1.011 Project Evaluation

Introduction

Course Requirements & Overview
Principles of Engineering Economy
Assignment 1
Civil Projects & Civilization
What is a Successful Project?

Learning Objectives

Methodology:
- Apply the basic methods of engineering economics in evaluating major infrastructure projects
- Develop and apply simple models for estimating costs and resources required for major infrastructure projects
- Explain and critique the process used to evaluate major infrastructure projects

Process:
- Understand the life-cycle of major projects
- Appreciate the complexity of major projects and the role for and limits of analysis in clarifying and resolving issues

Basic Concerns

(Sullivan et al., Engineering Economy)

Basic questions for any project:
- "Will its benefits exceed its costs?"
- "Is this the best possible project?"

Focus of "Engineering Economy"
- Systematic evaluation of the costs and benefits of proposed [or of potential] projects
- Analysis of alternative uses of financial resources, particularly in relation to the physical assets and the operations of an organization
- "Tradeoffs among different types of costs and the performance provided"

What is Your Role as an Engineer?

- Build projects
- Design projects
- Evaluate projects
- Propose projects
- Define problems

- Increasing complexity
- Decreasing certainty
- More possibilities
- Greater need for imagination and leadership

Principles

(Sullivan et al., pp. 4-7)

- Develop the alternatives
- Focus on the differences
- Use a consistent viewpoint
- Use a common unit of measure
- Consider all relevant criteria
- Make uncertainty explicit
- Revisit your decision

"Most errors can be traced to some violation or lack of adherence to the basic principles"

What is a Successful Project?

- It is built
- Engineering feasibility
- Financial feasibility
- The benefits are indeed greater than the costs
- This was an effective way to achieve those benefits
- The project was built in an efficient and effective manner
- No clearly better options
- No significant externalities
- Building this project did not foreclose other, even better projects
Elements of Project Evaluation

- Create a "story" for the project
- Estimate the time, resources, and other costs of building the project
- Determine how the project can be financed
- Support a comparison of costs and benefits
  - Financial
  - Non-financial
- Provide a process for dealing with controversies

Civil & Environmental Projects are the Key to Civilization

- Resources
  - Food
  - Water
  - Building materials
  - Energy
  - Clothing
  - Capital goods
  - Consumer goods

Benefits of Urbanization

- For people:
  - Diversity of lifestyles, opportunities, people
  - Frequency & quality of social events
  - Employment opportunities
  - Creation of enough time to enjoy the fruits of civilization
- For the system:
  - More efficient use of resources
    - Roads, buildings, water sources, etc.
  - Proximity of complementary activities
  - Efficiency in distribution of goods
  - Safety

Disbenefits of Urbanization

- Loss of self-sufficiency
- Possibility of extreme poverty
- Dependency upon transport system for resources
- Susceptibility to disease (physical and mental)
- Congestion
- Pollution - inability to absorb wastes

CEE Capabilities Limit the Growth and Quality of Urban Life

| Water supply | Dams, aqueducts, treatment systems |
| Food supply | Transportation & warehousing |
| Density of living | Floor area near city |
| Local Transportation | Floor area per person |
| Land available for development | Limits on time and money for commuting |
| Quality of life & options for moving | Bridges & transport capabilities |

CEE Projects Make Cities Possible and More Livable

- Water Supply
- Flood control
- Intercity transport
- Forests
- Sewers, water treatment