

**1 INTRODUCTION**

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**MANUFACTURING ECONOMY**

**Section 1**

**Why the Economy Perspective is Important to Engineers**  
(and other professionals)

- **Engineers "Design"**
- Engineers must be concerned with the economic aspects of designs and projects they recommend and perform
  - Analysis
  - Design
  - Synthesis

- **Engineers must work within the realm of economics and justification of engineering projects**
- Work with limited funds (capital)
- Capital is not unlimited – rationed
- Capital does not belong to the firm
  - Belongs to the Owners of the firm
  - Capital is not "free"...it has a "cost"

**Technical Perspective**

- **Technical Feasibility:**
  - In order to ensure the implementation of the design, the solution provided must obey the laws of nature and science
- **Technical Efficiency:**
  - Because there may be many solutions to a problem, the best technical solution should be sought. Examples include designing solutions that generate the least waste, consume the least energy, perform reliably in adverse conditions, and allow for easy production or maintenance

**Economic Considerations**

- **Economic Feasibility:**
  - The solutions provided must not exceed monetary budget limits
- **Economic Efficiency:**
  - The most economical of the many technical solution to a problem should be chosen

## Definition

ENGINEERING ECONOMY IS INVOLVED WITH THE FORMULATION, ESTIMATION, AND EVALUATION OF ECONOMIC OUTCOMES WHEN ALTERNATIVES TO ACCOMPLISHED A DEFINED PURPOSE ARE AVAILABLE.

## Definition

ENGINEERING ECONOMY IS INVOLVED WITH THE APPLICATION OF DEFINED MATHEMATICAL RELATIONSHIPS THAT AID IN THE COMPARISON OF ECONOMIC ALTERNATIVES

## Questions

- Knowledge of Engineering Economy will have a significant impact on you, personally.
- Make proper economic comparisons
  - In your profession
    - Private sector
    - Public sector
  - In your personal life

## Role of Engineering Economy in Decision Making

- **Remember:** People make decisions – not “tools”
- **Engineering Economy** is a set of tools that aid in decision making – but will not make the decision for you
- **Engineering economy** is based mainly on estimates of future events – must deal with the future and risk and uncertainty

## Role of Engineering Economy

- The parameters within an engineering economy problem can and will vary over time
- Parameters that can vary will dictate a numerical outcome – apply and understand ..
- Sensitivity Analysis

## Role of Engineering Economy

- Sensitivity Analysis plays a major role in the assessment of most, if not all, engineering economy problems
- The use of spreadsheets is now common and students need to master this valuable tool as an analysis aid

## DECISION CATEGORIES

### 1. Profit-Enhancing Program

A company may expand production, its product line, or service, in order to increase sales. These ventures generally take considerable investment, with hope of increasing revenues

- a. New Product Development
- b. New product Acquisition
- c. Production Capacity Expansion
- d. Service Capacity Expansion
- e. Improved Customer Service

## DECISION CATEGORIES (Cont')

### 2. Cost-Control Program

Engineers are often asked to correct errors in systems-errors that cost money. Designing and implementing solutions also costs money, including, at a minimum, the time and effort spent by the engineer in finding a solution to the problem. The expectation is that the engineer will provide solution that will save money in the long run

- a. Improving Efficiency
- b. Streamlining Operations
- c. Eliminating Waste
- d. Reducing Liabilities

## DECISION CATEGORIES (Cont')

### 3. Public-Improvement Program

Government entities often make investments, the goals of which is not to increase profits, but rather to increase some measure of public satisfaction

- a. Increased public satisfaction
- b. Increased public safety
- c. Improved infrastructure

## DECISION CLASSIFICATION

### 1. EXPANSION

This can take many forms, including expanding he production capacity of a current and expanding into new markets with new products or services.

- a. New product design and development
- b. Expansion of current development
- c. Construction of new facility
- d. Acquiring capacity
- e. Equipment, process, or technology selection

## DECISION CLASSIFICATION (Cont')

### 2. REPLACEMENT

A company may want to continue operations or services in some sector, but may want to do so in a more economical manner. This may lead to replacing equipment, changing processes, or changing locations.

- a. Equipment, process, or technology selection
- b. In house versus outsourcing

## DECISION CLASSIFICATION (Cont')

### 3. ABANDONMENT

Although it may not seem like an investment decision, the decision to walk away from a project, such as closing a facility, is a very important economic decision. It also represents the final stage in our decision-making process.

- a. Cease production
- b. Cease product line
- c. Close a facility
- d. Refire equipment

## DECISION RESULTS

### INVEST

- This “accept” or “go” decision releases the necessary funding to undertake a project

### DELAY

- This “wait” decision provides time to gather more information about the prospects of an investment or merely for the investment climate to change. On the one hand, the decision to delay may occur before a “go” decision

### DO NOT INVEST

- This “reject” or “no go” decision eliminates a proposal from further consideration. This decision also encompasses halting for a project, as in the abandonment decision just described

## Problem Solving Approach

1. Understand the Problem (*Recognition and definition of problem or opportunity*)
2. Collect all relevant data/information (*Generation of solution alternatives*)
3. Define the feasible alternatives (*Development of feasible alternative cash flows and information gathering*)
4. Evaluate each alternative
5. Select the “best” alternative (*Selection and implementation the best alternative*)
6. Implement and monitor (*Post-implementation analysis and evaluation*)

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Major Role of Engineering Economy

## Problem Solving Approach

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One of the more difficult tasks

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Where the major tools of Engineering Economy are applied

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### Tools

Present Worth, Future Worth  
Annual Worth, Rate of Return  
Benefit/Cost, Payback,  
Capitalized Cost, Value Added

## Time Value of Money

- Time Value of Money
- Money can "make" money **if Invested**
- Centers around an *interest rate*

The change in the amount of money over a given time period is called the **time value of money**; by far, the most important concept in engineering economy