UNIT - IV

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## Civil Engg. Projects

Ex. Vishnu Malik

Various civil engg. projects are :-

often (अक्सर)

1) Highway, Railway, Bridges etc.
2) Hydraulic structures i.e. Aqueduct, Weir, Barrage etc.
3) Earthwork i.e. embankment (filling) & cutting
4) Marine structures i.e. docks, Harbours
5) Dams & Reservoirs
6) Buildings etc.

## Environment Impact Assessment (EIA) (पर्यावरण प्रभाव आकलन)

It is defined as an "Assessment of the beneficial and adverse impacts on environmental resources, resulting from a proposed public & private project."

EIA is a systematic process to identify, predict and evaluate the environmental effects of proposed projects.
Particular attention is given in EIA practice for preventing, mitigating and offsetting the significant adverse effects of proposed projects.

EIA is intended to identify the impacts (both beneficial and adverse) of a proposed public and private development activities, often the focus is dominantly environmental.

EIA is mainly used for the following projects ⟶

1) Highway, Railway & Airport
2) Dams, Canals & Power plants
3) Industrial & Petrochemical plants
4) Bulk drugs & Pharmaceuticals etc.

Purpose / Objective ⟶

i) To maintain quality of the environment.
ii) To suggest remedial measures for development of projects.
iii) To avoid or minimise ~~potentially~~ damaging and costly negative impacts.
iv) To maximise positive impacts.

Methodology / Stages of EIA ⟶

1) Screening
2) Scoping
3) Impact Analysis
4) Impact Mitigation
5) Reporting
6) Review
7) Decision Making
8) Monitoring

1) Screening ⟶

This step determines whether or not EIA is required for a particular project.

And what level of EIA is required.

Outcomes of screening:→

- Full EIA required
- Limited EIA required
- No EIA required

2) Scoping :→
It is a critical step in the preparation of an EIA, as it identifies the issues that are likely to be of most importance during the EIA and eliminates those that are of little concern.
It identifies key issues and impacts to be considered.

3) Impact analysis :→

| | |
|---|---|
| Type | Biophysical, social, health or economic |
| Nature | direct, indirect, cumulative etc. |
| Magnitude | High, moderate, low |
| Extent | Local, Regional, Global |
| Timing | Immediate, long term |
| Significance | Important, Unimportant |

4) Impact Mitigation :→

- To avoid or minimize adverse impacts
- To enhance environmental and social benefits.

5) Reporting :→
- Indication of the main reasons for this choice.
- a description of the project
- a description of the aspects of the environment likely to be significantly affected by the proposed project
- measures to prevent and reduce the adverse environmental effects

Different names of EIA reports :-
- Environmental Impact Assessment Report (EIA report)
- " " Statement (EIS)
- " Statement (ES)
- Environmental Assessment Report (EA Report)
- " Effects Statement (EES)

6) Review :→
- Review the quality of the EIA report.
- Take public comments into account.
- Identify any deficiencies to be corrected.

Who perform the review?
- environmental agency
- independent panel
- public comment and input

7) Decision making :→
- To help establish environmental terms and conditions for project implementation
- To provide key input to help, determine if a proposal is acceptable.

8) Monitoring :-

- Verify that impacts are as predicted or permitted.
- Confirm that mitigation measures are working as expected.
- Take action to manage any unforeseen changes.
- Carry out periodic checks

Waste Avoidance in construction :-

It is the preferred choice for waste management measures. The aim of waste avoidance and reduction is to achieve waste minimization and therefore reduce the amount of waste.

Reduce :-

The best environmental & cost effective solution is to reduce the amount of waste you create.

- Avoid over ordering
- Storage area should be safe, secure and weatherproof.
- Do not accept poor or damaged deliveries.
- Have reuse and recycle bin on site.
- Identify materials that can be reused and recycled before the project begins.
- Measure exactly so you have the right amount of each material.

Reuse :→

Surplus or salvaged material can be used again for the same or a new purpose.

- Collect off cuts and use first instead of new materials.
- Have reuse and recycle bins on site.
- Identify materials that can be reused and recycled.
- Repair items so they can be reused or returned to the suppliers.
- Return, sell or donate unused and salvaged materials.

Recycle :→

Many materials can be recycled, some going back into making new construction products.

- Keep materials for recycling clean, dry and separate from other materials.
- Ask your waste contractor how they can help you to recycle.
- Locate containers close to working areas and use clear signs to show which material goes in each.

The following items can be recycled :→

- Metal
- Paper
- Wood
- Gravel
- Glass
- Brick
- Cardboard
- Plaster
- Asphalt etc.

## Efficiency Increase :→

The overall efficiency of a project is based on the manpower and the equipment. The successful completion of a project depend on efficient utilization of these two resources. The profitability and effectiveness of the project are the outcome of better management and control of the manpower and equipment resources.

## Tools to improve efficiency of manpower :→

i) Incentives should be given to both staff members and workers for achieving more efficiency.
ii) A core team has to be formed to measure, monitor and improve productivity.
iii) Invest in trainings
iv) Listen to your staff
v) Improve your communication
vi) Use of mobile technology

## Tools to improve efficiency of equipments :→

i) Read & follow the instruction of equipment manufacturer.
ii) Before starting the day, check the machine thoroughly.
iii) Check the machine at the end of the day.
iv) Keep the engine completely shut off while refueling the equipment.
v) Lubricate the equipment timely.
vi) The employee operating the equipment should be skilled and trained.
vii) If possible, keep the equipment housed in a building.

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## Advanced Construction Techniques for Better Sustainability :→

Sustainable construction includes techniques that contribute to creating a healthy environment for the future. While part of saving energy depends on the everyday practices of individuals, energy efficiency is more than remembering to turn off the light switches when you walk out of the room. With sustainable construction, energy efficiency is built into the structure.

The construction industry is repeatedly criticised for being inefficient and slow to innovate. The basic methods of construction, techniques and technologies have changed little since Roman times.

The term 'Advanced Construction Technology' covers a wide range of modern techniques & practices that encompass/contains the latest developements in materials technology, design procedures, quantity surveying, facilities management, structural design & management studies.

Some of techniques for sustainable construction are :

i) Using sustainable building materials :→
Sustainable building materials can be defined as materials with overall superior performance in terms of specified criteria.

ii) Using Solar power

iii) Using Biodegradable materials

iv) Use of smart appliances

v) Self powered buildings etc.

vi) Modular constructions

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# Reduction of Green House Gas Emission in Civil Engineering Projects ⇒

## Necessity ⇒

Buildings related to $CO_2$ emissions have continued to rise by around 1.4 per year since 2010, and more than four million death each year are attributable to illness from household air pollution.
The construction industry has a significant environmental footprint, especially in terms of greenhouse gas emission and energy consumption.
The emissions can be controlled and minimized by optimizing the utilization of construction resources.
This includes the optimal utilization of the available construction crews and materials in such a way that reduces greenhouse gas emissions while minimizing construction cost and duration.

## Techniques for reducing GHG emission ⇒

i) Reducing fuel use
ii) Conserving electricity
iii) Recycling & reuse of various construction materials
iv) Energy efficient site accomodation
v) Efficient use of construction plant
vi) Consolidation centers ⇒

These centres receives material and products in bulk. And then the material can be delivered to the site as needed.

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## Contribution of Civil Engg. to GDP :->

Construction industry contributes significantly in terms of scale & share in the development process for both developed and developing countries. The construction products provides the necessary public infrastructure and private physical structures for many productive activities such as services, commercial utilities and other industries. The industry is not only important for its finished products, but it also employs a large number of people (directly and indirectly) and therefore has an effect on the economy of a country or region during the actual construction process.

The state of the construction industry will affect most common measures of a national economy, such as GDP as mentioned earlier. It will affect the availability of capital, the decisions a government makes and even the social health of a country. The construction industry also has significance interaction with other economics sector as multiplies effects through its backward and forward linkages.

The construction industry is frequently used as a tool by government to manage the local or national economy. for example, when it is recession and the number of unemployment is high, government uses the construction sector to use the public expenditure.

Investment in the construction sector can be defined as construction - related to the Gross

fixed Capital formation (GFCF). GFCF is an expenditure on fixed assets (buildings, vehicles, machineries etc.) either for replacing or adding to the stocks of fixed assets. These fixed assets are repeatedly or continuously used in the production process.
The construction sector ~~contributes~~ constitutes about 40-60% of GFCF in most developing countries. The proportion of investment that goes to entirely new construction is likely to be higher than that which goes to repair and maintenance.
In developed countries, the construction industry accounts for approximately one third of the total investment in physical assets in the economy.
The construction industry is the Second largest industry in India after agriculture. It accounts for about 8% of India as GDP. It makes significant contribution to the national economy and provides employment to large numbers of people.

Cons. Industry
- → Real Estate i.e. Residential & Commercial constn.
- → Infrastructure building i.e. road, railway etc
- → Industrial construction i.e refineries, pipelines, textiles etc.

Gross Value Added (GVA) → 2018-2019 → 8.9% growth as compared to 2017-2018 → 5.7% growth from Constn. sector

## Contribution of Civil Engg to to Employment 6→

Around 16% of the nations working population depends on construction for its livelihood. The Indian construction industry employs over 30 million people and creats assets worth over 200 billion. It contributes more than 8 percent to the nation's GDP and 78 percent to the gross capital formation.

The real estate and construction sector will create over 15 million jobs over the next five years despite signs of stress in the segment in the last few quarters, the Economic Survey said today.

Real estate and construction industry together is the second largest employment providers in the country, next only to agriculture, according to the Economic Survey 2017-2018, tabled in Parliament.

The sector employed over 40 million workforce in 2013, and as per projections, it is slated to employ over 52 million workforce by 2017 and 67 million workforce by 2022.

"This implies that it will generate over 15 million jobs over the next five years, which will translate to about three million jobs annually."

As per the National Skill Development Council (NSDC), real estate and construction sector is expected to require over 66 million people by 2022.

## Health & Safety Aspects for Stakeholders in Construction projects :-

The construction industry plays a vital role in all countries, because it contributes significantly to the economic and social development of any nation.
The construction industry involves many types of activities and in terms of health and safety is considered unique by many researchers in terms of risk to life and limb. Construction industry conditions and organization present a great challange in terms of leadership, communication and team integration which all impact on health and safety.
Health & Safety (H&S) management has traditionally been the responsibility of the contractor. Most often, contractors are blamed for the accidents and other ill-health that occur on their construction sites. H&S performance is however enhanced when there is effective collaboration between those involved in the construction process.

## Stakeholder :-

A stakeholder, as defined by the Project Management Institute (2001), is any person, group or organization who can be positively or negatively impacted by, or cause an impact on the project.
The four main stakeholders are :
1) The Government

2) The client (employer)
3) The contractor
4) The Employees

The role of stakeholders in ensuring health & safety in construction projects is as under.

1) The Government :-

Government are major employers, policy makers, and regulators and have a leadership role in preventing work-related deaths, injury and disease through promoting, legislating and enforcing H & S requirements.
Government is a policy maker. Government should possibly strengthen the existing provisions for H&S. If some provisions are not applicable now, then new ones should be introduced, that is amended. The government as a policy maker must also be the enforcer and so must have a unit to ensure monitoring and enforcement.

2) The Client :-

The client is defined as "the organization or individual, who commissions the activities necessary to implement and complete a project in order to satisfy its or his needs.
Client should focus on the end result of the project and bear in mind that a project that is difficult to ~~maintain~~ build and difficult to manage / maintain is not a good design.
The client must make sure that the facilities for all of the workers are suitable as per their requirement. They must allow sufficient resources &

time for each stage in the project.

3) The contractor :→

Contractor have the duty to provide a work environment which is free from recognized hazards that are causing or likely to cause death or serious physical harm to their employees. The contractor is to ensure that employees comply with the H&S regulations on the site. The contractor must actually see the need for H&S, and must strictly adhere to procurement of H&S rules and must employ competent H&S personnel that will educate workers.

4) The employees :→

Employees are to ensure that they put on the appropriate Personal Protective Equipment (PPE) for every work and they are also to adhere to the H&S rules on the site.

Workers have health and safety responsibilities on site, as they are the most likely to be involved in an accident. They must report any obvious risks that they see in a site so that accidents can be avoided. They must follow the H&S rules.

Health & Safety measures in construction :→

i) Site layout & planning
ii) Personal Protective Equipment (PPE)
iii) First aid kits & accident reporting
iv) H&S Warning Signs
v) Safety Policy
vi) H&S trainings on site