more likely to happen in demolition, groundwork, or refurbishment. For example, workers in demolition sites could get exposed to dust or water contaminated by bird droppings. These could lead to various diseases such as histoplasmosis, a potentially fatal respiratory problem.

- **Chemical hazards**
  Jobs that involve handling chemicals present health risks to the employees. Exposure to substances such as corrosives, fumes, vapors, liquids, and dust can be extremely harmful. This may lead to irritation, sensitization, and carcinogenicity. Hence, it is crucial for an employer to mitigate the risks through implementing safety protocols that minimize or even eliminate the possibility of employees inhaling or ingesting the substances as well as absorbing them through their skin

- **Electrical hazards.**
  he majority of electric hazards involve construction workers coming into contact with power cables located either underground or overhead, or when working at heights close to power lines. Incorrect handling of electrical tools or machinery contributed to these incidents as well. An increasing number of workers also suffer from electrocution because they are assigned electrical work despite not being qualified electricians.

- **Social hazards**
  Social hazards, result from your location, socioeconomic status, occupation, and behavioral choices. For example, smoking cigarettes is hazardous to your health, and this is a behavioral choice. If you live in a neighborhood with lots of crime, this is a hazard based on your location.

- **Cultural/practice-related hazards**
  Culture is the knowledge, belief, art, law, morals, customs and habits that are acquired by people as members of society. It is also the common ways of life

and set of thoughts and feelings shared by the members of a society. Just as there are cultural practices that are good for health, such as breastfeeding a child, there are also cultural practices that adversely affect health and these can be considered to be cultural hazards

Causes of environmental hazards

The causes of environmental hazards such as

- Unplanned construction,
- Defective policies of agriculture,
- Deforestation,
- Population exploitation
- Transport.

Unplanned construction can create air pollution in every rural area and through their unplanned behaviour, it is also caused through trapping the solar radiation and also making all construction areas warmer. Environmental hazards can create difficulties and which creates some single obstacles.

Hazard Controls

Effective controls protect workers from workplace hazards; help avoid injuries, illnesses, and incidents; minimize or eliminate safety and health risks; and help employers provide workers with safe and healthful working conditions. The processes described in this section will help employers prevent and control hazards

To effectively control and prevent hazards, employers should:

- Involve workers, who often have the best understanding of the conditions that create hazards and insights into how they can be controlled.
- Identify and evaluate options for controlling hazards, using a "hierarchy of controls."
- Use a hazard control plan to guide the selection and implementation of controls, and implement controls according to the plan.
- Develop plans with measures to protect workers during emergencies and no routine activities.
- Evaluate the effectiveness of existing controls to determine whether they continue to provide protection, or whether different controls may be more effective. Review new technologies for their potential to be more protective, more reliable, or less costly

When evaluating the risks associated with specific hazards, the results of this evaluation should guide the in the selection of risk management techniques including elimination, substitution, engineering controls,

This is known as the Hierarchy of Controls.

Elimination and Substitution
The most preferred method of controlling risk is to eliminate the hazard altogether. In most cases, elimination is not feasible and when possible,

substitution is the best approach to hazard mitigation. When possible, substitute less hazardous agents in place of their more hazardous counterparts. This also applies to conditions and activities. Examples include substituting toluene for benzene, non-lead-based paints for lead-based ones, or SawStop table saws for existing traditional table saws.

Engineering Controls

Engineering controls consist of a variety of methods for minimizing hazards, including process control, enclosure and isolation, and ventilation.

- Process controls involve changing the way that a job activity is performed in order to reduce risk. Examples of this include using wet methods when drilling or grinding or using temperature controls to minimize vapor generation.
- Enclosure and isolation are targeted at keeping the chemical in and the researcher out, or visa versa. Glove boxes are a good example of enclosure and isolation. Interlock systems for lasers and machinery are other good examples of isolating processes.
- The most common method for ventilation in research laboratories is localized exhaust systems. Fume hoods, snorkels, and other ventilation systems are discussed at length in the Laboratory Equipment and Engineering Controls section of this site.

Administrative Controls

Administrative controls are controls which alter the way work is performed. They may consists of policies, training, standard operating procedures/guidelines, personal hygiene practices, work scheduling, etc. These controls are meant to minimize the exposure to the hazard and should only be used when the exposure cannot be completely mitigated through elimination/substitution or engineering controls.

Personal Protective Equipment (PPE)

PPE should always be used as a last line of defense and is an acceptable control method when engineering or administrative controls cannot provide sufficient protection. PPE may also be used on a temporary

basis while engineering controls are being developed. See the standalone PPE section of this site for more information.

Storage methods of Hazardous Waste Materials

Proper storage and handling of hazardous waste containers is an important practice that not only promotes a safe work environment, but also ensures you're following legislative requirements.

In addition to understanding and following all federal, provincial and municipal hazardous waste legislation, here are 8 tips to help you safely store and handle your waste:

1. Prominently display weather-resistant labels that indicate the name of the hazardous waste. Follow all WHIMIS, Safety and Legislative guidelines.

2. Use sealable containers that prevent release of contents and prevent other substances from entering the containers.

3. Use storage containers that are compatible with the type of waste stored, and are made of durable, weather- and corrosion resistant materials.

4. Ensure wastes are stored in an area that is inaccessible to unauthorized persons, clearly identified as a hazardous waste storage area, and designed to prevent secondary containment.

5. Implement a secondary containment system for all containers used to store hazardous wastes, and for all equipment used in transporting hazardous wastes that are in a liquid or gas form.

6. Limit the amount of hazardous waste on-site by continually monitoring your hazardous waste volume.

7. Ensure all employees are adequately trained on the handling and storage of your hazardous waste. This should include emergency response training.

8. Keep your hazardous waste contingency plan up-to-date, including current contact information for the facility owners or operators as well as procedures to follow in the event of an emergency.

Disposal methods of hazardous wastes

1: Underground disposal

The only way this method is compliant is when the hazardous waste is brought to mines that are either inactive or partially active (along with meeting additional geological and technical specifications). Many companies need to dispose of radioactive waste, whether from medical treatments, laboratory experiments, nuclear fuel production, or radioactive ore mining. For those cases, this method is considered a strong, cost-effective option.

According to the EPA, these hazardous material disposal facilities will vary in their sustainability. The agency is responsible for protecting people and the natural world by verifying that these units' design, operation, and maintenance adhere to its standards.

2: Landfill disposal

Dumpsites and landfills are the most commonly used and oldest method of hazardous waste disposal. Hazardous waste landfills are specially

built and are NOT intended for liquid wastes. They are engineered and excavated so that they are within the ground rather than piling upward.

These landfills are lined with clay, HDPE, or other non-porous materials to prevent the waste from leaching into the ground. Wind dispersal controls, leak protection systems, and a double liner are additional protections so that humans and the environment come into contact with as little waste as possible.

Human health is generally not impacted by hazardous waste landfills. However, it is possible for people near the landfill to be harmed if there is a leak.

3: Ocean dumping

For the avoidance of groundwater contamination, deep-sea depositing is sometimes used. It is necessary to treat hazardous waste before the disposal of hazardous materials, as ocean dumping has a major impact on marine life. This treatment is important to human health, too, since the waste can make its way to humans when they consume seafood. Some environmental agencies ban this practice, but it is allowed by the EPA if you <u>have a permit</u> and strictly <u>follow its guidelines</u>

Regarding sustainability, treatment is critically important. Radioactive waste, <u>industrial waste</u>, and sludge all cause considerable ocean pollution. Mercury and cadmium, toxic heavy metals, are within about 10 percent of dredged material

PPE in line with environmental regulations

Personal protective equipment (PPE) refers to all equipment (e.g. devices, appliances and associated accessories) that is worn by an individual, in order to provide protection against one or more health or safety risks, whilst at work.

The Personal Protective Equipment at Work Regulations 1992 seeks to ensure that where risks cannot be controlled by other means PPE should be correctly identified and put into use.

Under the requirements of The Health and Safety at Work Act 1974 (external site), employees will not be charged with or contribute to the provision and maintenance of PPE. If there is a need for PPE items they must be provided free of charge by the employer.

The regulations do not apply where requirements are detailed in other regulations such as respirators in The Control of Substances Hazardous to Health Regulations 2002 (COSHH). Many other regulations have specific requirements for the provision, maintenance and the use of PPE.

Such as the regulations dealing with asbestos, noise or ionising radiation. This ensures that specific hazards and their controls are dealt with by specific regulations.

1. SAFETY FOR THE HEAD

Wearing a helmet offers protection and can prevent head injuries. Select a sturdy helmet that is adapted to the working conditions. These days you can find many elegant designs and you can choose extra options such as an adjustable interior harness and comfortable sweatbands.

2. PROTECT YOUR EYES

The eyes are the most complex and fragile parts of our body. Each day, more than 600 people worldwide sustain eye injuries during their work. Thanks to a good pair of **safety glasses**, these injuries could be prevented. Do you come into contact with bright light or infrared radiation? Then **welding goggles or a shield** offer the ideal protection!

3. HEARING PROTECTION

Do you work in an environment with high sound levels? In that case it is very important to consider hearing protection. **Earplugs** are very comfortable, but earmuffs are convenient on the work floor as you can quickly put these on or take them off.

4. MAINTAIN A GOOD RESPIRATION

Wearing a **mask** at work is no luxury, definitely not when coming into contact with hazardous materials. 15% of the employees within the EU inhale vapours, smoke, powder or dusk while performing their job. **Dust masks** offer protection against fine dust and other dangerous particles. If the materials are truly toxic, use a **full-face mask**. This adheres tightly to the face, to protect the nose and mouth against harmful pollution.

5. PROTECT YOUR HANDS WITH THE RIGHT GLOVES

Hands and fingers are often injured, so it is vital to protect them properly. Depending on the sector you work in, you can choose from gloves for **different applications**:

- protection against vibrations
- protection against cuts by sharp materials
- protection against cold or heat
- protection against bacteriological risks
- protection against splashes from diluted chemicals.

6. PROTECTION FOR THE FEET

Even your feet need solid protection. **Safety shoes** (type Sb, S1, S2 or S3) **and boots** (type S4 or S5) are the ideal solution to protect the feet against heavy weights. An **antiskid sole** is useful when working in a damp environment, definitely if you know that 16,2% of all industrial accidents are caused by tripping or sliding. On slippery surfaces, such as snow and ice, **shoe claws** are recommended. Special socks can provide extra comfort.

7. WEAR THE CORRECT WORK CLOTHING

Preventing accidents is crucial in a crowded workshop. That is why a good visibility at work is a must: a **high-visibility jacket and pants made of a strong fabric** can help prevent accidents. Just like the hand protection, there are versions for different applications.

8. WORST-CASE SCENARIO

Prevention is better than cure. A smart thing is to be prepared for the worst. A **classic first-aid kit** is no luxury but a **first-aid kit for the eyes** can also be an essential first aid. If the employee comes into contact with chemicals, a **safety**

shower is mandatory, so that he can rinse the substances off his body at any moment.

Occupational Safety and Health Standards (OSHS)

Occupational Safety and Health (OSH) deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards. Its goal is to prevent accidents and harm to people from work-related activities.

Research has shown that safety and well-being at the workplace equals good business and profitability. Employers have primary responsibility for the occupational safety and health of workers. They are responsible for conducting risk assessments and organizing business operations with safety as the first priority. Governments set the frameworks to enable employers to provide flexible solutions to manage workplace safety. OSH performance is key to reputation management, particularly where businesses depend on the relationship with global consumers.

What is International Organization for Employers (IOE) position on OSH?

Occupational safety and health is an important priority of the IOE. IOE supports the development of a basic legal international framework, managed through effective enforcement mechanisms at the national level. IOE strongly supports the replacement of a piecemeal approach to the development of legal instruments by pursuing:

- A programme to review the relevance of current standards (ILO Standards Review Mechanism);

- A flexible approach as offered in the Promotional Framework for Occupational Safety and Health (C187, 2006);
- The development of practical guidance and codes of practice which will assist employers.

How does IOE's work on OSH advance the agenda for business?

IOE represents the interests of employers in the development of standards and other instruments for OSH at the international level. In addition, IOE provides guidance on OSH areas of interest to its members and employers, in particular on topics where other international bodies have not developed authoritative guidance or information. IOE also leads the Global Occupational Safety and Health (GOSH) network, comprised of senior safety and health risk management and sustainability professionals from multinational enterprises and employers organisations. GOSH debates current and emerging global OSH issues on a confidential basis.

Chapter 2.
Control environmental Pollution control

Environmental pollution is the continuous contamination of the biological elements of the earth resulting in the adverse destruction of normal environmental processes.

The effect and cause of Environmental pollution reveal the contaminated physical and biological aspect of the earth, in a way that negatively impacts the ideal environmental systems. The pollutants could result in major or minor destructions, of which the main destruction can be measured and its effectiveness monitored. On the other hand, the minor destruction happens as a marginal disruption to the fragile stabilized natural food web pyramid offset and this can only be recognized for a very long period.

Air Pollution: Causes, Effects, and Control measures.

Air Pollution

Air pollution is the release of contaminated air, indoors or outside. It is a biological and chemical shift into the atmosphere.

Causes:

Some Causes of Air pollution includes:

Combustion of Fossil Fuels: Burning substances like coal and petroleum, can release sulfur dioxide which pollutes the environment. Also, pollutants like Nitric oxide, NO2, carbon monoxide, organic matter, and lead released from transport vehicles cause air pollution.

Effects:

Some of the Effects of Air pollution includes:

Chronic Conditions: Chronic Conditions such as heart infection, stroke, asthma, chronic bronchitis, and cancer are the effects of Air pollution.

The outbreak break outbreak global Warming: Heightened temperatures, rise in sea levels and melting of ice from cooler regions, and loss of habitat have marked an unavoidable crisis caused by air pollution.

Acidic Rain: Nitrogen oxides asulfurulfurom the burning of fossil fuels are circulated in the environment when it rains, through the raindrops that fall to the ground ruining crops, ani, mals, and and and.

The outbreak of Eutrophication: Eutrophication is an accumulated forming alga that matures in sea latest and attacks fish, animals, and pla, nts,

Control measures.

Some of the control measures for Air Pollution includes:

- Proper Household Practices.
- Conservation of Energy
- Comprehend the topic of Recycling waste materials
- Prioritizing Clean Energy Resources
- Usage of Energy-Efficient Equipment.
- Equipmentlution.

Noise pollution: Causes, Effects, and Control measures.

Noise is defined as any noise above 60 decibels (dB). Specifically, noise comes to be dangerous when it exceeds 70 decibels (dB) and is severe above 110 dB.

Causes

Some of the causes of noise pollution include:included noise: Traffic noise reports for one of the most polluting noises noises

Noise from Construction sites

Loud music from music.

Animals

Effects

Some of the effects of Noise Pollution includes:

- Bodily effects such as ear pains, Respiratory turmoil, heart issues, HBP, migraines, and colitis.
- Psychological effects such as depression, tiredness, stress attack, hysteria, aggressiveness, anxiety, loss of sleep, and irritability.
- Memory loss and lack of concentration.

Control measures

- Avoid noisy activities.
- Choose a less noisy transport medium such as electric vehicles over cars.
- Sleep at the appropriate times.
- The Use of The regulators to absorb nosy materials.
- The government rates residential areas from noise-producing ones. noise-producingution.
- Water pollution: Causes, Effects, and Control measures.
- Water pollution is the discharge of harmful substances into the water.

Causes

Some of the existing water pollutants include:

- Included Waste
- Insecticides
- Pesticides
- Fertilizers

Effects

Intake of polluted water in humans causes water-borne diseases such as typhoid, cholera, hepatitis, and others.

- Chaos in the Ecosystem.
- Increase in the oxygen content affecting aquatic organisms.
- Disturbance in the food chain when pollen is consumed.
- Control measures
- Proper treatment of sewage.
- Conservation of water.
- Using environmentally favorable material
- Using products that do not end up as pollutants.

Sustainable resource use

Sustainability is the term used to protect and conserve the environment or nature. In our environment, natural resources play a crucial role in human life. Natural resources exist on the earth independently. But, due to human activities, these resources are going to be damaged or become extinct in the near future. The main objective of Enviromental sustainability is to make a balance between nature and natural resources.
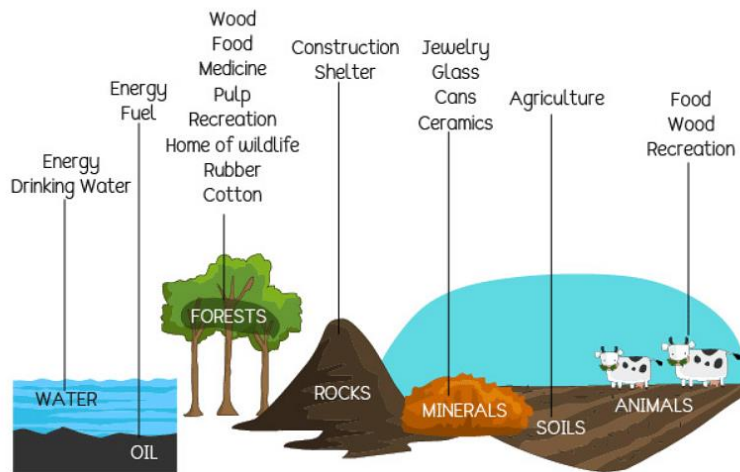
So much of what we buy, do or use every day has an environmental impact or effect. Using petrol in our cars, electricity in our homes and paper in our offices makes an impact on the environment. In our modern lives, it is not realistic to expect that we stop using our cars or our appliances completely. But we can start to use them in a way that reduces their environmental impact.

Chapter 3.

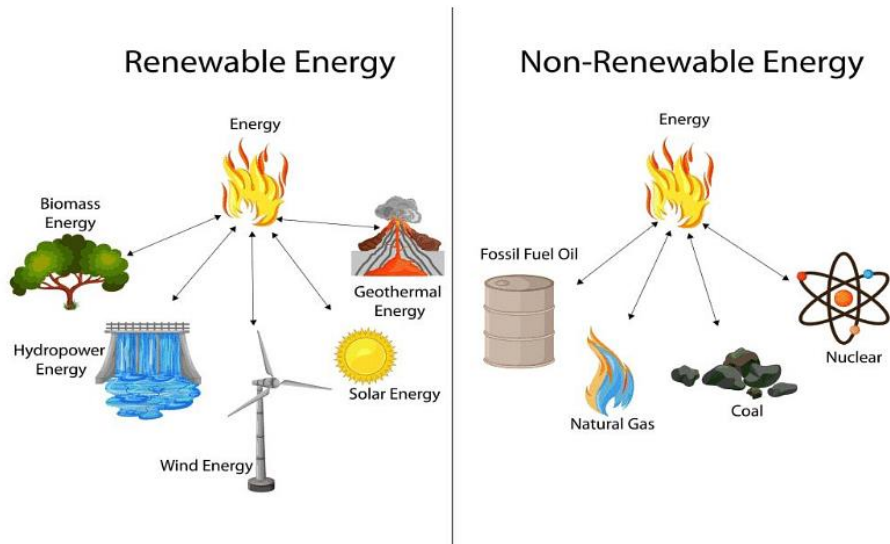## Demonstrate sustainable resource use

Natural Resources and its Types

Natural resources are those resources which occur on the earth independently. It means there is no human intervention in existing natural resources. Natural resources are playing an essential role in the human life cycle. There are some natural resources like air, water, sunlight, minerals, etc., which are necessary for the survival of humans as well as for animals.

Most natural resources are of two types:

Renewable Resources: The resources which can be obtained after usage are known as renewable resources. Renewable resources replenish by nature. These resources are available in bulk and there are less chances of extinction. Also, the recovery rate is more for renewable resources. For example, Sunlight, soil, water, air etc.

Non-Renewable Resources: The resources which cannot be obtained after usage at the maximum limit are known as non-renewable resources. Non-Renewable resources do not replenish by nature. These resources are available in a very limited amount and there are more chances of extinction. Also, the recovery rate is very slow for non-renewable resources. For example, Fossil-Fuels, Gold, Minerals, Coal and Petroleum etc.

Techniques in measuring usage of resources

Let's gain an in-depth understanding of Techniques in measuring current usage of resources

1. Measuring Overall Resource Utilization

Overall resource utilization is the method of measuring how much a resource is utilized in totality against its availability or capacity.

Which implies;

Overall Resource utilization = Actual or allocated total time / Available resource time or resource capacity.

2. Measuring Billable Utilization of Resources

Billable utilization is the method of measuring how much a resource is utilized for billable work against its availability or capacity.

Which means;

Billable Resource utilization = Actual or allocated billable time / Available resource time or resource capacity.

3. Measuring Non-Billable Utilization of Resources

Non-billable resource utilization is a method of measuring how much a resource is utilized for non-billable work against its availability or capacity. Non-billable work is related to non-billable projects, BAU, meetings, etc.

Which means;

Non-Billable Resource utilization = Actual or allocated non- billable time / Available resource time or resource capacity

4. Measuring Strategic Utilization of Resources

Strategic resource utilization is the method of measuring how much a resource is utilized for strategic projects. Strategic projects are for achieving long term strategic goals of the business.

So, we measure Strategic utilization as:

Strategic Resource utilization = Actual or allocated strategic time / Available resource time or resource capacity

Calculating current usage of resources

There are two ways to calculate resource utilization, depending on whether you calculate resources for personnel or equipment and how you choose to present the information. Here are the two calculations:

Resource utilization

Resource utilization = (billable hours/available working hours) x 100

Resource utilization is a percentage of how much productive time is spent out of all possible time. It can be calculated for personnel, equipment and even workspaces. Here's how to calculate resource utilization:

- Determine the maximum number of available working hours
- Determine the number of billable hours worked
- Divide the billable hour total by the available working hour total
- Multiply the result by 100

Example: A manager would like to calculate how much time an engineer on their team spent on her project during the past month. First, the manager calculates her total available working hours:

22 workdays in the month x 8 hours of work each day = 176 available working hours

Next, the manager asks the engineer how many hours she spent working on the project, and finds out that she spent 132 hours working on the project. The manager divides this number of billable hours worked by the available working hour total, then multiplies by 100 to get the engineer's resource utilization for the month:

*(132 billable hours worked / 176 available working hours) * 100 = (.75) x 100 = 75% resource utilization for this engineer during this month*

Billable utilization

Billable utilization = (billable hours/(total working hours - hours spent on nonbillable tasks)) x 100

Billable utilization is an alternative to resource utilization that can be useful for analyzing personnel workload. While resource utilization accounts for all of a person's working hours, billable utilization accounts only for the remaining hours after the mandatory nonbillable hours of work have been subtracted. An employee may never reach 100% resource utilization, but they can reach 100% of billable utilization. Here's how to calculate billable utilization:

- Determine how many hours an employee has available to spend on billable tasks
- Determine how many hours the employee has spent on billable tasks
- Divide the actual time spent on billable tasks by the potential total possible hours for billable tasks
- Multiply the result by 100

Example: The engineer's manager wants to calculate the engineer's billable utilization for that month to display the employee's diligence more clearly to the department head. They know the engineer had one day off that month and attended safety training, daily meetings and site meetings each week. These nonbillable activities total 40 hours for the month. So the manager calculates the possible hours that the engineer could spend on billable tasks:

176 available working hours for the month - 40 hours spent on nonbillable tasks = 136 potential billable hours for the month

The employee spent 132 hours on billable tasks. So the manager divides 132 billable hours by 136 potential hours, then multiplies the result by 100 to see the engineer's approximate billable utilization:

(132 billable hours worked/136 potential billable hours) x 100 = (about .97) x 100 = 97% billable utilization

Methods for minimizing wastage

1. Use a reusable bottle/cup for beverages on-the-go

You might already have a reusable water bottle, but do you use it all the time? You can put that reusable bottle to use, save money and reduce waste. By taking your own water with you, you'll also reduce your chances of purchasing more expensive beverages on-the-go.

2. Use reusable grocery bags, and not just for groceries

Just like a reusable water bottle, you may already have a reusable grocery bag, though it's often forgotten at home. Try writing BAGS on the top of your grocery list to help you remember, or keep them in the back seat where they aren't as easy to forget.

3. Purchase wisely and recycle

You can reduce the amount of waste you produce by purchasing products that come with less packaging and/or come in packaging that can be recycled. Not all plastics are recyclable

4. Compost it!

While composting requires more effort than the previously mentioned lifestyle changes, it will provide you with a beneficial return on your investment of time and effort. Depending on the conditions, you may have compost in 3 to 12 months to use in your garden.

5. Avoid single-use food and drink containers and utensils

Whenever possible, try to avoid single-use coffee cups, disposable utensils, straws and napkins. Some businesses will even give you a discount on your coffee for bringing your own mug. Keep a set of silverware at work along with a plate, bowl and cup that you can wash and reuse. Skip the plastic straw altogether or buy reusable metal ones instead..

6. Buy secondhand items and donate used goods

Before you go buy something new, consider buying it used which can also save you lots of money. That can mean buying secondhand clothes at Goodwill, used furniture and repurposed construction materials at Habitat for Humanity's ReStore or searching Craigslist for a deal on a bicycle. By purchasing secondhand items you'll be supporting local charities in addition to saving items from ending up in the dump.

7. Shop local farmers markets and buy in bulk to reduce packaging

Shopping at your local farmers market is a win-win. First, you'll be supporting local farmers while also getting fresher ingredients than you might find in the big-box grocery store. Food produced locally doesn't have to be shipped as far or refrigerated in transit. Local farmers often rely on less packaging and many are happy to have you return last week's berry basket or egg carton for use next week.

8. Curb your use of paper: mail, receipts, magazines

In today's digital world, most companies offer bills by email, and some even offer incentives to do so. More stores are offering e-receipts, too, which are great because they're harder to lose if you need to make a return. Consider digital subscriptions for your favorite magazines that you can read on your tablet or computer. Digital subscriptions are often a little cheaper than the hard-copy version, as well.

Waste management procedures

There are three steps necessary to properly manage waste:

- Identify Wastes
- Evaluate Waste
- Manage Wastes

1. Identify Wastes

Provides safe, effective, and efficient waste management services for managing nonhazardous solid waste, recyclable waste, and hazardous waste. The community is responsible for identifying the type of waste produced and using the appropriate management system.

2. Evaluate Waste

The community must evaluate their waste for its physical, chemical, and biological characteristics to determine how it is to be properly managed.

A waste may be:

- Recyclable material (e.g., paper, soda cans)
- Compostable organic waste (e.g. food, animal bedding, biodegradable plastics)
- Non-hazardous solid waste
- Hazardous radioactive waste: containing or contaminated with a radioactive isotope
- Hazardous biological waste: containing or contaminated with an infectious or potentially infectious agent, a biological toxin, animal carcasses, genetically modified organisms, recombinant DNA, etc.
- Hazardous chemical waste: waste chemicals, products which are chemical in nature (cleaning agents, paint, motor oil, and pharmaceutics), products that

contain chemicals (fluorescent lamps, thermometers), or materials contaminated with chemicals (contaminated soil or rags)
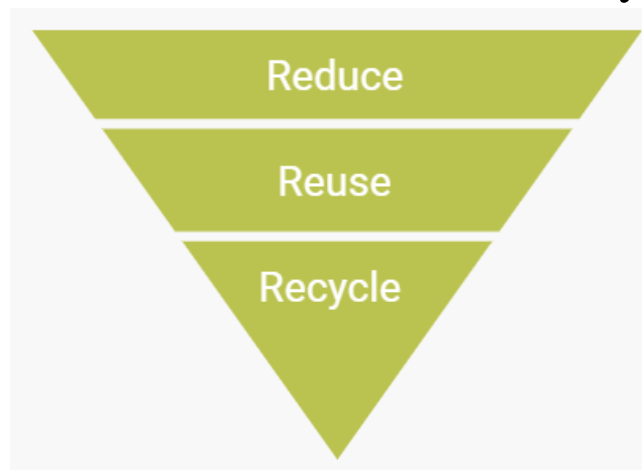
3. Manage Wastes

Once wastes have been identified and evaluated, the community must manage it according to applicable

Principles of 3Rs (Reduce, Reuse, Recycle)

3 R's of environment i.e., Reduce, Reuse, and Recycle, are essential parts of Waste Hierarchy. 3 R's works together to reduce the waste generated and for the improvement of the waste management process. In short, we can call three R's as "The principle of the waste management process."

Reduce, Reuse, and Recycle helps in reducing the amount of carbon-di-oxide in the atmosphere and save the environment. You can also be a part of this mission just by making a few changes in your daily lifestyle. Everyone's contribution is needed to breathe healthily and live healthily. Let's understand the 3 R's of the environment in detail.

Reduce – The First "R" of Waste Hierarchy

Reduce – The First "R" of Waste Hierarchy

The first R in the waste hierarchy is "Reduce." The crucial thing in the waste management procedure is to maintain a perfect balance in consumption and recycle & reuse. If the consumption is less, the rate of recycling or reuse will also be less.

Reuse – The Second "R" of Waste Hierarchy

If you have a bag full of old things that are not in use, then you can find out a way to reuse these thrown away things. The reuse of old stuff can reduce waste and does not affect the waste hierarchy. If you do not have any use of any of these thrown away items, then you can also donate it to someone who needs it.

Recycle – The Third "R" of Waste Hierarchy

Recycling is the third stage of the waste management process. Recycling is a process in which the dumping items are transformed into a new item. You can also send your unused items to recycling centers. It is vital that you are well aware of the things that can be recycled

Methods for economizing or reducing resource consumption

Preventing resource depletion is vital for the environment, economy and the health and well-being of the human population. We use a vast range of natural resources, but there are even more ways to conserve them.

Here things we can do to start protecting the earth's resources.

1. Make Electricity Use More Efficient

We use natural resources, such as coal and natural gas, to produce the electricity we use in homes, offices, stores and elsewhere. We can conserve some of that electricity simply by turning things off and unplugging them when we're not using them and by using more energy-efficient appliances and light bulbs.

2. Use More Renewable Energy

Resources like wind and sunlight, however, can also be used to generate electricity, but these resources are renewable. That means once they are used, they become available again quickly. While using fossil fuels to generate electricity burns up finite resources, using renewables does not.

3. Avoid Use Plastics

Reducing our plastic use helps us avoid the use of the resources needed to make plastic and prevents plastic waste from harming the natural environment. Substituting single-use plastics like plastic grocery bags, utensils and straws with durable items can help.

4. Drive Less

Gasoline is a product made from crude oil, a finite natural resource and fossil fuel. Car manufacturing also requires many different kinds of natural resources, includes rubber and various metals.

You can conserve natural resources by not owning a car, owning a more fuel-efficient car or driving less. Walking, bicycling taking public transportation and carpooling are all excellent alternatives to driving.

5. Recycle More And Improve Recycling Systems

Improving our recycling systems can also help. Researchers can find new, more efficient ways to recycle, local governments can make recycling easier and businesses can implement recycling programs for their employees.

6. Use Sustainable Agriculture Practices

Agriculture is necessary but extremely resource-intensive. There are, however, ways to farm more sustainably.

7. Reduce Food Waste

Approximately a third of the food produced for human consumption every year gets wasted or lost. Because of all the resources required to grow, transport and prepare the food, this is a huge waste. Keeping track of the food you have, planning meals and shopping trips ahead of time and properly storing food can help reduce food waste at home.

8. Promote Sustainable Forest Management

Forests are full of natural resources. The ecosystem services they provide are valued at approximately $33 trillion annually, and about a quarter of the world's population depends on them to make a living. Yet, we're destroying forests faster than the earth can replenish them — at a rate of about 60 acres each minute.

9. Treat Wastewater Before Discharging It

Water is, of course, crucial to survival, but more than 2 billion people don't have clean drinking water at home.Part of the reason for this is that some industrial plants and wastewater treatment plants, especially in developing countries, discharge water into streams and rivers without adequately treating it. It's crucial that wastewater discharge regulations are enforced if they exist, and that they get introduced that if they don't yet exist.
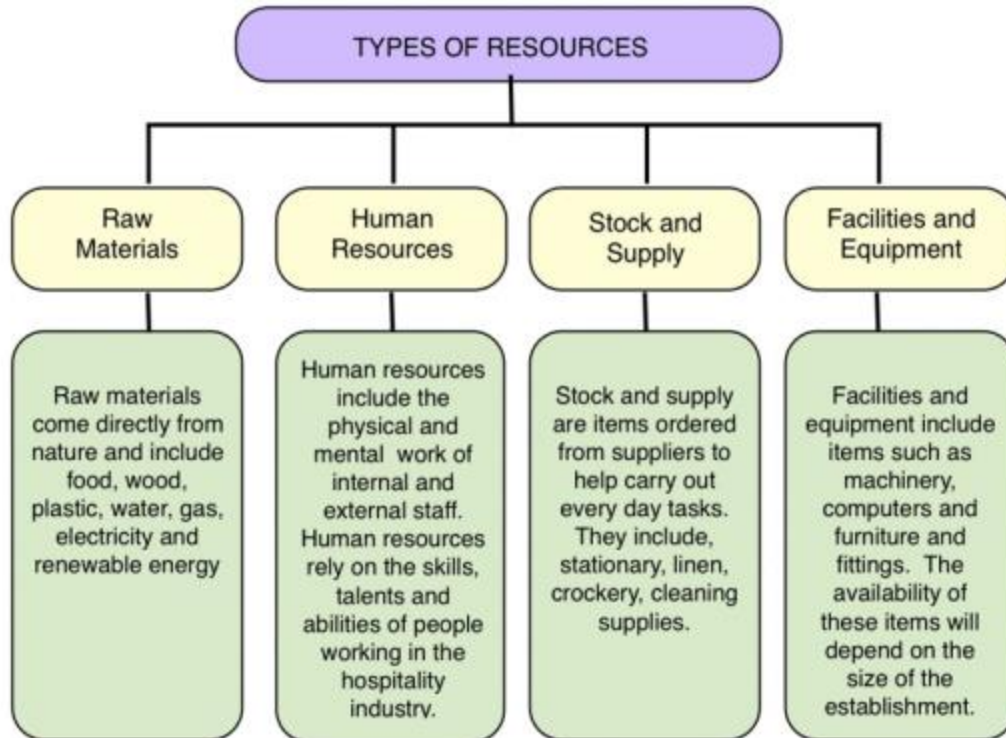
Chapter 4

Evaluate current practices in relation to resource usage

Resource efficiency

Resource efficiency is the maximizing of the supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively, with minimum wasted (natural) resource expenses. It means using the Earth's limited resources in a sustainable manner while minimising environmental impact.

The environmental performance of products and services has become a key issue in today's business environment. Organizations are investigating ways to improve their environmental performance. This can often be achieved through better resource efficiency. Environmental and resource efficiency issues will vary depending on the industry, organization, and activities conducted

TYPES OF RESOURCES

Raw Materials	Human Resources	Stock and Supply	Facilities and Equipment
Raw materials come directly from nature and include food, wood, plastic, water, gas, electricity and renewable energy	Human resources include the physical and mental work of internal and external staff. Human resources rely on the skills, talents and abilities of people working in the hospitality industry.	Stock and supply are items ordered from suppliers to help carry out every day tasks. They include, stationary, linen, crockery, cleaning supplies.	Facilities and equipment include items such as machinery, computers and furniture and fittings. The availability of these items will depend on the size of the establishment.

Collection of information on resource efficiency

Resource Use, Waste Generation and Efficiency Profile The purpose of establishing your resource use, waste generation and efficiency profile is to collect and analyze baseline data for your premises. This baseline data can then be used to identify an appropriate efficiency indicator and track your progress as you implement your environmental strategies.

There are five steps in the process

Step 1 – Collect data

Step 2 – Analyze data

Step 3 – Establish a baseline period

Step 4 – Identify activities

Step 5 – Estimate resource use and waste generation for the key activities.

Step 1 – Collect Data

To undertake this assessment, you need to collect the following information:

- The quantity of resources used by type
- The quantity of production or activity at the site by type
- The quantity of waste generated by type
- The quantity of greenhouse gas emissions associated with each input and output

If possible, a separation or estimation of the amount of water used for fire testing. Where possible, this data should be collected over a 2-year period and recorded on a monthly basis. Having monthly data collected over this timeframe will help you identify seasonal trends.

Step 2 – Analyze Data

Look for patterns in your data and consider the seasonal aspects that affect your resource use or waste generation. If your data allows, look for variations within weeks to identify trends on a weekly basis as well as on a monthly basis. Compare the resource consumption and waste generation to your business activities. Some industries have resource efficiency indicators that are already set.

Step 3 – Establish a Baseline Period

Using the information collected, you will need to establish baseline data. This is the data you will use to evaluate your improvements against. The data you use should be current (i.e. no more than 2 years old) and contain at least 12 months data. The baseline data needs to be reviewed against your 2-year period data. You need to determine if it represents a typical year at your workplace. If not, you should indicate why and estimate what a typical year will look like.

Step 4 – Identify Activities When analyzing your data, it is preferable to divide it by activities at your workplace rather than departments or sections. Use of resources and the waste generated is usually relevant to particular activities so this will give you more accurate information to work with. You will need to start by listing all the common activities.

Step 5 – Estimate Resource Use and Waste Generation for Key Activities As the use of resources and the wastes generated are often inter-related, you should firstly undertake an integrated mass and energy balance for the whole site. When estimating the resource use and waste generation for each activity, remember these key principles:

Sum (individual activity resources/wastes) = Total resource/wastes

Sum (inputs) = sum (outputs)

Measure Current Resource Usage

Once you have identified the resources used, you will need to calculate a usage rate. This will provide a basis for tracking and monitoring your progress towards becoming more efficient. Some resource usage may be readily available by reviewing supplier invoices. Current water and electricity bills provide usage rates that can easily be compared over time. To determine your organization's current resource use, you will need to conduct an assessment. Firstly, you will need to determine what resource usage you are going to look at.

The next step is to determine how you will measure the resources use. You can either:

- Conduct a desktop assessment
- Conduct a physical assessment.

A desktop assessment will involve reviewing reports and records

You will need to determine which records can provide you with the information needed to determine energy usage. The records needed may include:

- Purchasing logs.
- Receipts.
- Water or energy bills.
- Waste bills.
- Equipment lists and specifications.

A physical assessment will involve physically counting items or observing employees.

You may want to undertake a workplace inspection.

Appropriate techniques to resource usage may include but not limited to:

- Examining and documenting resources in work area
- Examining invoices from suppliers
- Examining relevant information and data

- Measuring resource usage under different conditions
- Reports from other parties involved in the process of identifying and implementing Improvements
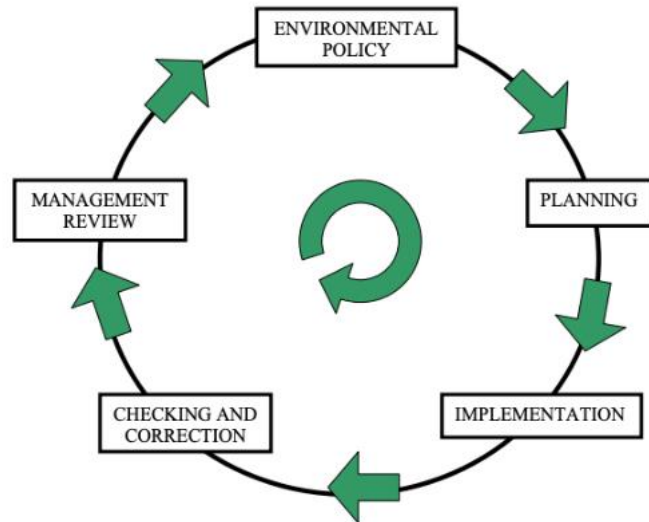
Environmental Management System

In its most simple terms, an environmental management system (EMS) is an approach to identifying the ways that the environment is impacted by our work activities. An EMS helps set priorities for action and it challenges each and every employee to continually look for ways to lessen those impacts and to protect the environment.

An EMS is defined as a self-correcting and continual improvement system that seeks to reduce environmental impacts associated with a facility's activities while helping to ensure compliance with environmental regulations. It provides a structured method for incorporating environmental considerations into day-to-day operations while promoting continual improvement of the environment and human health. The EMS guides NIEHS as it integrates environmental responsibility in its decision-making at all levels and in the conduct of all institute programs and practices.

Procedures of Environmental Management System Structure

Like most EMSs, the NIEHS EMS follows the Plan Do Check Act structure provided by the ISO 14001 EMS Standard. This involves a five-step process that addresses each of the following key elements of the ISO Standard:

Step 1: Environmental Policy

The EMS development process starts with establishing an Environmental Policy that is tied to the organization's mission.

Step 2: Planning

The planning step consists of identifying regulatory and other requirements; identifying processes, resources, and significant impacts; identifying pollution prevention opportunities; developing objectives and targets for improvement efforts; and creating a planning, programming, and budgeting system.

Step 3: Implementation

The implementation step consists of defining the structure, responsibilities, and programs; implementing training; creating the EMS documentation (including document control and record keeping); communicating the EMS to personnel; developing and implementing standard operating procedures [SOPs]; and developing and implementing emergency preparedness and response procedures.

Step 4: Checking and Correction

The checking and corrective action step includes monitoring and measuring (e.g., internal assessments), problem and cause identification, corrective and preventative action implementation, and an EMS Review.

Step 5: Management Review

In the management review step, upper management reviews the EMS, including the results of internal assessments. Modifications to the EMS are made, as necessary, to ensure compliance. The management review is designed to ensure continual improvement of the EMS, taking into account the results of checking and corrective actions undertaken in Step 4.

Analysis and recording of Information.

Organizations record information, create documents and file them for future use as part of daily business activity. Filing can be one of the most frustrating jobs for any employee, but when it is done in a structured way it can be done quickly and save a lot of time when a document is required in the future. You need to select the most appropriate method for recording information based on what you are recording, the nature of your organization and any particular procedures and guidelines that already exist. You need to ensure you familiarise yourself with your organisation's requirements

Why record and file documents?

The previous section explained the importance of measuring resource usage. This is because it helps provide information on how effectively an environmental initiative has reduced resource usage, identifies opportunities for improvement and helps us understand any cost savings. It is important that this data is recorded and filed for future access.

Some reasons for this are listed below.

- **Compliance**

There may be workplace policies and procedures in place that require this data to be collected and stored for a period of time. Often these procedures are to support legal requirements, so it is important that the records are kept and stored for audit purposes

- **Record usage**

How often you collect resource usage data will depend on the type of document you use to record your information. Generally, if you are collecting data regularly, it is most useful to record that data in a database format, whether in a spreadsheet or a database. It is helpful, though not necessary, to name date columns with numbers, rather than text, as this helps keep them in order in some applications. For example, if you sorted months alphabetically your list would start with April, August, December – and end with September.

- **File documents**

Documents are filed so that they can be easily accessed at a future date, whether for further business use or for legal compliance requirements. Filing can be done either electronically or in hard copy. Files are increasingly being stored electronically, as this is much simpler for organisations to manage and it is easier to control access.

6 current purchasing strategies

Supplier Optimization

Involve only key suppliers and optimize the supplier base to simplify the purchasing process

TQM Practice

TQM strategy monitors personnel management, customer & supplier relationships, product design etc.

Risk Management

Uncertainties & complexities causing supply chain disruption dealt with effective risk management process.

Global Sourcing

Provides organizations with an opportunity to source skills and resources thereby increasing their productivity

Vendor Development

Organizations focusing on vendor development will eventually realize efficiency gains sooner in the future.

Green Purchasing

Abiding by the green purchasing standards help in cost-savings, minimize supply chain risk and enhance their brand image.

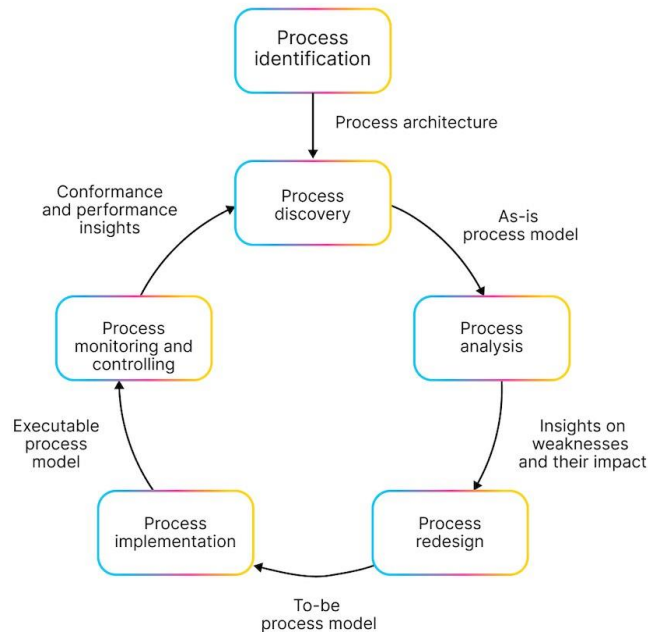# Analysis of current work processes to access information and data

What is process analysis?

Process analysis is a way of gaining insight and visibility into the steps employees and organizations perform work to achieve their goals. By taking a deep dive into your current processes, you'll see what works well, what needs to be improved, and how to achieve better business results.

There are many ways to conduct a business process analysis from consulting projects to dedicated process intelligence software. Some methods follow the popular Six Sigma or Lean Six Sigma methodologies, while others may take a less rigidly defined approach for the needs of the analyzed organization.

The six common stages in the process analysis lifecycle can include

1. **Identify your goals**. Start by identifying why, when, and what in your business case for process intelligence.
2. **Discover as-is state.** Assess the current state of your processes through process discovery.
3. **Map processes.** Visualize how your processes are planned and designed to be through business process mapping.
4. **Redesign processes.** Evaluate of how processes can be incrementally adjusted through process re-engineering.
5. **Implement changes.** Align your processes with the "should-be" model and plans through process implementation.
6. **Monitor and adjust.** Ensure that teams comply and conform to agreed processes through process monitoring.

Once you've repeated this cycle you can re-visit the goals and state of your processes to restart the process once again.

Identification of Improvements to work place practices

Making suggestions for improvement is part of your role as a member of a team or work group. If you have thought of something that makes your work easier or reduces the amount of resources used, then you should share it so that other members of the team benefit. Your suggestions may help other people in the team and, in turn, they may also make suggestions that can help you.

How to make suggestions

How you make suggestions will depend on several things, including the type of suggestion, the nature of your work group, the size of your work group and your supervisor's preferences. In a relaxed, relatively informal work group, it may be appropriate to offer verbal suggestions during team meetings, without prior notice.

Your proposal may include the objective, background, outline, funding, advantages, risks and recommendations. These are described in detail here.

- **Risk**

Identify any risks, inconveniences or possible disadvantages withthe suggestion. When identifying them, explain how these risks will be minimized. For example, the risk that people will not use the duplex function on a new printer will be minimized by asking the IT department to set it as a default for everyone's computer.

- **Recommendations**

Briefly recommend implementing the suggestion, with some persuasive comments about the advantages. Use brief, clear sentences and bullet points where possible. A short proposal that generates interest and further discussion is often more effective than a longer,more informative one that is put aside until your supervisor has to read it. Written suggestions may also be appropriate if you work in a more formal environment, or if you do not have regular team meetings where suggestions can be raised. Even if you have prepared a written document, it is usually more effective to arrange a meeting where you review the document with your supervisor, so that you can address any questions or concerns.

Suggestions may include but not limited to ideas that help to:

- ✓ Improve energy efficiency
- ✓ Increase use of renewable, recyclable, reusable and recoverable resources
- ✓ Maximise opportunities such as use of solar power or other alternative formsof energy, where appropriate
- ✓ Prevent and minimise risks
- ✓ Reduce emissions of greenhouse gases
- ✓ Reduce use of non-renewable resources

Chapter 5

Identify Environmental legislations/conventions for environmental concerns

Compliance is about meeting the requirements of accepted practices, legislation, prescribed rules /regulations, specified standards, or the terms of a contract. Businesses must comply with environmental standards to ensure sustainability.

Legislation and Compliance

<u>What is Compliance?</u> Compliance is acting in accordance with rules or standards.

<u>What is an act?</u> An act is a written law passed by Parliament.

<u>What is a regulation?</u> A regulation is a rule or directive made and maintained by an authority.

Rules designed to control or govern conduct.

<u>What is a code of practice?</u> A code of practice is a set of rules or standards which have been designed in accordance with legislation and regulations, and are enforced by local government agencies.

Is also written guidelines issued by an official body setting out recommended or preferred processes, actions or organizational structures to be applied in a given setting.

<u>Law</u> - legislation passed by governments which is enforceable by courts.

Best practice - methods and techniques that have consistently shown superior results which are used as benchmarks.

Compliance may include but not limited to:

- Meeting relevant laws, by-laws and regulations or best practice to support compliance in environmental performance and sustainability at each level as required (such as Environmental Protection or Biodiversity Conservation Act):
- International
- Local government
- Industry
- Organization

Environmental Law plays a very crucial and important role in regulating the use of natural resources and in protecting the environment. The success of environmental legislations mainly depends on the way they are enforced. Legislation also serves as a valuable tool for educating masses about their responsibility in maintaining healthy environment. Numerous legislations have already been put forth at national and international levels. In this lesson, you will learn about some important environmental legislations.

Our five most effective pieces of environmental legislation are the Clean Air Act, the Endangered Species Act, the Montreal Protocol, the Clean Water Act, and Reformation Plan No. 3 of 1970.

ENVIRONMENTAL LAWS IN KENYA

NEMA: National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment/

NATIONAL ENVIRONMENT COUNCIL: responsible for policy formulation directions for the purposes of the Act. The Council also sets national goals and objectives, and determines policies and priorities for the protection of the environment.

PROVINCIAL AND DISTRICT ENVIRONMENT COMMITTEES: Contribute to decentralisation of environmental management and enable participation of local communities. There are a few key areas that environmental law works to regulate in order to lessen the impact on the environment. Some of these areas include:

NOISE REGULATIONS, 2009 These Regulations prohibit a production of any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

WETLAND REGULATIONS, 2009 Specific sections have requirements that apply to wetlands in Kenya either in private or public land. The regulations empower the District Environment Committee to co-ordinate, monitor and advise on all aspects of wetland resource management within the district.

WATER QUALITY REGULATIONS

 This includes the following:

- Protection of sources of water for domestic use;
- Water for industrial use and effluent discharge;
- Water for agricultural use. These Regulations outline:
- Quality standards for sources of domestic water;
- Quality monitoring for sources of domestic water;
- Standards for effluent discharge into the environment;
- Monitoring guide for discharge into the environment;
- Standards for effluent discharge into public sewers.

WASTE MANAGEMENT REGULATIONS

These Regulations apply to all categories of waste . These include:

- Industrial wastes;
- Hazardous and toxic wastes;
- Pesticides and toxic substances;
- Biomedical wastes;
- Radio-active substances.

These regulations outline requirements for handling, storing, transporting, and treatment/ disposal of all waste categories. Disposal of waste by NEMA licensed company.

Assignment : Explain Community needs and expectations of Environmental legislations in Kenya

International Environmental Protocols (Montreal, Kyoto)

Montreal Protocol

The Montreal Protocol is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. It was agreed on 16 September 1987, and entered into force on 1 January 1989. Since then, it has undergone nine revisions, in 1990 (London), 1991 (Nairobi), 1992 (Copenhagen), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), 1998 (Australia), 1999 (Beijing) and 2016 (Kigali)[1][2][3] As a result of the international agreement, the ozone hole in Antarctica is slowly recovering.

Developing and developed countries have equal but differentiated responsibilities, but most importantly, both groups of countries have binding, time-targeted, and measurable commitments.

The Protocol includes provisions related to Control Measures (Article 2), Calculation of control levels (Article 3), Control of trade with non-Parties (Article 4), Special situation of developing countries (Article 5), Reporting of data (Article 7), Non-compliance (Article 8), Technical assistance (Article 10), as well as other topics. The substances controlled by the treaty are listed in Annexes A (CFCs, halons), B (other fully halogenated CFCs, carbon tetrachloride, methyl chloroform), C (HCFCs), E (methyl bromide), and F (HFCs).

Kyoto Protocol

The Kyoto Protocol was adopted on 11 December 1997. Owing to a complex ratification process, it entered into force on 16 February 2005. Currently, there are 192 Parties to the Kyoto Protocol.

The Kyoto Protocol is based on the principles and provisions of the Convention and follows its annex-based structure. It only binds developed countries, and places a heavier burden on them under the principle of "common but differentiated responsibility and respective capabilities", because it recognizes that they are largely responsible for the current high levels of GHG emissions in the atmosphere.

In its Annex B, the Kyoto Protocol sets binding emission reduction targets for 37 industrialized countries and economies in transition and the European Union. Overall, these targets add up to an average 5 per cent emission reduction compared to 1990 levels over the five year period 2008–2012 (the first commitment period).

Chapter 6

Implement specific environmental programs

In recent years, sustainability has become an increasingly important consideration in the construction industry. As communities become more conscious of their impact on the environment, they are pushing for higher sustainability standards in construction projects.

The Rise of Sustainable Construction

According to a study by Dodge Data & Analytics, 83% of construction companies have increased their use of sustainable building materials and practices over the past three years. This surge in sustainable construction can be attributed to various factors:

> *Environmental concerns*: With climate change becoming a global crisis, communities are seeking ways to reduce their carbon footprint. Sustainable construction offers an opportunity to mitigate environmental impacts.

> *Cost savings*: Although sustainable materials and technologies may have higher upfront costs, they often lead to long-term savings through reduced energy consumption and maintenance.

> *Regulatory requirements*: Governments worldwide are implementing stricter regulations to promote sustainable construction. Communities are now demanding compliance from builders.

Communities are at the forefront of driving sustainability in construction projects. Let's explore some of the strategies they employ to push for higher sustainability standards:

Collaborative Planning and Design

Communities are involved in the planning and design phase of construction projects to ensure sustainable practices are incorporated from the beginning. This collaborative process helps to:

> *Identify local sustainability goals*: Each community has its unique priorities and resources. Engaging with the community ensures that the construction project aligns with these goals.

Enhance energy efficiency: Communities advocate for the use of energy-efficient systems, such as solar panels and smart sensors, to maximize energy savings.

Promote green spaces: Including parks and green areas in construction projects improves air quality and provides recreational spaces for community members.

Embracing sustainable construction practices early on helps create a sense of ownership and pride within the community, leading to long-term benefits for both residents and the environment.

Incentive Programs and Regulations

Another way communities drive sustainability is through the implementation of incentive programs and regulations. By offering rewards and creating rules, they encourage builders to go above and beyond compliance. Some initiatives include:

Tax incentives: Communities provide tax incentives to builders who incorporate sustainable elements into their projects, such as green roofs or rainwater harvesting systems.

Building code standards: Communities establish stricter building codes that require builders to meet certain sustainability criteria, such as energy efficiency and waste management.

Certification programs: Recognizing sustainable practices, certification programs like LEED (Leadership in Energy and Environmental Design) award builders who meet specific sustainability benchmarks.

These measures incentivize builders to prioritize sustainability, creating a ripple effect that promotes sustainable construction throughout the industry.

Education and Awareness

Communities understand that awareness and education play a crucial role in driving sustainable practices. By educating residents, builders, and other stakeholders, communities aim to:

Change mindsets: Many still view sustainable construction as expensive and inconvenient. Through education, communities can dispel these misconceptions and highlight the long-term benefits.

Encourage behavior change: Communities promote sustainable living practices by providing resources and information on energy conservation, recycling, and renewable energy.

Support knowledge sharing: Hosting workshops, webinars, and conferences allows community members to learn from industry experts and share their experiences with sustainable construction.

By fostering a culture of sustainability, communities pave the way for a more environmentally conscious construction industry.

Resource availability

Whether a resource is available for use depends on several factors.

Supply: Some resources are very abundant. Some are rare. When a resource is close to running out, a replacement needs to be found. Some resources are very valuable because they are very rare.

Price: The price of a resource depends on how much of it is available. It also depends on how easy it is to find and extract. A resource may not be used until its price goes up enough to cover the costs of finding and extracting it.

Politics: Resources are not found equally around the world. Some nations may have a lot of certain vital resources. Some nations may have none. It is possible for a nation rich in a resource to control who gets it. They can also control the price

5s of good housekeeping

5S in housekeeping refers to the implementation of the 5S methodology for maintaining clean, safe, and efficient workplaces. The methodology has a practical application in housekeeping by reducing waste, boosting efficiency, and establishing standards for staff members to follow, ensuring a consistent quality of work.

How to Apply 5S Principles in Housekeeping

Again, each "s" in 5S refers to a specific step in the process, which is housekeeping in this context. Below is a breakdown of each "s" in the process:

1. Sort

The first step is sorting all items in a work area, such as cleaning materials, brooms, vacuum cleaners, and anything used for work. From there, employees must separate unnecessary items and only keep the ones needed for their tasks.

2. Set in Order

This step is the act of making every item or tool needed for housekeeping much easier to access. It involves organizing tools and cleaning materials in specific and logical locations to smoothen out workflows.

3. Shine

This is the step that involves cleaning and inspecting the workplace. In housekeeping, this is done to ensure that none of the tools used for work are damaged and that everything is working fine. It also instills in workers that they must make sure every area they work on is spotless and clean.

4. Standardize

This step involves creating standard processes for workers to follow, especially when it comes to the first three S's. That way, all tasks are performed in a uniform manner, ensuring consistency.

5. Sustain

The last step in 5s is sustaining your 5s practices to ensure that the organization is always working as quickly and efficiently as possible. To do this, the staff needs to commit to maintaining the principles of 5S when performing housekeeping tasks.

Identification of programs/Activities (work)

1] Identifying the Work

The obvious first step in the process of organizing is to identify the work that has to be done by the organization. This is the ground level from which we will begin.

So the manager needs to identify the work and the tasks to be done to achieve the goals of the organization.

2] Grouping of Work

For the sake of a smooth flow of work and smooth functioning of the organization, similar tasks and activities should be grouped together. Hence we create departments within the company and divisions within each department. Such an organization makes the functioning of the company way more systematic.

Depending on the size of the organization and the volume of work, an organization can have several department and divisions. And every department has a manager representing them at the top-level of the management.

3] Establish Hierarchy

The next step in the process of organizing is to establish the reporting relationships for all the individual employees of the company. So a manager establishes the vertical and horizontal relationships of the company.

This enables the evaluation and control over the performances of all the employees in a timely manner. So if rectifications need to be made, they can be made immediately.

4] Delegation of Authority

Authority is basically the right an individual has to act according to his wishes and extract obedience from the others. So when a manager is assigned certain duties and responsibilities, he must also be delegated authority to carry out such duties effectively.

If we only assign the duties, but no authority he will not be able to perform the tasks and activities that are necessary. So we must always assign authority and clearly specify the boundaries of the duties and the authority which has been delegated.

5] Coordination

Finally, the manager must ensure that all activities carried out by various employees and groups are well coordinated. Otherwise, it may lead to conflicts between employees, duplication of work and wastage of time and efforts. He must ensure all the departments are carrying out their specialized tasks and there is

harmony in these activities. The ultimate aim is to ensure that the goal of the organization is fulfilled

Setting of individual roles /responsibilities

Roles and responsibilities are both necessary for the company's growth and success. When employees know their responsibilities are suitable to their job role, they are more likely and determined to finish their work on time. The role determines a person's profile in a team, which indicates the areas of specialization of that person in certain tasks and job roles

How to define your team's roles and responsibilities?

1. Identify what needs to be completed

First of all, as a leader, try to make a plan for all the tasks that need to get completed. It allows you to have a clear idea of all the tasks that you want to get done as a team. Now, delegate the tasks according to the expertise and skill set of the team members

2. Recognizing strengths and weaknesses of team members

Knowing the strengths and weaknesses of your team members, you can assign them a task that relates to their strengths. Assign tasks to employees related to their field knowledge or expertise, or interest. This will not create boredom and always keeps an employee motivated towards his or her job. If a particular field is a weakness for any other employee, consider assigning that task to another team member who can perform that task more successfully.

3. Knowing the employee job profile

Have a note of each team member's job description when you are planning their duties. An employee should be given tasks that adhere to what they were hired for in the first place. It's also important to take into consideration their interests and past successes. A combination of their job description and their personality will help you better delegate your team's roles and responsibilities.

4. Get feedback from your team members

Feedback from your team members can help you in many ways. It will help you to encounter the problems that an employee has faced or is facing in your team. So that from next time you would be having a clearer knowledge and idea about your

team members and their previous experiences. It will further help you to assign them tasks in a better way than earlier.

5. Communicate the roles and responsibilities to the employees

There is no point in defining the roles and responsibilities of the employees who are not made aware of them. As a leader, make sure each team member should be made aware of what is expected from him or her. You can do this in several ways. You can hold meetings, workshops and can even send a formal email mentioning their responsibilities.

Problems constraints encountered in work environment

1. Problems with communication and relationships.

Just as in any other aspect of life, strong working relationships really matter. Not only do they help overcome stress and improve mental health in the workplace, they also contribute to a professional workplace environment and underpin positive employee behavior

2. Executive uncertainty in a changing world.

If the last couple of years have taught us anything, it's how unpredictable the world can be. From global to hyper-local, challenges related to change are all around us. The professional workplace you need today might look very different to the one you valued so much yesterday

3. Concerns about technology and innovation.

Keeping up with technological advancement can cause work issues at any level of an organisation. Executive fears about competitive advantage can sometimes result in additional employee pressure.

4. Workplace environment issues.

Both the physical and the emotional environment of a workplace are important to job satisfaction and employee motivation. Feeling physically uncomfortable or mentally unsupported can be a huge obstacle at work to any member of a workforce. It's particularly important to remember this if your business includes employees who work in a virtual environment, for example at home.

5. Challenges related to employee motivation.

An energized and motivated workforce has to be any employer's goal. Let's face it, we all work harder when we feel switched on by what we're doing and by the people around us.

6. Worries about job security and career growth.

If you're worried about future-proofing your career, you're not alone. Whilst job prospects are positive in some high demand jobs, other employment areas - particularly those related to travel - are struggling. Job security is vital to company success because of the training and efficiency issues created by high hiring rates.

7. Training methods that don't meet workforce needs.

Fail to train your workforce properly and you risk most of the workplace challenges listed above. Effective training is easier to achieve than you might think. As the pace of digitalisation and the advancement of collaborative technologies increase, effective real-time upskilling becomes more and more important.

Resolving problems /constraints encountered

How to deal with challenges in the workplace

- ✓ Keep ahead of the curve.
- ✓ Encourage collaboration.
- ✓ Improve training opportunities.

The complicated and fluctuating nature of the workplace problems listed above only adds to the difficulty of dealing with them. How can business leaders plan effectively to overcome challenges?

1. Keep ahead of the curve.

If your policy is to keep up with change, you'll always be running one step behind. For a successful career you need to step ahead of change and embrace all it brings. One of the best ways to do this is to be ready to learn. Read journals, join networking groups, hire experts, get some training and of course, keep a close eye on your competitors.

2. Encourage collaboration.

Collaboration is a million times easier if the whole workforce understands your organisation's values and mission. Once you've established this, make sure your ethos and systems reward collaboration over individual success.

3. Improve training opportunities.

No matter what their role, your whole workforce deserves relevant and regular training. If you're a manager, don't assume you know best, survey your employees to find out where they feel their training gaps are.

Chapter 7

Monitor activities on Environmental protection/Programs

Environmental monitoring refers to the tools and techniques designed to observe an environment, characterize its quality, and establish environmental parameters, for the purpose of accurately quantifying the impact an activity has on an environment. Results are gathered, analyzed statistically, and then published in a risk assessment and environmental monitoring and impact assessment report.

Periodic monitoring and Evaluation of activities

The three main types of environmental monitoring are soil, atmosphere, and water. Some techniques of environmental scanning and monitoring include filtration, sedimentation, electrostatic samples, impinges, absorption, condensation, grab sampling, and composite sampling.

Data collected from these methods of environmental monitoring can be input into a DBMS, where it can be categorized, analyzed, visualized, and create actionable insights that drive informed decision making.

Air Monitoring: Environmental data gathered using specialized observation tools, such as sensor networks and Geographic Information System (GIS) models, from multiple different environmental networks and institutes is integrated into air

dispersion models, which combine emissions, meteorological, and topographic data to detect and predict concentration of air pollutants.

Soil Monitoring: Grab sampling (individual samples) and composite sampling (multiple samples) are used to monitor soil, set baselines, and detect threats such as acidification, biodiversity loss, compaction, contamination, erosion, organic material loss, salinization, and slope instability.

- Salinity Monitoring: Remote sensing, GIS, and electromagnetic induction are used to monitor soil salinity, which, if imbalanced, can cause detrimental effects on water quality, infrastructure, and plant yield.

- Contamination Monitoring: Chemical techniques such as chromatography and spectrometry are used to measure toxic elements, such as nuclear waste, coal ash, microplastics, petrochemicals, and acid rain, which can lead to the development of pollution-related diseases if consumed by humans or animals.

- Erosion Monitoring: Monitoring and modeling soil erosion is a complex process in which accurate predictions are nearly impossible for large areas. The Universal Soil Loss Equation (USLE) is most commonly used to try to predict soil loss due to water erosion. Erosion may be due to factors such as rainfall, surface runoff, rivers, streams, floods, wind, mass movement, climate, soil composition and structure, topography, and lack of vegetation management.

Water Monitoring: Environmental sampling techniques include judgmental, simple random, stratified, systematic and grid, adaptive cluster, grab, and passive; semi-continuous and continuous environmental monitoring; remote sensing and environmental monitoring; and bio-monitoring are used to measure and monitor ranges for biological, chemical, radiological, microbiological, and population parameters

Analyzing data gathered

Analytics is used to transform this multitude of information into actionable knowledge. This concept is similar to data analysis with the exception that

analytics also uses advanced techniques to make predictions. The process is divided into several steps:

Define the needs: this first step is the determination of the goal of the analysis.

Collect: different types of variables from internal or external sources are collected.

Clean: duplicate or unnecessary inputs are deleted to ensure accuracy.

Analyze: there are several techniques to perform the analysis of data. Descriptive analytics summarizes historical data whereas a predictive analytic model is focused on future trends. Values can be transformed into graphics, charts, or other visual element to make them more understandable. This method is called data visualization.

Interpret: the results are finally interpreted to find the best courses of action.

Data analysis has become essential for the management of the five environmental impacts related to shipping: air pollution, noise pollution, vessel discharges, port congestion, and marine species invasion. Predictive analytics is used to forecast certain phenomena or identify disruptions:

Air pollution: fluctuations in the quality of air are detected and areas at high risk of pollution are identified as well as the sources. At Sinay, we developed a CO2 API to calculate carbon emissions from a sea voyage. It has also been certified by the Smart Freight Center as part of the Global Logistics Emissions Council (GLEC) framework.

Noise pollution: sound exposure level (SEL) is estimated to ensure compliance with international standards on radiated underwater noise emissions.

Vessel discharges: water discharges can affect the marine environment and human health. AI uses statistical factors to predict the quality of water.

Port congestion: smart ports use AI to prevent port congestion by managing vessel traffic and cargo operations in real-time. This proactive method reduces delays, optimizes the time ships spend at berth and leads to smoother port operations.

Marine species invasion: machine learning algorithms can monitor the displacements of invasive species by utilizing information gathered from sensors. The increase in their population can be controlled and their impact on native species minimized.

<p style="text-align:center">Documentation of recommendations and submission</p>

Setting of management support systems to sustain and enhance the program

Management support systems focus on managerial uses of information resources. These systems provide information to manage for planning and decision making. The information provided by these systems is based on both the internal and external data using various data analysis tools.

They also offer a choice to the user to select out of these tools for the purpose of data analysis. These systems serve the information needs of managers at middle and top levels in the managerial hierarchy.

There are three types of management support systems, namely:

1. Decision Support Systems,
2. Executive Information (support) Systems and
3. Expert Systems.

Decision Support Systems:

Decision support systems (DSS) are designed to support the decision making process of managers to improve their effectiveness and thereby efficiency of the enterprise. They are based on the premise that managerial judgement cannot be replaced by any computer based solution. However, by offering the support of data and models, it is possible to improve the decision making process even in the case of semi-structured and unstructured problems.

The basic purpose of DSS is to extend the capability of a manager's decision making process by supporting tools and data made available to him under his direct control. DSS neither presupposes specific information requirements and predefined tools for analysis for different types of decisions nor does it impose any solutions on a manager.

Thus, it gives flexibility to the manager to decide the input data, tool of analysis, depth of analysis and reliance on the outcome of Analysis for decision making. DSS offers an interactive environment for users and thus permits manager to

experiment with data and models to develop the optimal decision making strategy in a given situation.

Executive Information Systems:

DSS are designed to cater to the information needs of managers at middle to top levels. They relate to rule-based work doing modelling and analysis of data in order to make it useful in decision making.

However, at the top of managerial level, there is a need to focus more on packaging and delivery of information than on generation of information. The top manager deserves better environment for information access than that provided by DSS.

The top executives need fast access to up-to-date, concise information and exception reports with facilities to personalised information and analysis. The information systems designed to cater to such needs of top executives are called Executive Information Systems (EIS) or Executive Support Systems.

These systems act as electronic briefing systems and offer tremendous flexibility in use. EIS uses internal as well as external information and offers an interactive and a user friendly operating environment.

Expert Systems:

The increasing complexities and dynamism in the emerging business environment require greater interaction of functional' managers with the experts so as to get timely advice. These experts would not only sift information from vast pools of diverse information, but also use their expertise to offer advice.

A business expert system receives a problem from the user, identifies its data requirements, analyses the relevant data against the decision rules (contained in a knowledge system). Once the problem is solved, the system through its inference engine reports the solution to the user and is also able to explain its line of reasoning in reaching that solution.

A business expert system can act as an aid to managerial effectiveness by providing advice. Its solutions/advices are always consistent, uniform, thorough and methodical. It functions as a standardised problem solver. The business expert system is able to explain the line of reasoning it uses for solving a problem.

Monitoring and reporting of environmental incidents to concerned /proper authorities

An Environmental Incident is an event that may cause harm or potential harm to an environmental receptor e.g. air, water, land, wildlife or local habitat.

In many cases, major pollution incidents can be prevented if appropriate pollution prevention measures are in place or immediately available.

Environmental incidents may include (but not limited to):

- An emergency
- Notifiable incidents (section 30 of the Act);
- Nn event that poses a threat to human health or the environment (which does not necessarily trigger section 30 of the Act);
- Non-conformance with an environmental performance indicator;
- A complaint received regarding an environmental issue;
- A failure of environmental control plant;
- Power failure; or
- exceedance of environmental control plant capacity.

You should have in place an environmental incident response procedure. This procedure would identify such steps as (this list is by no means exhaustive):

- The purpose and scope of the plan;
- Responsibilities;
- Criteria for incidents, including the distinction between an incident, notifiable incident and emergency;
- Types of incidents and management of those incidents;
- Notification requirements;
- Incident investigation;
- Corrective actions; and
- Record management.

Emergency response

An emergency is a sudden disaster or accident that causes or threatens to cause severe harm to human health or damage to property or the environment. An emergency requires immediate action to limit its impact. You will have identified emergency situations during your risk assessment and listed these as such in your risk rating table. Emergency events might involve fire, flood, loss of containment (e.g. from tank or pipe failure), vehicle impact, or sabotage.

You should have an emergency response plan in place for your activities. This plan might include a description of the types of emergency, methods for limiting the environmental impacts, communications, training of emergency response personnel, and post-emergency actions. Your emergency plan must have mitigation controls in place to deal with the scenarios you have identified through your risk assessments (as required by section 25(4)(c) of the Act).

Reporting of incidents and emergencies

Reporting of incidents, emergencies and near misses must follow a documented procedure. It should promote a culture of reporting, ownership and responsibility to human health and the environment. The reporting process must include details of the incident, the response to the incident, outcomes of any remedial actions taken, investigations into the cause of the incident, and actions taken to prevent recurrence of the event.

Chapter 8
Analyze resource use

Identification of resource consuming processes

Resource consumption is a critical aspect of any business operation. It refers to the amount of resources, such as labor, materials, and overhead, utilized to produce goods or provide services. Understanding how resources are consumed is essential for optimizing resource allocation and managing costs effectively.

1. Identifying resource drivers:

To understand resource consumption, it is crucial to identify the activities that consume resources within a business process. These activities are known as resource drivers. For example, in a manufacturing company, resource drivers could include machine setups, material handling, and quality inspections. By identifying these drivers, businesses can gain insights into the specific activities that contribute to resource consumption, enabling them to allocate resources more efficiently.

2. Quantifying resource consumption:

Once the resource drivers have been identified, it is necessary to quantify their impact on resource consumption. This involves measuring the amount of resources consumed by each driver. For instance, the number of machine setups required to complete a production run or the amount of raw material used in the manufacturing process. By quantifying resource consumption, businesses can accurately determine the cost associated with each activity and make informed decisions to optimize their resource allocation.

3. Allocating costs using activity-based costing:

Activity-based costing (ABC) provides a framework for allocating costs based on the activities that consume resources. Unlike traditional costing methods that rely on broad cost drivers like direct labor hours or machine hours, ABC allocates costs to specific activities that drive resource consumption. For instance, using ABC, a company can allocate the cost of machine maintenance to the activities that require

the most maintenance time, rather than spreading it evenly across all products or services. This enables a more accurate reflection of resource consumption and facilitates better cost management.

4. Identifying non-value-added activities:

Understanding resource consumption also involves identifying non-value-added activities within a business process. These activities do not contribute directly to the creation of value for the customer but still consume resources. By eliminating or minimizing non-value-added activities, businesses can reduce resource consumption and optimize their cost structure. For example, in a service-oriented business, administrative tasks that do not directly impact customer satisfaction could be streamlined or automated to reduce resource consumption.

5. Evaluating resource consumption patterns:

Lastly, analyzing resource consumption patterns over time is crucial for identifying trends and potential areas for improvement.

Analysis of resource flow through different parts of the process.

A flow resource is a resource which is neither renewable nor non-renewable, and must be used where it occurs and replenishes itself.

The flow of natural resources in the economic and social system will go through four processes:

Stage I

Is that natural resources are mined to become available resource products;
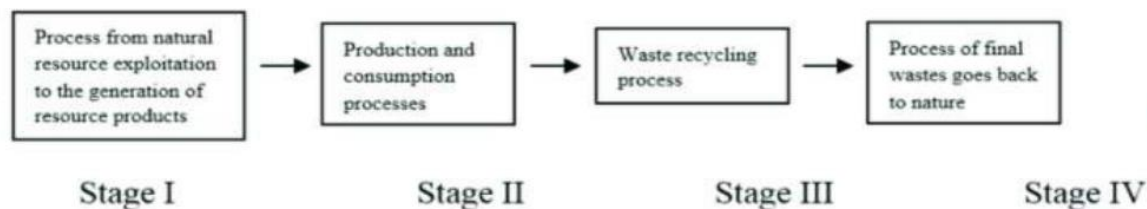
Stage II

Is that resource products are converted into various types of commodities and consumed;

Stage III

Is the generation of waste during production and consumption, and the waste is partially recycled;

Stage IV

Is the process of unrecycled waste return

Four stages of natural resource flow in an economic and social system.

Classification of wastes for possible source of resources.

Waste is a product or substance which is no longer suited for its intended use. Whereas in natural ecosystems waste (i.e. oxygen, carbon dioxide and dead organic matter) is used as food or a reactant, waste materials resulting from human activities are often highly resilient and take a long time to decompose.

For legislators and governments, defining and classifying waste based on risks related to the environment and human health are therefore important in order to provide appropriate and effective waste management. For the producer or holder, assessing whether a material is waste or not is important in identifying whether

waste rules should be followed. Definitions are also relevant in the collection and analysis of waste data as well as in domestic and international reporting obligations.

Waste can be classified based on source (who/what generated the waste? See Figure below), substance (what is it made of?), hazard properties (how dangerous is it?), management (who handles it?) or a mix of these concepts.

The origin of waste

Two main waste categories can be established based on the distinct legislation and policy instruments usually in place: non-hazardous or solid waste; and hazardous waste. Such a classification is also used in the Basel Convention. Hazardous waste is usually regulated at the national level, while non-hazardous is regulated at the regional or local (municipal) level. (See Figure below.)

Non-hazardous/solid waste is all waste which has not been classified as hazardous: paper, plastics, glass, metal and beverage cans, organic waste etc. While not hazardous, solid waste can have serious environmental and health impact if left uncollected and untreated .

Hazardous waste is waste that has been identified as potentially causing harm to the environment and human health and therefore needs special, separate treatment and handling. Chemical and physical characteristics determine the exact collection and recycling process. Chemical treatment, incineration or high-temperature treatment, safe storage, recovery and recycling are possible modes of treatment for hazardous waste. Most hazardous waste originates from industrial production. Special kinds of hazardous waste include:

- **E-waste** is waste from electric and electronic equipment such as end-of-life computers, phones and home appliances. E-waste is generally classified as hazardous because it contains toxic components (e.g. PCB and various metals).
- **Medical waste** originates from the human and animal healthcare systems and usually consists of medicines, chemicals, pharmaceuticals, bandages, used medical equipment, bodily fluids and

body parts. Medical waste can be infectious, toxic or radioactive or contain bacteria and harmful microorganisms (including those that are drug-resistant).

- **Radioactive** waste contains radioactive materials. The management of radioactive waste differs significantly from that of other waste. Auditing the management of radioactive waste is not the subject of this MOOC.

DEVELOP RESOURCE CONSERVATION PLANS

Conservation of land, water and other natural features and resources is a priority for many communities. In order to implement conservation projects in a manner that protects what a community or region values the most requires some type of plan. To be effective, such a plan would be based on an inventory of the features and resources in a geographic area of interest. By compiling information on the identification, location and attributes of natural features and resources, community or regional groups can develop a plan to protect these features and resources through voluntary and/or regulatory means. A conservation plan can be a vision for the future ecological health of an area. It typically includes reference to a natural resources inventory, a description of important features and an action plan to protect these features over a long period of time.

Why create a conservation plan?

A conservation plan may be created to:

- Identify and describe the most important natural features and resources in a geographic area
- Promote conservation of these natural features and resources
- Guide municipal or private voluntary land conservation planning
- Document conservation priorities and recommended policies in a municipal master plan
- Suggest regulatory protection for some features and resources

Determination of efficiency of use/conversion of resources

Resource efficiency stands for the relationship between natural raw materials or technical-economic materials and the benefits gained from their use, whether in production or consumption. The aim is to maximize the benefits of products or services while minimizing consumption and waste. The less energy and material required to produce a product the better. The goals are

- **Energy efficiency**: Reducing energy consumption
- **Material efficiency**: Avoidance of material waste and losses and reduction of the use of operating and auxiliary materials
- **Cost efficiency**: Cost savings through less energy and material use
- **Reduction of negative environmental impacts**: Achieving CO2 savings by sparing resources

What can a company do to become more resource efficient?

Save: save the resource in every possible way and in every possible place considering sustainability and environmental impact.

Recycling and reuse: increase internal reuse and recycling of (waste) materials and elements of the product, e.g. in repair services.

Substitute: use secondary/recycled raw materials instead of primary materials as input materials, if possible. However, check that these materials do not originate from uses where hazardous substances are frequently used. For example, never use secondary plastics from electronic wastes to produce children toys (content of brominated flame retardants).

Reduce: assess the amounts of chemicals and other raw materials used in production, including energy and water. Identify reduction potentials. Employees are a good information source to identify superfluous use!

Plans for increasing the efficiency of resource use

Improving resource efficiency is one of the most effective ways a community can decrease waste and reduce their environmental impact. It also gives them an opportunity to lower costs and increase profits by using the resources they have available to their full potential.

Below plans to increase efficiency Resource use

1. Apply The Waste Hierarchy

Waste hierarchy - prevention, preparing for re-use, recycling, othe recovery and disposalThe Waste Hierarchy ranks waste management options according to what is best for the environment, with prevention being the most desirable option and disposal being the least.

2. Assess Your Waste

Assessing your waste will not only help you to apply your waste hierarchy, but also to identify problem areas and develop a plan of action.You might discover that a particular process is causing more waste than you realised, or that a different material can be used in place of a less efficient one.

3. Control Your Waste

In a similar vein, if you work in manufacturing, you can control your waste by improving the overall control of your processes.

By increasing your accuracy, improving communication, and providing the right tools and training, you will give your team the toolkit the need to reduce mistakes and thus reduce the waste caused by them.

4. Implement an Environmental Management System

Environmental management systems, such as ISO 14001, are becoming increasingly popular for businesses looking to reduce their environmental impact.

These management systems can help your organization to improve its environmental performance, reduce environmental liability, and decrease costs.

5. Reduce Energy Consumption

By reducing the consumption in your business, you will both save energy and reduce your running costs. Ways that you can decrease your energy consumption include turning off lights and equipment when not in use, use cold water rather than hot where possible, and utilising power saving functions in your technology.

6. Increase Energy Efficiency

LED lightbulbNot only can you take steps to reduce energy consumption in the workplace, but you can also make changes in order to improve your energy efficiency. For example, you could change your lights to LEDs which use up to 90% less energy than traditional incandescent bulbs. You could also improve your insulation to minimise energy waste, or fit self-closing doors to reduce heat loss.

7. Communicate With Your Staff

Make sure you clearly communicate the organisation's goals for improving efficiency and reducing waste in the workplace, and what is expected of your team. Allocate an appropriate amount of time and resources for what you want to achieve,You should also consult with staff at all levels, as they may come across issues you haven't identified and might have their own suggestions.

8. Use Refills Where Possible

Bag of environmentally friendly cleaning supplies If you can't reduce, refill!

Some things, such as cleaning products or hand soaps, can't be eliminated from the workplace, however you can reduce the amount of waste they generate.

Some places are lucky enough to have a local zero waste store nearby where you can refill the containers you currently own, however there are plenty of other options – for example, some cleaning products can be bought in tablet form and dissolved in water, or some companies sell plastic free refills.

9. Reduce Wasteful Office Practices

As you will have identified in your waste hierarchy, the best-case scenario is to prevent waste, even if it is recyclable. With this in mind, it is worth reviewing your office practices to find ways to limit waste.

Printing is one of the biggest culprits for unnecessary waste in the office – to combat this you could look at changes processes that involve printed documents, set up printers and scanners to be double-sided, and discourage unnecessary printing.

10. Understand The Legislation

Finally, it is important that you understand the legislation that regulates the waste generated by your business. As a business owner, you have a duty to:

- Keep waste to a minimum
- Sort and store waste correctly
- Complete waste transfer notes
- Ensure your waste carrier is registered
- Ensure your waste carrier disposes of waste legally

Assignment:

Explain causes of low efficiency of use of resources