

MCN-201 :

SUSTAINABLE ENGINEERING

MODULE 1

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Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM).

Sustainability

- Sustainability refers to achieving our goals without affecting the capacity of future generations to achieve their goals.
- Sustainability means that there is a chance that humans and other forms of life on our planet will continue to survive for as long as we are here.
- In addition to natural resources, we also need social and economic resources. Sustainability is not just environmentalism.
- Sustainability was built on the idea of managing the environment.

Why do we need sustainability?

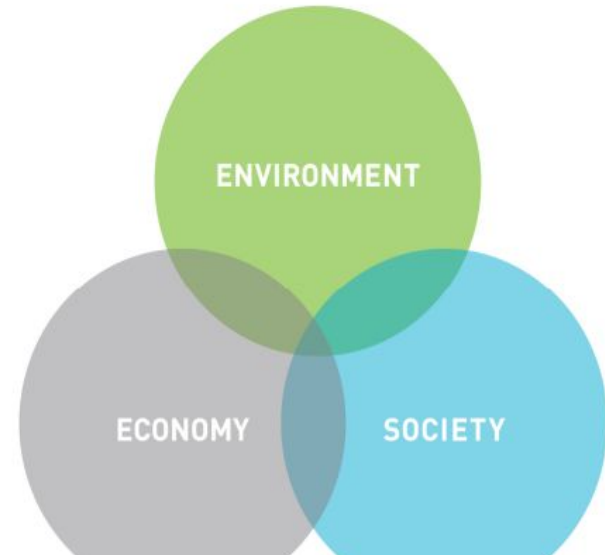
- The general goal of environmental sustainability is to even things out.
- As we've seen, environmental sustainability provides huge benefits for human health and that of all other species.
- Sustainability can increase life expectancy by providing healthier living conditions and better healthcare, which could also lessen the divide between the rich and poor.
- Sustainable development encourages more responsible manufacturing and production, covering the industrial side of waste and pollution.
- It also encourages companies, industries, and governments to make decisions based on long-term consequences, rather than taking the easiest, cheapest option.

Concept & evolution of Sustainability

Pillars of Sustainability

The three bottom lines, or pillars, are:

- Economic Sustainability
- Social Sustainability
- Environmental Sustainability



Economic Sustainability

Economic Sustainability takes into account the social and ecological consequences of economic activity. It incorporates new paradigms like circular economy, cradle to grave etc. Additionally, economic sustainability also means that human communities across the globe are able to maintain their independence and have access to the resources that they require, financial and other, to meet their needs.

Social Sustainability

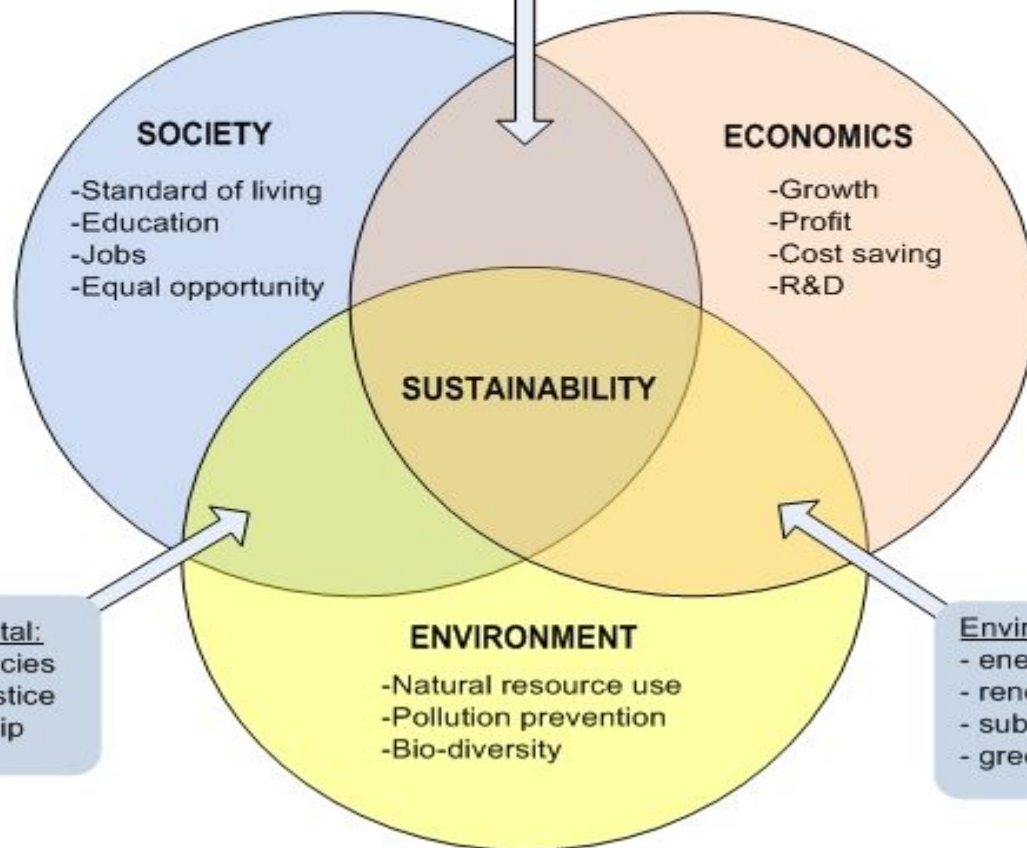
A socially sustainable society is one in which all members have equal rights, all share equitably in societal benefits, and all participate equally in the decision-making process. Universal human rights and basic necessities are attainable by all people, who have access to enough resources in order to keep their families and communities healthy and secure.

Environmental Sustainability

Ecological integrity is maintained, all of earth's environmental systems are kept in balance while natural resources within them are consumed by humans at a rate where they are able to replenish themselves.

Social Economic Aspects

- business ethics
- fair trade
- worker's benefits



SOCIETY

- Standard of living
- Education
- Jobs
- Equal opportunity

ECONOMICS

- Growth
- Profit
- Cost saving
- R&D

SUSTAINABILITY

ENVIRONMENT

- Natural resource use
- Pollution prevention
- Bio-diversity

Social Environmental:

- Conservation policies
- Environmental justice
- Global stewardship

Environmental Economic

- energy efficiency
- renewable fuels
- subsidies, incentives
- green technology

Economic Sustainability

- Economic sustainability refers to practices that support the long-term economic development of a company or nation while also protecting environmental, social, and cultural elements.
- Today, economic sustainability is a goal that very few organizations achieve, despite a fairly universal understanding of what types of business practices (e.g., burning of fossil fuels, creating food waste, leveraging harmful manufacturing methods) contribute to climate change.

ECONOMIC SUSTAINABILITY EXAMPLES

- A variety of economic sustainability examples are taking hold around the world.
- In some cases, businesses and governmental agencies are improving their sustainability practices to reduce their carbon footprint.

AIR-TO-WATER INNOVATIONS

- One of the most exciting examples is emerging technology that can extract water from the air.
- Several companies have developed or are working on these types of innovations.
- For example, Zero Mass Water's system, which is powered by solar panels, captures air with a fan, filters out dust and pollutants, and separates out the water. It has been installed in more than 40 countries.

GROWTH OF RECYCLING

- Recycling is still one of the best ways to reduce your carbon footprint.
- Today, a variety of companies have made a business out of recycling or its counterparts: upcycling, downcycling, e-cycling, and precycling.
- These include local recycling centers, websites like Ebay, vintage and pre-owned clothing shops, and apps such as LetGo.

MICRO-FARMING

- Micro-farming, also known as urban farming, is farming on residential or commercial property of less than five acres.
- Micro-farming is a relatively easy way for a community to improve the food security of its residents and boost local economic growth while benefiting the environment.
- Each micro-farm offers benefits such as reduced carbon emissions, less use of pesticides and herbicides, and better public health.
- When a micro-farm replaces a grass yard, the farmer also ensures he or she is using less water and providing an attractive area for pollinating insects.

Social Sustainability

“Social sustainability, as an independent dimension of sustainable development, and equally important as the economic or environmental dimension still lacks broad recognition by scientists as well as by decision makers.”

The **five** dimensions of social Sustainability are:

- Quality of life
- Equality
- Diversity
- Social Cohesion
- Democracy & Governance

Quality of Life Social Sustainability

- Quality of life is a big topic and covers many aspects of things that affect our living qualities.
- For example, affordable housing, physical & mental medical support, education training opportunities, employment opportunities, access to support, and of course safety and security.

Equality dimension of Social Sustainability

- Equality is the act to reduce disadvantages to certain groups, or helping certain groups to remove barriers to have more control of their lives.
- It also includes identifying the causes and reasons of disadvantages and find ways to reduce them.

Diversity dimension of Social sustainability

- Diversity includes finding needs from different diverse groups of different diversity types and assess their needs, and educating everyone to have diverse viewpoints to leverage benefits of diversity.
- **Social Cohesion dimension of social sustainability**
- Social Cohesion means increasing participation by individual in a target group, as well as helping target groups to access public and civic institutions. One important factor is to build links between different target groups in a broader way by encouraging target groups to contribute to society as well.
- **Democracy & Governance**
- Governance is to make sure budget and resources are adequate to sustain sustainability programs and the ability to measure it.

● **Environmental Sustainability**

- Environmental sustainability aims to improve the quality of human life without putting unnecessary strain on the earth's supporting ecosystems. It's about creating an equilibrium between consumerist human culture and the living world. We can do this by living in a way that doesn't waste or unnecessarily deplete natural resources

● **examples of environmental sustainability**

- There are two primary ways in which environmental sustainability can be achieved: by individuals and by corporations and government bodies.
- As individuals, we can take small but effective steps towards a more sustainable lifestyle, like using less water, reducing our meat consumption and switching to reusable products to reduce our dependence on single-use plastics.
- From a corporation's perspective, environmental sustainability may involve switching to renewable energy in warehouses, factories and offices or cutting down on single-use plastics in manufacturing.

The benefits of **environmental sustainability** are:

- We can protect ecosystems
- We can continue to enjoy nature as it is
- We can protect endangered species
- Less pollution in the cities will result in better respiratory health for all
- It could halt or reverse the effects of global warming
- We won't be creating huge landfills all over the world that will take hundreds of years to break down