



UNIVERSITY OF GONDAR

INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INDUSTRIAL ENGINEERING

ENGINEERING ECONOMICS AND COSTING

COURSE CODE IEng 2181

TARGET GROUP 2nd YEAR INDUSTRIAL ENGINEERING REGULAR STUDENTS

Course contents

- *Introduction*
- *Time value of money*
- *Depreciation*
- *Cost comparison of alternative methods*
- *Economic analysis of industrial operations*
- *Cost estimation*
- *Production cost estimation*
- *Cost estimation & analysis of re-engineering of manufacturing process & reverse engineering of products*

Introduction to engineering economics and costing

After studying Chapter 1, the students should be able to:

- ❖ Understand the need for Engineering Economy in the field of engineering.
- ❖ Understand the basic Engineering Economy
- ❖ Determine the role of Engineering Economy in decision making.

Introduction

- ❖ Development in **science** and **technology** causes changes for **improvement**.
- ❖ Knowledge in the field of engineering is very important, for example in **designing** a **product** or **services**.
- ❖ Decision making requires a systematic financial management.
- ❖ Engineering and economic are closely related.
- ❖ Engineering Economic involves systematic evaluation in financial management in solving engineering problems.

What is Engineering Economy?

- ❑ Economic decision making for engineering systems is called engineering economy.
- ❑ Engineering economy is also, the study of industrial economics and the economic and financial factors which influence industry.
- ❑ It is a collection of techniques that simplify comparisons of alternatives on an economic basis.
- ❑ Engineering economics begins only after the alternatives have been identified.
- ❑ Engineers are the people who are familiar with all the technicalities of machinery and production therefore they are the best judges of:
 - a) the useful lives of an asset, and
 - b) they also have the technical knowledge to calculate the number of units a proposed plant would produce when operational.

What is Engineering Economy?

- ❑ In today's competitive world of business it has become essential that engineers should practice **financial project analysis for engineering projects** and **make rational decisions**.
- ❑ Engineering economy also includes **the study of accounting practices for manufacturing concerns**.
- ❑ Unique features of accounting for manufacturing concerns are **process costing, batch costing, cost allocation**, etc.
- ❑ Therefore, all engineers, regardless of their employment, should know **methods and tools** used in **project evaluation**.
- ❑ The purpose of engineering economy is to expose all engineering students **to the methods which are widely used for evaluation of projects**.

Engineering economic decisions

- **Engineers** play a major role in **capital investment decisions** based on their technical knowledge
- Factors affecting the decision making process are from combination of **economic** and **non economic** factors
 - ✓ **Economic factors:** production cost, total revenue, financial sources
 - ✓ **Non economic factors:** social responsibilities, environment, laws, politics
- The decision to choose between **alternatives** depend on the monetary factors
- The **decision made** is a balance between a combination of **technical** and economic aspect.

Con't

May be categorized into 3 programs

- 1. Program to increase profit;** example, development of a new product, increasing new production capacity, and improving customer service center.
- 2. Cost control programs:** such as, defect reduction programs because each defect is costly, efficiency improvement, waste reduction and liabilities reduction programs.
- 3. Facilities/infrastructure programs:** such as construction of roads, bridges, playground etc. These programs are not profit oriented but rather focus on increasing convenience and comfort at minimum cost.

Cont..

Decision is classified into 3

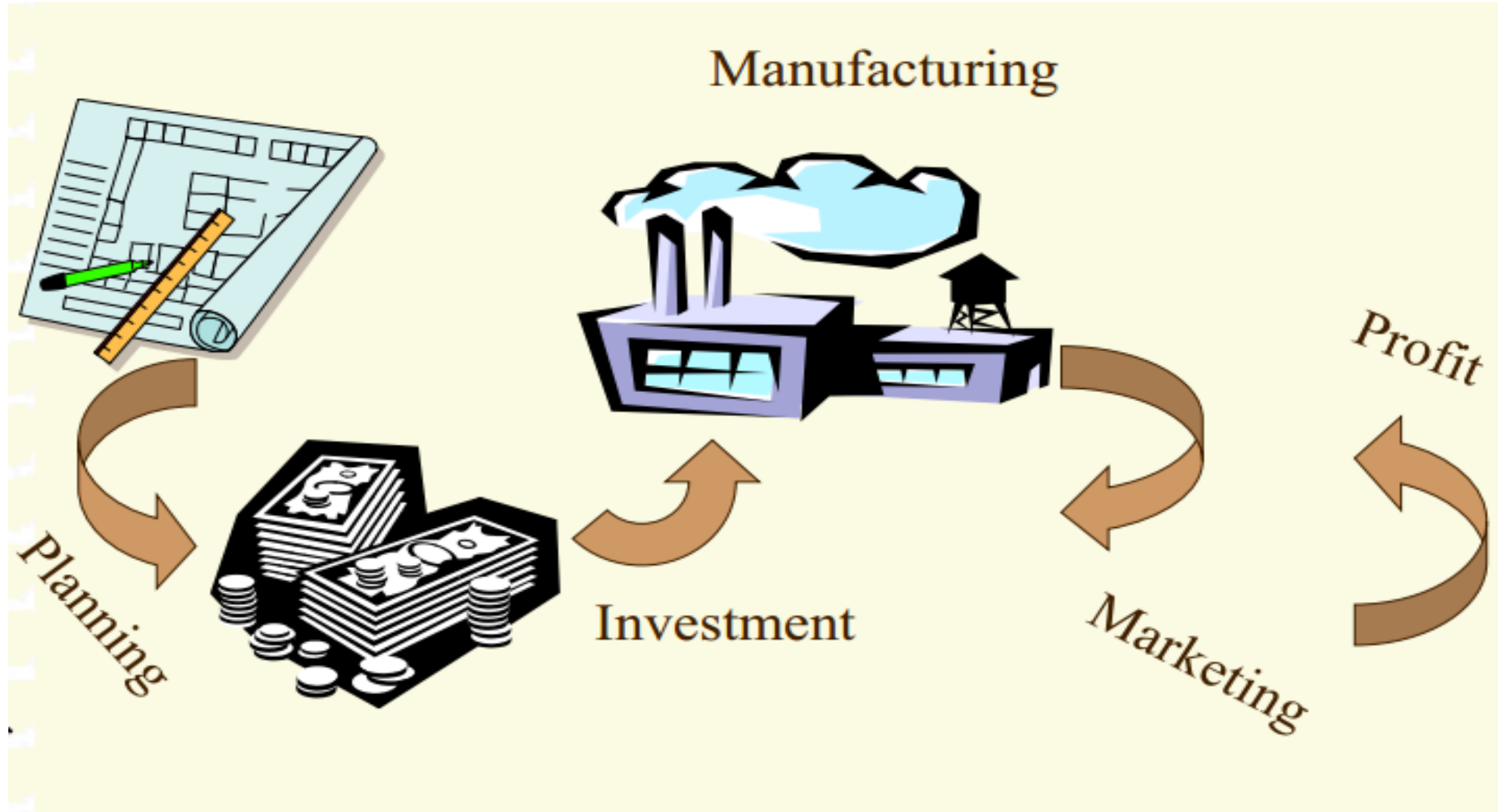
- ❑ **Expansion;** production capacity, exploring new market for product or service.
- ❑ **Replacement;** replacing existing method with the optimum and least costly method, equipment, process or location.
- ❑ **Closure;** usually the last resort; more towards investment decision such as closing down factory, termination of projects and others.

Decision-making process

1. Recognize a decision problem
2. Define the goals or objectives
3. Collect all the relevant information
4. Identify a set of feasible decision alternatives
5. Select the decision criterion to use
6. Select the best alternative



Decision making process



Fundamentals of engineering economics

❖ **Economics** – the study of how individuals and societies make decisions about ways to use **scarce resources** to fulfill wants and needs.

❖ This Resources can be

1. Land-All gifts of nature, such as: water, air, minerals, sunshine, plant and tree growth, as well as the land itself.

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

Fundamentals of engineering economics.....

3. Capital

- **Machinery:** 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

❖ **NEEDS** – “stuff” we must have to survive,
generally: food, shelter, clothing



❖ **WANTS** – “stuff” we would really like to have (Fancy food, shelter, clothing, big screen TVs, jewelry, conveniences . . .

✓ Also known as LUXURIES



Engineering economics.....

- ❖ **Engineering economics:** is the application of economic principles and techniques to engineering problems or the evaluation of design and engineering alternatives.
- ❖ It deals with the **concepts and techniques of analysis useful in evaluating the worth of** systems, products, and services in relation to their costs.

Eng. economics....

- ❖ As a discipline, it is focused on the branch of economics known as microeconomics in that it studies the behavior of individuals and firms in making decisions, by making comparisons on alternatives regarding the allocation of limited resources.
- ❖ For example in comparing the comparative costs of two alternative capital projects or in determining the optimum engineering course from the cost aspect.
- ❖ The role is to assess the appropriateness of a given project, estimate its value, and justify it from an engineering standpoint.

Eng. economics....

- ❖ Engineering economics is important to all fields of engineering because no matter how project is, it will fail if it is not economically feasible.
- ❖ Engineering economic analysis is often applied to various possible designs for an applied to various possible designs for an engineering project in order to choose the optimum design, thereby taking into account both technical and economic feasibility.

Engineering Economic Principles

- ❑ **Principle 1** Generate alternatives.
- ❑ **Principle 2** Consider differences only.
- ❑ **Principle 3** Use the same perspectives for each alternatives.
- ❑ **Principle 4** Use the same unit of measurement.
- ❑ **Principle 5** Consider all relevant factors.
- ❑ **Principle 6** Conduct sensitivity analyses.
- ❑ **Principle 7** Continuous monitoring and improvement of decision.

Why do engineers need to learn about economics

- ❖ **Ages ago**, the most significant barriers to engineers were technological.
- ❖ Now a day natural resources (from which we must build things) are becoming more scarce and more expensive.
- ❖ We are much more aware of negative side-effects of engineering innovations (such as air pollution from automobiles) than ever before.
- ❖ Engineers must ask themselves if a particular project will offer some net benefit to the people who will be affected by the project,
- ❖ Simply put, **engineers must decide if the benefits of a project exceed its costs**

The role of engineering economics

- **Assess** the appropriateness of a given project
- **Estimate** its value
- **Justify** it
- **Costing** – refers to the technique and process of ascertaining cost.

THANK YOU

If any

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