

**Blue Apple Educational Foundation
(BAEF)**

PRESENTS:

**4TH
NATIONAL ENGINEERING SCIENCE &
TECHNOLOGY ESSAY COMPETITION**

NESTEC 2023

AWARD CEREMONY

Title:

"Innovations in Sustainable Engineering: Balancing Technological Advancements with Environmental Responsibility"

Guest Speaker Profile:

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Presentation Outline:



1.0 Introduction

1.1 Definition of Key terms

2.0 What is Traditional Engineering? / Cases

3.0 Sustainable Engineering Projects

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1.0 Introduction

1.1 Definition of Key Terms:

(a) Innovation

(b) Sustainable Engineering

1.2 Innovation:

Innovation is the systematic practice of developing and marketing products and services for adoption by customers.



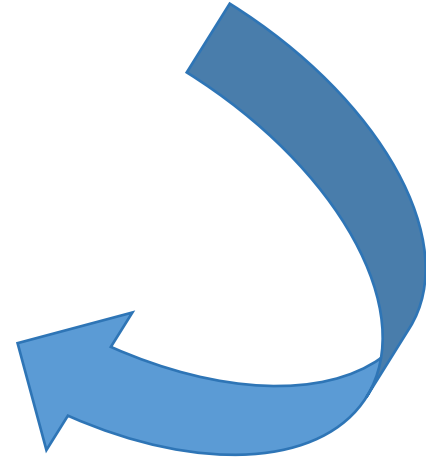
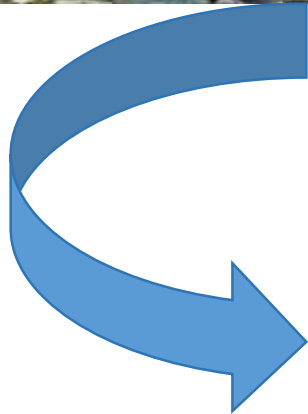


Phone Innovative Cycle





Means of Transport Innovative Cycle

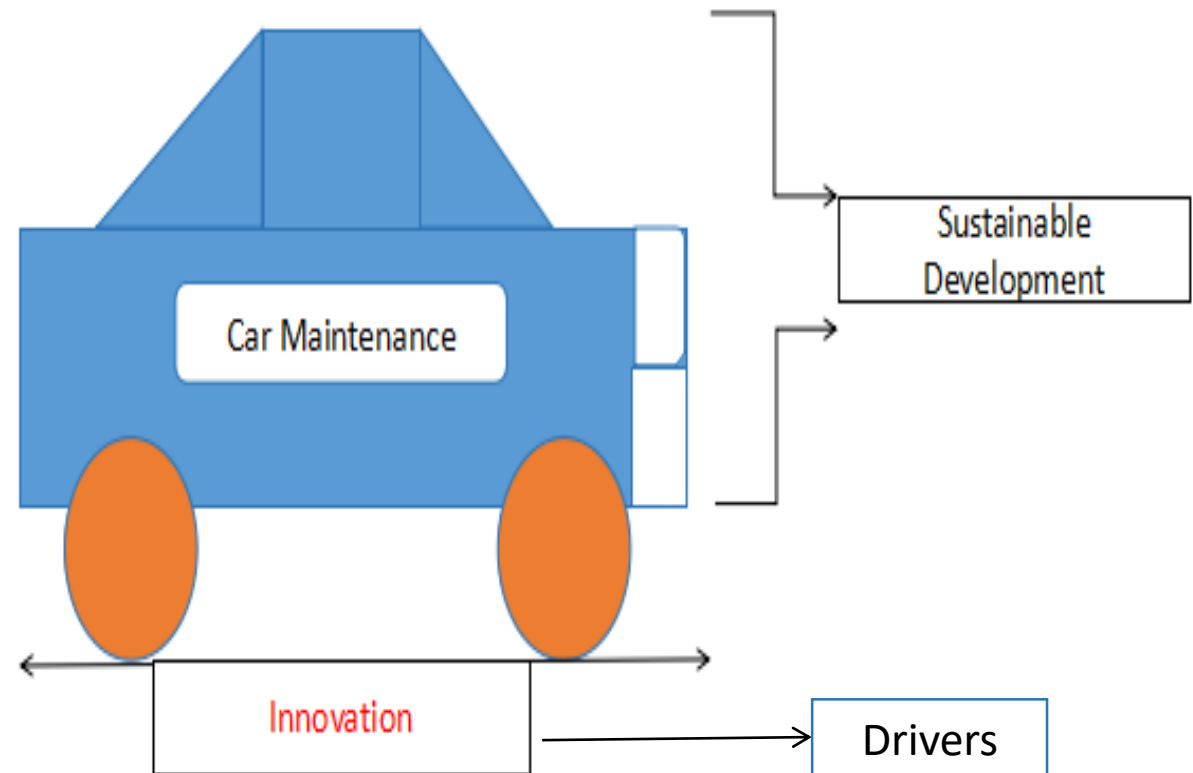


1.2.1 Significance of Innovation

- Sustainable development is the need of the hour, and innovation is a key driver in achieving it.
- Innovation plays a critical role in ensuring that the planet and society can continue to thrive for generations to come.
- Innovation find new and more efficient ways of using resources, reducing waste and pollution, and creating sustainable products and services. These are the direct or indirect results of innovation
- It help organizations and governments to address the social, economic, and environmental challenges facing the world today.

...Still on Innovation

- Innovation can also help to improve the quality of life of people, particularly those in developing countries.*



1.2.2 Innovation in environmental sustainability

- *Innovation is essential in addressing environmental challenges:*

- Climate change,
- Air pollution,
- Water scarcity, and
- Deforestation are some of the most significant environmental challenges of our time.

Solutions:

- For example, the development of renewable energy sources such as solar, wind, and hydropower has been a major innovation in the fight against climate change.
- An innovative mechanism can trap Air pollutant or treat air pollutant / laws against release of untreated toxic gases
- Innovation in waste management and recycling can help reduce the amount of waste that ends up in landfills, reducing the negative impact on the environment.

1.2.3 Innovation in economic sustainability

- *Innovation plays significant role in economic development through:*

- *Creating new industries,*
- *Create new jobs, and opportunities,*
- *Drive economic growth and development*

- *Similarly, innovation in agriculture can help increase food production, improving food security and providing new opportunities for farmers.*

1.2.4 Innovation in social sustainability

• Innovation also plays a critical role in addressing the following social challenges:

- Poverty,
- Inequality, and
- Access to basic services such as healthcare and education

Solutions:

- For example, innovative technologies such as telemedicine can help provide access to healthcare in remote areas where it was previously unavailable.
- Similarly, innovations in education such as e-learning platforms can help make education accessible to people who may not have access to traditional educational institutions.

2.0 What is Traditional Engineering?

- **Traditional Engineering** can simply be said to be the practice of making use of available materials and methods without following Engineering standards with the aim of solving only immediate issues with no thought of future or environmental concerns. (Guest Speaker)

- Issues Associated with Traditional Engineering

- Create more Environmental Concerns
- Causes more harm to future plans
- Only concerned with immediate issues
- It causes /promote more issues

2.1 Case Studies of Traditional Engineering Project

- Mining Engineering

In Nigeria, we practice artisanal mining system (Traditional Engineering) which is very detrimental to both the environment, the community and also the eco-system.



Lithium Mining Site in Nigeria

...Still on Traditional Mining Practice

- Traditional Mining



Artisanal Digging Process



Pool of water

Artisanal Drilling Process



Pumping Machine

Dewatering into farm land

2.2 Traditional Civil Engineering Projects

- Traditional Engineering



**Collapsed Building in
Delta State, 2022**



Bad Constructed Road in Anambra State, 2021

2.3 Traditional Electrical Engineering Projects



**National
Grid
Failure**



2.3.1 (NEW NORMAL) - GREEN ENERGY



3.0 Sustainable Engineering

Sustainable Engineering is referred to as the integration of social, environmental and economic considerations into product, process and energy system designs. Thom *et al* (2011).

Sustainable engineering takes into account the entire lifecycle of a project, from the selection of materials, use of natural resources to the disposal or reuse of materials at the end of a project's useful life.



3.1 Sustainability Engineering Projects

3.1 The Gateshead Millennium Bridge in the United Kingdom

(a) It is a pedestrian and cyclist bridge powered by a kinetic energy recovery system (KERS).

(b) The KERS captures the energy generated by the bridge's movement and stores it in a flywheel, which is then used to power the bridge's lighting and other systems.



3.2 *The Eden Project in Cornwall, England*

(a) The project promote site for attraction and features a series of geodesic domes that house a variety of plant species from around the world. (**generating income**)

(b) The domes are designed to be energy efficient and autonomous, with rainwater collection and greywater systems, as well as solar panels and wind turbines. (**energy efficient**)



3.3 The San Francisco Public Utilities Commission's Sunset Reservoir Solar Project

(a) The project features more than 7,000 solar panels that generate clean electricity. (Installed in 2008)

(b) It is one of the largest municipal solar projects in the country and it triples San Francisco's solar output of over 5 megawatt.



4.0 Traditional Engineering Vs Sustainable Engineering

• Traditional Engineering

- (i) It considers the object
- (ii) It focuses on technical issues
- (iii) It solves only immediate problem (**now**)
- (iv) It considers local context

• Sustainable Engineering

- (i) It considers the system in which the object will be used
- (ii) It integrate both technical and non technical issues
- (iii) It strives to solve futuristic problems (**future**)
- (iv) It considers global context

5.0 Challenges of implementing Sustainability Engineering?

Implementing sustainability engineering can present many challenges, including:

1. Cost:

One of the main challenges of implementing sustainability engineering is the cost. Sustainable infrastructure projects can often be more expensive to design and build than traditional projects, which can be a barrier to their adoption.

2. Limited resources:

Another challenge is the limited availability of resources such as funding, skilled labor, and materials. This can make it difficult to implement sustainable infrastructure projects, particularly in resource-constrained or developing areas.

3. Complexity:

Sustainable infrastructure projects can be complex and require the integration of multiple disciplines and stakeholders. This can make coordinating and managing these projects challenging and difficult to measure and demonstrate their impact.

4. Regulation(s):

Sustainability engineering can be impacted by various regulations and standards, varying by region and sector. Ensuring compliance with these regulations can be challenging, particularly for innovative or pioneering new projects.

5. Public perception:

Another challenge is the public perception of sustainable infrastructure projects. Some people may be skeptical of or resistant to these projects, making it difficult to secure support and funding.

Conclusions:

1. Innovations should cut across all research work (Dr Bain - Bainite Structure)
2. Professional Bodies (NIEEE, NSME, NMGS etc) should also help in funding both Undergraduate and Post graduate research just like what NESTEC is doing.
3. Research work should hover around renewable energy, 3D printing, environmental sustainability, Carbon reduction etc
4. Engineering projects should follow Engineering ethics in order to avoid building collapse, bridge collapse, early destruction of road etc
5. All Engineering project(s) must be innovating and sustaining.

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Thank you all for listening