LN01: Introduction to Engineering Economics

EEE 452: Engineering Economics

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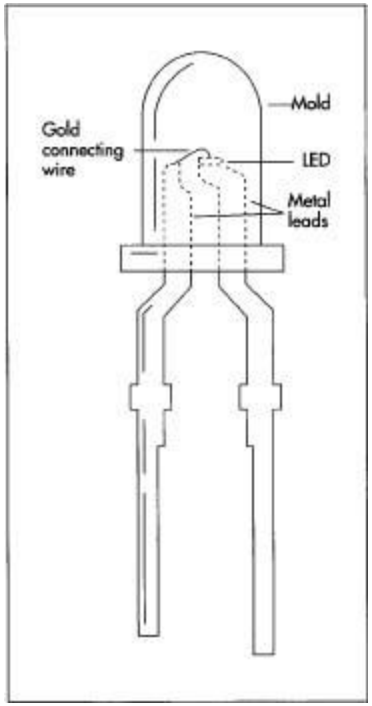
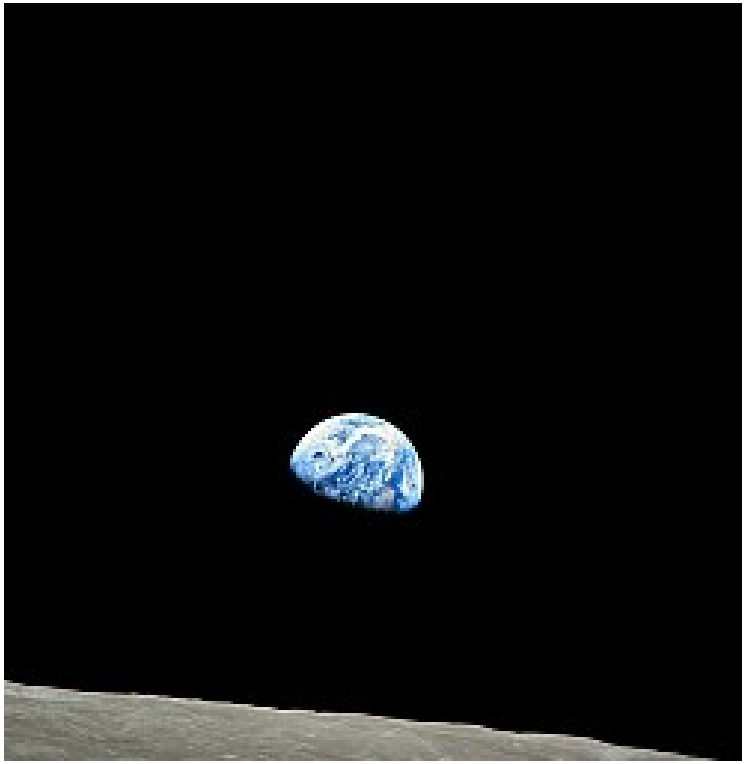
What this course is like





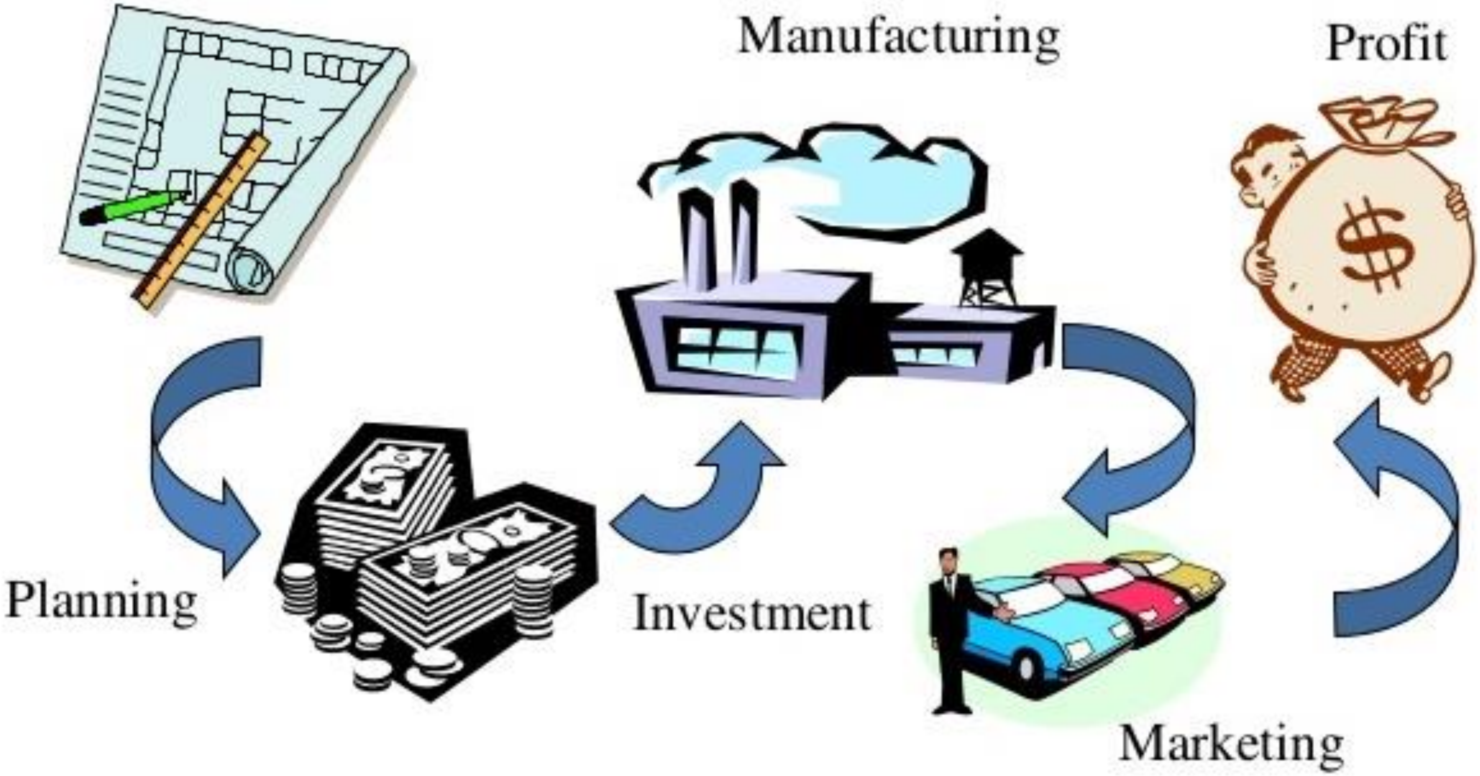
Earthrise is a photograph of the Earth and parts of the Moon's surface taken from lunar orbit by astronaut Bill Anders in 1968, during the Apollo 8 mission. Source: Wikipedia

What is Economics?

- As per Wiki
  - Economics is the social science that describes the factors that determine the production, distribution and consumption of goods and services.
  - Economics focuses on the behavior and interactions of economic agents and how economies work.

Adapted from : Professor Rokon Zaman

Engineering Economics



Why do we study it?

-to create new wealth in competitive market

- We would like to increase both consumer and producer surpluses (create new wealth) through technological innovations:
  - Products with better features for creating higher utility/$
    - Fly same distance at less cost
  - Reduce cost of production through process improvement and taking advantage from economies of scale as well as scope.
- Guide our decision of technology development, product and process innovation, and setting up production capacity through economic rational.

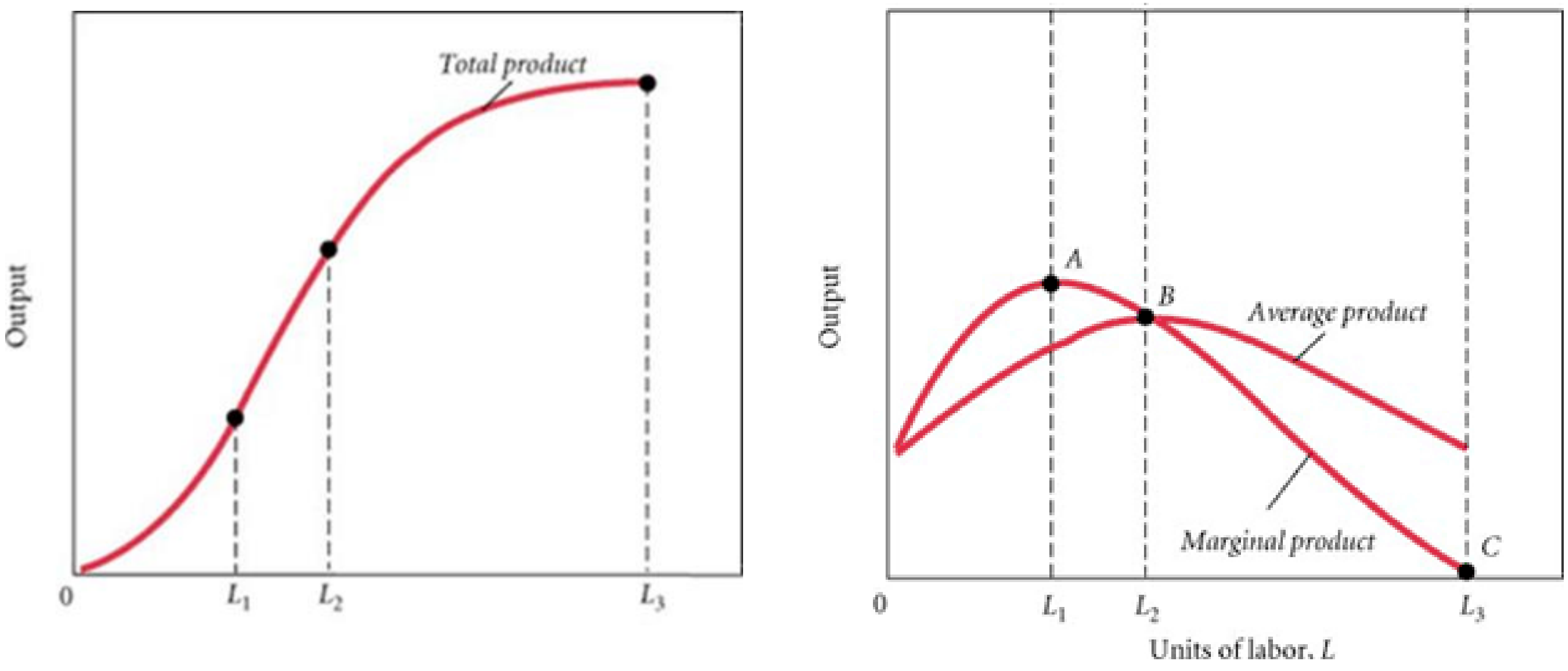
Adapted from : Professor Rokon Zaman

Estimation of production function?

- In economics, a production function relates quantities of physical output of a production process to quantities of physical inputs or factors of production.
- Used to define marginal product and to distinguish allocative efficiency, a key focus of economics.
- Address allocative efficiency in the use of factor inputs in production and the resulting distribution of income to those factors, while abstracting away from the technological problems of achieving technical efficiency, as an engineer or professional manager might understand it

Source: wikipedia

Concept of production function

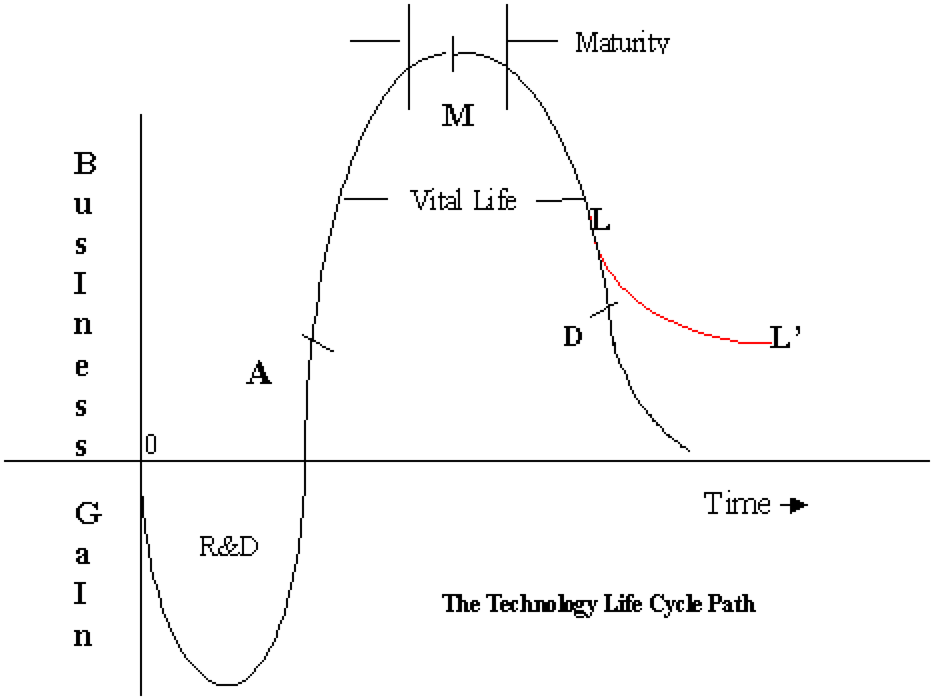


Average product vs marginal product

Source: Wikipedia

What is technology life cycle?

- The **technology life-cycle** (TLC) describes the commercial gain of a product through the expense of research and development phase, and the financial return during its "vital **life**". ... The development of a competitive product or process can have a major effect on the lifespan of the **technology**, making it shorter.



Source: Wikipedia

What is technology innovation management?

- **Innovation management** is a combination of the management of innovation processes, and change management. It refers both to product, business process, and organizational innovation.

Source: Wikipedia

What is innovation diffusion?

- **Diffusion of innovations** is a theory that seeks to explain how, why, and at what rate new ideas and technology spread. Everett Rogers, a professor of communication studies.
- A process by which an innovation is communicated over time among the participants in a social system. The origins of the diffusion of innovations theory are varied and span multiple disciplines.
  - Think of 2001~2004 while telco was booming in BD

What is organizational decision making process?

- **Group decision-making** (also known as **collaborative decision-making**) is a situation faced when individuals collectively make a choice from the alternatives before them. The decision is then no longer attributable to any single individual who is a member of the group. This is because all the individuals and social group processes such as social influence contribute to the outcome. The decisions made by groups are often different from those made by individuals.

Source: wikipedia

Design for Manufacturing

- **Design for manufacturability** (also sometimes known as **design for manufacturing** or **DFM**) is the general engineering practice of designing products in such a way that they are easy to manufacture. The concept exists in almost all engineering disciplines, but the implementation differs widely depending on the manufacturing technology. DFM describes the process of designing or engineering a product in order to facilitate the manufacturing process in order to reduce its manufacturing costs. DFM will allow potential problems to be fixed in the design phase which is the least expensive place to address them. Other factors may affect the manufacturability such as the type of raw material, the form of the raw material, dimensional tolerances, and secondary processing such as finishing.

Source: Wikipedia

What is network economics?

- **Network economics** refers to business economics that benefit from the network effect. It is also known as Netromix. This is when the value of a good or service increases when others buy the same good or service.
- Example
  - Telecommunication
  - Social media networks

Source: Wikipedia

What is venture capital?

- **Venture capital** (**VC**) is a type of private equity,[1] a form of financing that is provided by firms or funds to small, early-stage, emerging firms that are deemed to have high growth potential, or which have demonstrated high growth (in terms of number of employees, annual revenue, or both). Venture capital firms or funds invest in these early-stage companies in exchange for equity, or an ownership stake, in the companies they invest in. Venture capitalists take on the risk of financing risky start-ups in the hopes that some of the firms they support will become successful. The start-ups are usually based on an innovative technology or business model and they are usually from the high technology industries, such as information technology (IT), clean technology or biotechnology.

Source: Wikipedia

What is Risk in business? Is it quantifiable?

- Risk assessment consists of an objective evaluation of risk in which assumptions and uncertainties are clearly considered and presented.
- Both the quantities by which risk assessment is concerned – potential loss and probability of occurrence – can be very difficult to measure. The chance of error in measuring these two concepts is high.

Source: Wikipedia

Time Value of Money

- The **time value of money** is the greater benefit of receiving money now rather than later. It is founded on time preference.
- The principle of the time value of money explains why interest is paid or earned: Interest, whether it is on a bank deposit or debt, compensates the depositor or lender for the time value of money.

$$PV = \frac{FV}{(1+r)}$$

Source: Wikipedia

Accounting for Intangible Assets

- An **intangible asset** is an asset that lacks physical substance (unlike physical assets such as machinery and buildings) and usually is very hard to evaluate.
- Includes patents, copyrights, franchises, goodwil l, trademarks, trade names, the general interpretation also includes software and other intangible computer based assets.
- Contrary to other assets, they generally—though not necessarily—suffer from typical market failures of non-rivalry and non-excludability

Source: Wikipedia

What is market regulation in terms of economics?

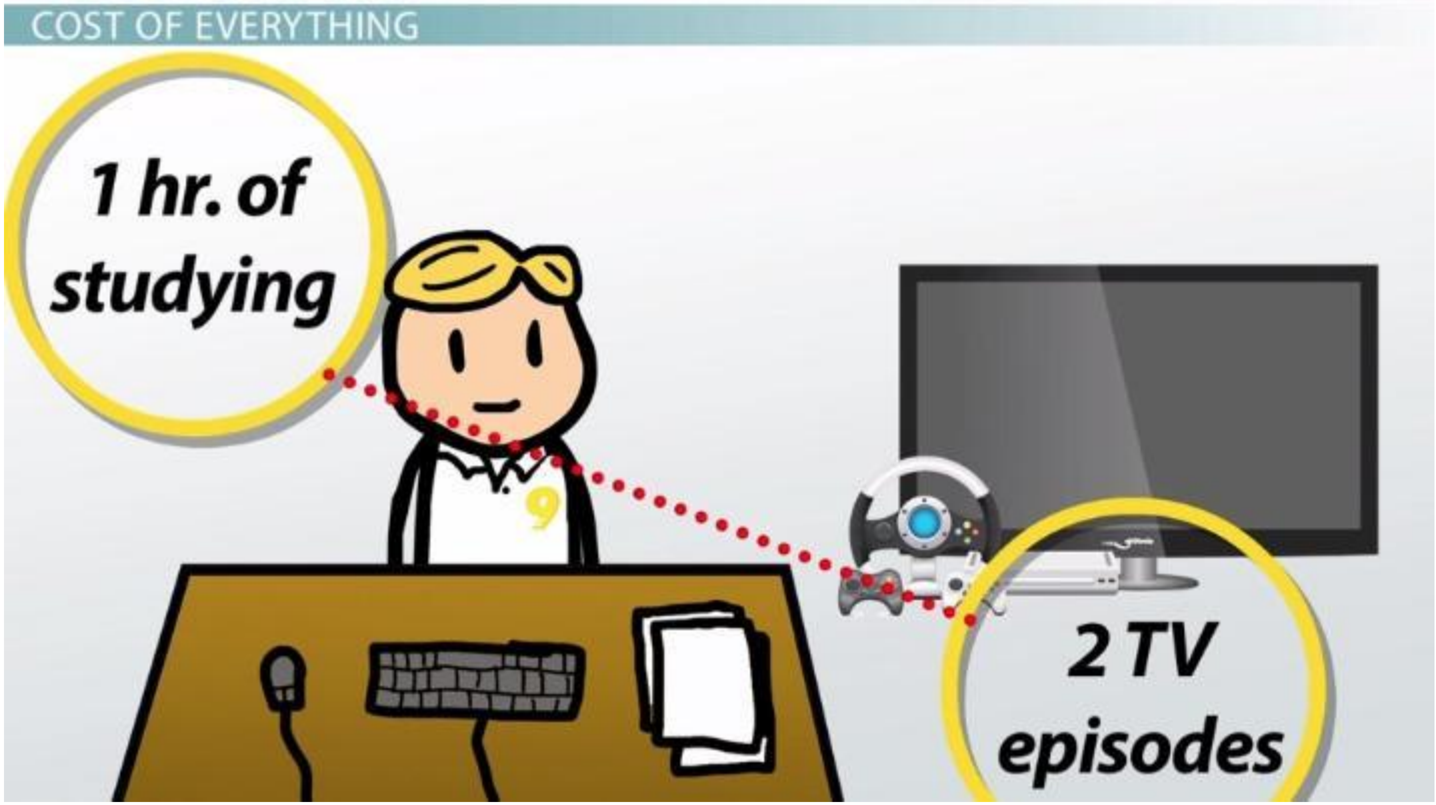
- The economics of regulation. It is the application of law by government or independent administrative agencies for various purposes, including remedying market failure, protecting the environment, centrally-planning an economy, enriching well-connected firms, or benefiting politicians.

Source: Wikipedia

Some Concepts

- Opportunity Cost
- Avoidable costs
- Sunk costs
- Variable cost , Fixed cost

Opportunity Cost



Avoidable Cost

- a cost that can be avoided by not producing
- In a bakery, if you produce you will need to procure raw materials like flour, sugar, baking powder, electricity/gas/coal, labor. Incur cost
- If you don’t produce you avoid these costs.– avoidable costs



Sunk Costs

- Cannot avoid, even if production is stopped.
- If you stop producing cakes, you cannot avoid the depreciation cost of the baking oven you bought when you set up the facility.

Variable cost , Fixed cost

- Variable costs vary with the rate of production. Variable costs are avoidable.
- Fixed costs do not
- A fixed cost is partly or completely sunk if there is some percentage that could not be avoided if production were to cease.