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## WHAT IS ECONOMICS ?

The study of how limited resources is used to satisfy unlimited human wants

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## WHAT IS ECONOMICS ?

The study of how individuals and societies choose to use scarce resources that nature and previous generations have provided.

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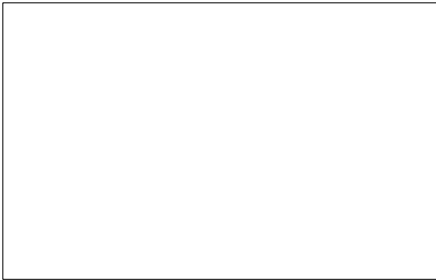
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## Resources



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## Resources

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### **LAND**

**All gifts of nature, such as: water, air, minerals, sunshine, plant and tree growth, as well as the land itself which is applied to the production process.**



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## LABOR

The efforts, skills, and knowledge of people which are applied to the production process.



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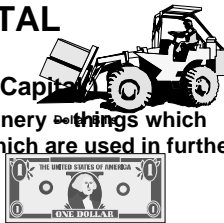
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## CAPITAL

- Real Capital (Physical Capital)
  - Tools, buildings, machinery ~~or things~~ which have been produced which are used in further production
- Financial Capital
  - Assets and money which are used in the production process
- Human Capital
  - Education and training applied to labor in the production process



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## Origins of Engineering Economy

The perspective that ultimate economy is a concern to the engineer and the availability of sound techniques to address this concern differentiate this aspect of modern engineering practice from that of the past.

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## Origins of Engineering Economy

- **Pioneer:** Arthur M. Wellington, civil engineer  
latter part of nineteenth century;  
addressed role of economic analysis in engineering projects;  
area of interest: railroad building
- Followed by other contributions which emphasized techniques depending on financial and actuarial mathematics.

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## PRINCIPLES OF ENGINEERING ECONOMY

1. Develop the Alternatives;
2. Focus on the Differences;
3. Use a Consistent Viewpoint;
4. Use a Common Unit of Measure;
5. Consider All Relevant Criteria;
6. Make Uncertainty Explicit;
7. Revisit Your Decisions

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## DEVELOP THE ALTERNATIVES

The final choice (decision) is among alternatives. The alternatives need to be identified and then defined for subsequent analysis.



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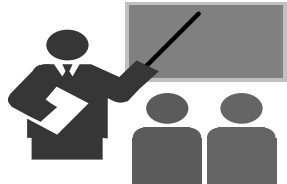
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## FOCUS ON THE DIFFERENCES

Only the differences in expected future outcomes among the alternatives are relevant to their comparison and should be considered in the decision.



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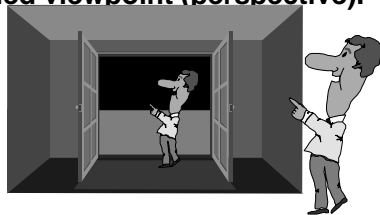
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## USE A CONSISTENT VIEWPOINT

The prospective outcomes of the alternatives, economic and other, should be consistently developed from a defined viewpoint (perspective).



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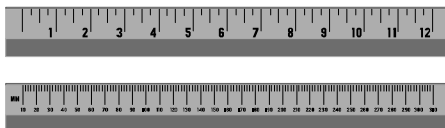
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## USE A COMMON UNIT OF MEASURE

Using a common unit of measurement to enumerate as many of the prospective outcomes as possible will make easier the analysis and comparison of alternatives.



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## CONSIDER ALL RELEVANT CRITERIA

Selection of a preferred alternative (decision making) requires the use of a criterion (or several criteria). The decision process should consider the outcomes enumerated in the monetary unit and those expressed in some other unit of measurement or made explicit in a descriptive manner.



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## MAKE UNCERTAINTY EXPLICIT

Uncertainty is inherent in projecting (or estimating) the future outcomes of the alternatives and should be recognized in their analysis and comparison.



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## REVISIT YOUR DECISIONS

Improved decision making results from an adaptive process; to the extent practicable, the initial projected outcomes of the selected alternative should be subsequently compared with actual results achieved.



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## **ENGINEERING ECONOMY AND THE DESIGN PROCESS**

An engineering economy study is accomplished using a structured procedure and mathematical modeling techniques. The economic results are then used in a decision situation that involves two or more alternatives and normally includes other engineering knowledge and input.

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### **ENGINEERING ECONOMIC ANALYSIS PROCEDURE**

1. Problem recognition, formulation, and evaluation.
2. Development of the feasible alternatives.
3. Development of the cash flows for each alternative.
4. Selection of a criterion ( or criteria).
5. Analysis and comparison of the alternatives.
6. Selection of the preferred alternative.
7. Performance monitoring and post-evaluation results.

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### **ACCOUNTING AND ENGINEERING ECONOMY STUDIES**

Modern cost accounting may satisfy any or all of the following objectives:

1. To determine the cost of products or services
2. To provide a rational basis for pricing goods or services
3. To provide a means for controlling expenditures
4. To provide information on which operating decisions may be based and the results evaluated

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