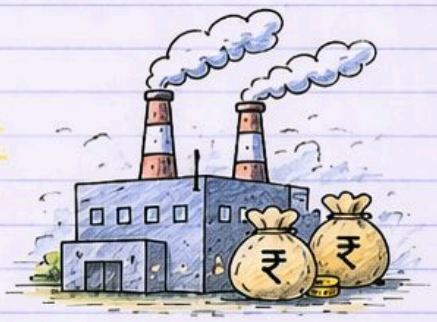
Economics

Module-4 Notes

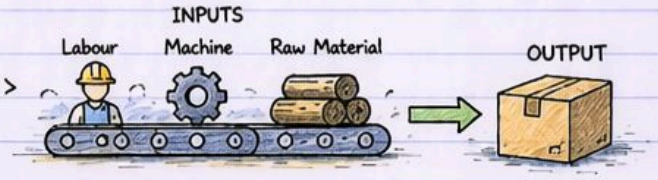
by pyqfort.com



Contents Covered:

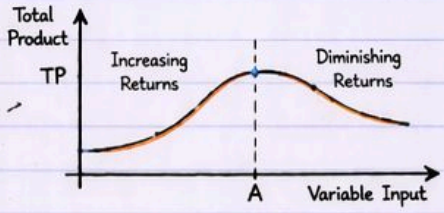
- **Production Intro**

Production means creating Goods & Services.



- **Law of Variable Proportion**

As we add more & more Variable Input, keeping Fixed Input constant, Total Output first increases at an increasing rate, then at a decreasing rate.



- **Law of Returns of Scale**

When all inputs are changed in the same proportion...

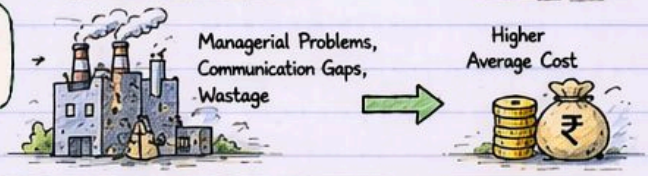
Increasing Returns	Constant Returns	Decreasing Returns
Output ↑↑	Output ↑	Output ↑ (less than proportionate)

- **Economies of Scale**

Larger Scale of Operation leads to lower Average Cost.

- **Diseconomies of Scale**

Too Large a Scale may lead to higher Average Cost.



- **Concepts of Cost of Production**

Explicit Cost: Actual payments made by the firm.

Implicit Cost: Imputed cost of own resources.

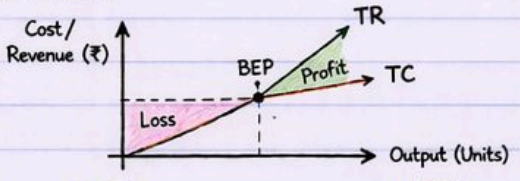
Total Cost = Explicit Cost ↑ Implicit Cost

- **Types of Costs**

Fixed Cost (FC)	Variable Cost (VC)	Total Cost (TC)	Average Cost (AC)
Rent, Salaries	Raw Material, Direct Labour	TC = FC + VC	AC = TC / Output

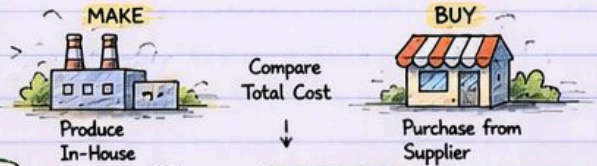
- **Break Even Analysis**

Break Even Point is where Total Revenue equals Total Cost. No Profit, No Loss.



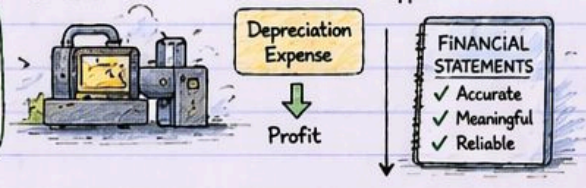
- **Make or Buy Decisions**

Should we produce in-house or buy from outside?



- **Relevance of Depreciation towards Industry**

Depreciation shows the wear & tear of Assets. It helps in calculating True Cost and Profit.



Production Intro

Production : Refers to the process of converting inputs (labor, capital, raw materials) into goods & services to satisfy human needs & wants. A supply.

Factors of Production

① **Land** - Refers to all natural resources.

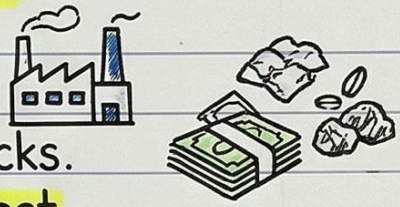
Includes land, forests, minerals, minerals.
Land is limited to producted & earns rent.
Key Characteristics:
- ✓ Fixed supply (cannot be increased)
- ✓ earns rent

② **Labor** - Refers human effort (physical & mental) in production. Includes skilled & unskilled workers.

Example: factory worker, a doctor, teacher.
- ✓ Can improved with training & earns wages / salaries.

Key Characteristics:
- ✓ Improved with education, earns wages.

③ **Capital** - man-made resources.



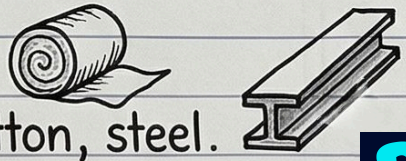
- Fixed Capital - Money, raw materials, stocks.
- Working Capital - buildings, earns interest.

Key Characteristics:
- ✓ Can be increased, more savings and investment.
- ✓ Earns income in the form of interest.

④ **Entrepreneur**

The person who, organizer & risk-taker.
Takes and makes decisions to stun futurb idea.
Innovation and risk-ragzing a team, earns profit.
Key Characteristics:
- ✓ Combines other factors effectively, earns profit.

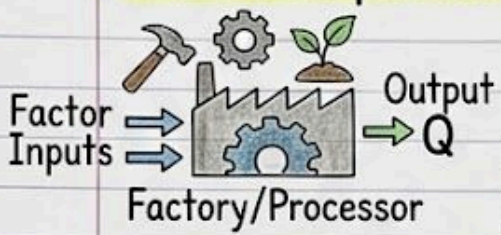
⑤ **Raw Materials**



Basic inputs, natural or synthetic. e.g., cotton, steel.

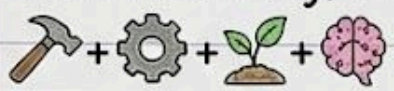
Production Function in Economics

★ Depicts the relationship between quantity produced and factors factors of production required.Mathematical relationship showing showing varying output levels for different input combinations (L, K, T, E).



"Technical relation connecting factor inputs and outputs (Prof. Koutsoyiannis)."

★ Mathematically, expressed as:



$$Q = f(L, K, T, E) \longrightarrow f(\ ) \rightarrow Q$$

(pile of goods)

Q = Output (Production)
L = Labor (Human effort)
K = Capital (Machinery, tools, equipment)
T = Land (Natural resources)
E = Entrepreneurship (Managerial and organizational ability)

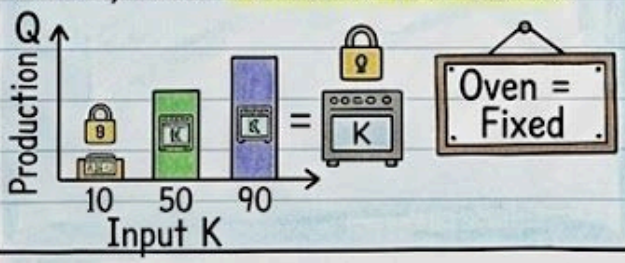




★ Two Types of Factor Inputs

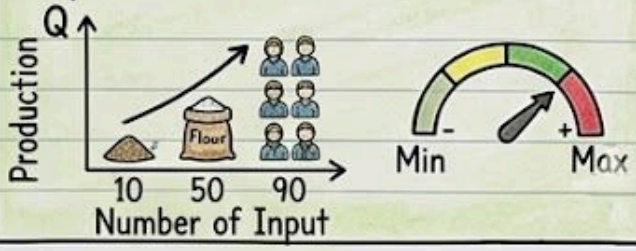
1. Fixed Inputs

Inputs that don't change with production level. Constant in short run.Example Scenario:
A bakery oven can bake 100 cakes/day. Baking 50 or 90 cakes, cakes, oven remains the same.



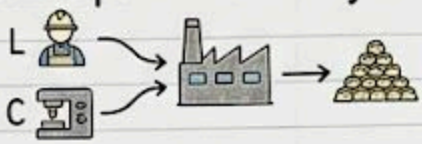
Variable Inputs

Variable inputs change with production level.Example Scenario: Bakery needs to produce more cakes → require more flour, sugar, and workers. The quantity depends on production level.



Types of Production Function

The production function represents the relationship between input factors (like labor and capital) and output. It helps firms analyze how changes in inputs affect production.

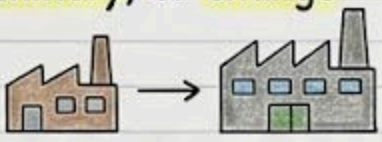


1. **Short-Run Production Function:**
   - In the short run, at least one factor of production is fixed, while others are variable.
   - Firms can change labor and raw materials but cannot quickly change factory size or machinery.
   - The Law of Diminishing Returns applies:
     - As more units of a variable input (e.g., labor) are added to a fixed input (e.g., machinery), the additional output (marginal product (MP)) eventually decreases.

1st worker → 3
2nd worker → 2 piles
3rd worker → 1 pile

☆ **Example:** A car factory with a fixed number of machines can hire more workers, but after a point, adding more workers leads to congestion, reducing efficiency.

2. **Long-Run Production Function:**
   - In the long run, all factors of production are variable (no fixed inputs).
   - Firms can expand factory size, buy new machinery, or change technology.



IRS → CRS → DRS
↑ Doubling ↑ Piles ↓ 1.5-size

The concept of Returns to Scale applies:
   - Increasing Returns to Scale (IRS): Doubling inputs are more than double the output.
     - IRS: The honest pile alone, chot pariicular output.
     - CRS: The nnputs exactly double, less than output.
     - DRS: The size pile and 1.5-size pile.

☆ **Example:** A company expands its factory and buys more advanced machines, increasing production more efficiently.

LAW OF VARIABLE PROPORTION (LAW OF DIMINISHING RETURNS)

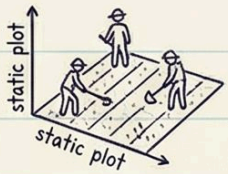
Definition: Explains total output changes with ONE variable input (e.g., labor) while other inputs are FIXED (e.g., land or machinery).

Leftwitch's Statement: "The law of variable proportions states that if the input of ONE resource is increased by equal increments per unit of time while the inputs of other resources are held CONSTANT, TOTAL OUTPUT WILL INCREASE, but beyond some point the resulting INCREASES will be SMALLER AND SMALLER."

Also known as: Law of Diminishing Marginal Returns (SHORT RUN only)

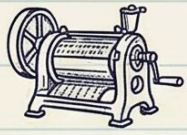
Assumptions of the Law of Variable Proportion:

1. Short-Run Scenario: At least one factor (like land) is FIXED, another (like labor) is VARIABLE.

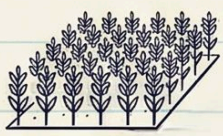


2. Homogeneous Units: All units of the variable factor (laborers) are IDENTICAL in skill & efficiency.

3. No Change in Technology: Technology and production methods remain CONSTANT.



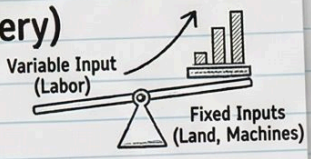
4. Constant Quality of Fixed Inputs: Fixed input efficiency (like land fertility) does not change.



5. Perfect Divisibility: The variable factor (workers) can be added in small units (one worker at a time).

Stages of the Law of Variable Proportion

The Law of Variable Proportion states that when one input (such as labor) is increased while keeping other inputs (such as land, machinery) fixed, the total output does not increase at a constant rate. Instead, it follows three distinct stages:



Stage 1: Increasing Returns to a Factor (Stage of Growth)

- TP increases at an increasing rate as more units of variable factor (e.g., labor) are added.
- MP rises (workers and resources better utilized).
- AP also increase but slower rate than MP.

Why It Happens?

- Better utilization of fixed inputs (workers use land/machinery effectively).
- Specialization and division of labor improves efficiency.
- Underutilized fixed factors become operational.

Example: 1 worker + 1 machine is inefficient; adding more workers lets them divide tasks and use machine effectively.

End of Stage 1: MP reaches its maximum.

Stage 2: Diminishing Returns to a Factor (Stage of Efficient Utilization)

- TP continues to increase but at a decreasing rate.
- MP starts to decline.
- AP reaches its maximum and starts falling.

Why It Happens?

- Fixed inputs become a constraint (e.g., short-run limits).
- Limited space/resources reduce efficiency.
- Coordination problems arise.

Example: Small kitchen with too many chefs leads to overcrowding & colliding chefs, reduces efficiency.

End of Stage 2: Firms operate here (TP max, MP positive); firms stop *just before* MP becomes negative.

Stage 3: Negative Returns to a Factor (Stage of Overcrowding)

- TP starts to decline.
- MP becomes negative (each added worker reduces overall output).
- AP continues to fall.

Why It Happens?

- Excessive use of variable factor (too many workers).
- Overcrowding leads to poor coordination & conflicts.
- Fixed resources over-utilized, reducing productivity.

Example: Factory with 1 machine and too many workers; they get in each other's way, delays & errors, output falls.

End of Stage 3: Firms never operate here as it leads to losses.

Practical Example & Importance: Law of Variable Proportion

I. Practical Example: A Smartphone Factory

Consider a factory producing smartphones.

1. hires a few workers, production efficiency, machines are utilized.

2. Hiring more workers, production but but at a slower rate, limited space.

3. Too many workers, mismanagement, machine breakdowns, reduced production.

Key Learning: optimal level of input (Stage 2) maximize efficiency.

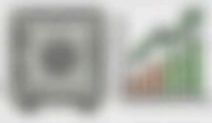
II. Importance of the Law:

1. Understanding Short-Run Production.
   - Decisions on labor/capital vs. fixed resources.

2. Guides Resource Allocation & Efficiency.
   - Identify 3 stages to avoid inefficiencies.
   - Firms try to operate in Stage 2 (Diminishing Returns) minimal

3. Practical Application in Industries.
   (agriculture, manufacturing, service sectors)
   - Determine optimal workforce, equipment usage.
   - Avoid inefficiencies.

4. Cost Control & Profit Maximization.
   - Stop hiring before marginal returns become negative.



5. Determines Pricing and Employment Decisions.
   - Marginal productivity declines → invest in better technology, balance wages, pricing strategies.

6. Basis of Further Economic Theories.
   - Foundation for cost analysis, returns to scale.
   - Supports theories like diminishing marginal utility, optimal factor combination.

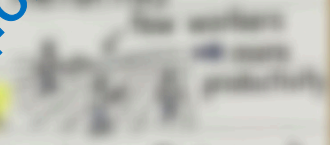
Name: _____ Date: _____

Causes and Effects of the Law of Variable Proportion

I. Causes of the Law of Variable Proportion

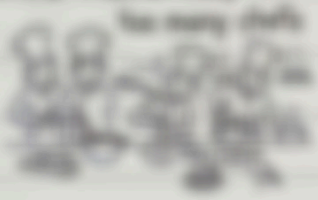
The law operates due to 3 major reasons:

1. **Better Utilization of Fixed Inputs** (Stage 1: Increasing Returns)
When first variable units (e.g., labor) are added to fixed factors (e.g., land/machinery), efficiency increases.



2. **Overcrowding and Diminishing Efficiency** (Stage 2: Diminishing Returns)
After a point, fixed inputs get overused. Extra labor adds less efficiency.

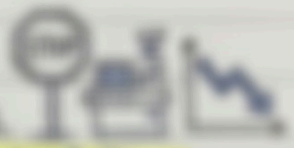
3. **Overutilization and Negative Impact** (Stage 3: Negative Returns)
Beyond a limit, excessive variable use leads to inefficiencies and waste.



II. Effects of the Law of Variable Proportion

This law has several economic and business impacts:

1. **Optimal Use of Resources**
Prevents wasting resources. Prevents waste of resources.
Firms stop adding inputs when marginal productivity starts falling.

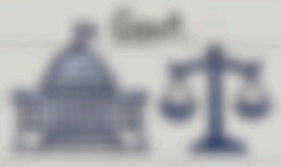


2. **Decreasing Marginal Returns Affect Employment**
Less returns mean firms stop hiring, impacting jobs.

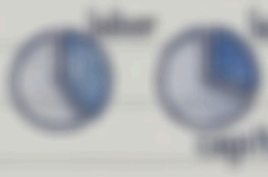
3. **Impacts Pricing and Wage Policies**
Prices and wages adjust based on per-worker productivity.

4. **Encourages Innovation and Technology Adoption**
Firms invest in new tech to overcome diminishing returns.

5. **Guides Government Policies on Labor and Production**
Regulate industries and prevent overuse of resources.
Agricultural planning is also supported.



6. **Helps in Economic Planning and Growth**
Useful for allocating labor/capital.



Law of Returns to Scale

Core Concept & Definition: Long run relationship between inputs & outputs. When ALL factors (land, labor, cap, etc.) are increased proportionally (Contrast: Variable Prop is just 1 factor), unlike variable proportions, here ALL inputs change.
Statement: When inputs are increased proportionally, output may increase:

1. Same proportion
2. More than that proportion
3. Less than that proportion, leads to three types of returns.

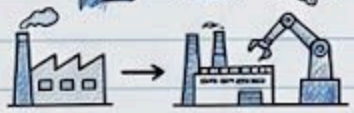
1. Increasing Returns to Scale (IRS)

Def: Output increases more than proportional increase in inputs.
Example: Double L & C → More than Double output.

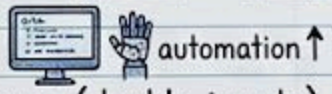
- Causes of IRS:
  - Economies of Scale (large-scale means lower costs)

  - Specialization & Division of Labor (workers focus on tasks, improvements in efficiency)

  - Better Utilization of Fixed Factors (expansion makes machines more productive)



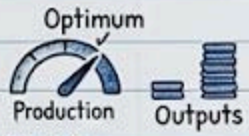
  - Technological Advancements (automation)



Example: Car factory expands from 100 → 250 cars (double inputs).

2. Constant Returns to Scale (CRS)

Def: Output increases in same proportion as inputs.
Example: Double inputs → Output doubles.



- Causes of CRS:
  - Optimum Production Size (firm reaches efficient level)
  - Balanced Growth of Factors (no efficiency gain/loss)

  - Efficient Resource Utilization Maintained (inputs/outputs expand same rate)

Example: Bakery increases both workers & ovens by 50% → 50% increase in bread production.

3. Decreasing Returns to Scale (DRS)

Def: Output increases by less than proportional increase in inputs.
Example: Double L & C → Output less than doubles.

- Causes of DRS:
  - Managerial Inefficiencies (large organizations difficult to manage)
  - Resource Constraints (some resources scarce, e.g., land)
  - Coordination Problems (communication challenges slow productivity)

Example: Software company doubles employees but 'workflow inefficiencies' lead to only 1.5x output.

Comparison: Law of Variable Proportions (LVP) vs Law of Returns to Scale (LRS)

Both laws describe how changing input variables affect production. However, they differ in key ways.

Basis of Comparison	Law of Variable Proportions (LVP)	Law of Returns to Scale (LRS)
Time Period	Short Run (at least one fixed factor)	Long Run (all factors variable)
Nature of Input Change	Only one input is increased while others remain fixed	All inputs (labor, land, capital) are increased in a fixed proportion
Effect on Output	Initially increases at an increasing rate, then slows, and finally decreases	Output may increase more than, equal to, or less than the proportion of input increase
Stages of the Law	Three stages: Increasing, Diminishing, and Negative Returns	Three types: Increasing, Constant, and Decreasing Returns to Scale
Reason for Occurrence	Limited availability of fixed factors leads to inefficiency	Changes in efficiency, specialization, and economies/diseconomies of scale
Applicability	Short-run production decisions (e.g., hiring more labor for a fixed machine).	Long-run planning for business expansion (e.g., doubling land, labor, and capital)

Basis of the Difference (Constraint vs. Economies):

- LVP:
  - Fixed Factors constraint (limited space, land, or machinery reduces efficiency).

  - Lack of Coordination (too many workers in a fixed space creates inefficiencies).

- LRS:
  - Economies of Scale (improved specialization, bulk purchasing, better technology improves output).
  - Diseconomies of Scale (overexpansion leads to poor coordination, inefficiencies, and higher costs).

Effects of Both Laws on Production:

- LVP: helps determine the optimal labor-to-capital ratio.

- LRS: helps industries plan for long-term growth and expansion strategies.

Real-Life Examples:

1. LVP Example: Small Bakery

One baker & one oven → efficient.

Hiring one more baker → significant production (Stage 1).
Adding a third baker → production increases slightly (Stage 2).

Adding a fourth baker → overcrowding, reducing efficiency (Stage 3).

2. LRS Example: Large Automobile Company

Doubles labor, machinery, and factory size.

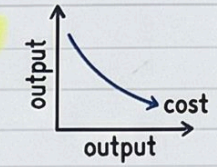
If output more than doubles → Increasing Returns.

If output doubles → Constant Returns.

If output increases less than double → Decreasing Returns.

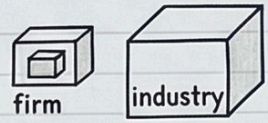
ECONOMIES OF SCALE /
REASONS OF INCREASING RETURNS TO SCALE

Economies of Scale refer to the cost advantages that a firm experiences as it increases production. As the scale of production grows, the average cost per unit of output decreases due to improved efficiency and better resource utilization.



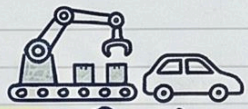
Formal Definition: "Economies of scale occur when an increase in production leads to a lower cost per unit, allowing firms to operate more efficiently and competitively in the market."

Broadh, economies of scale are classified as:
(1) Internal Economies of Scale: arise due to the change in the size of the firm of the firm and are available to that firm only.
(2) External Economies of Scale: arise due to the expansion of the industry i.e. number of firms.



Internal Economies: The savings effected by a firm by increasing its level of operations are referred to as internal economies. Cairncross definition mentions those achieved by a factory without help, due to an increase in output.
Koutsoyiannis split it into: (1) Real Economies and (2) Pecuniary Economies.
(1) Real Economies: réduction in physical quantity of inputs, raw materials, various labour and various capital.

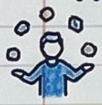
Types of Internal Economies: ✓
✓ [Technical Economies → Advanced machinery improves efficiency.
car company using robotic assembly lines.



[Managerial Economies → Specialized managers improve productivity.
multimeter hired financial experts.

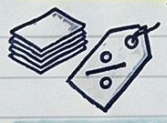
[Financial Economies → Bigger firms get cheaper loans. ✓
multimeter securisa loans at lower interest rates than small businesses

[Marketing Economies → Bulk purchasing reduces costs. ✓
Walmart gets discounts for buying in bulk.



[Risk-Bearing Economies → Diversification spreads risks. ✓
smartphone company with new product lines.

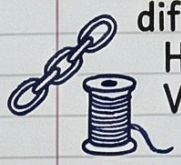
✓ Pecuniary Economies: Realised from paying lower prices for production factors due to bulk-buying as size increases. Big customers so * purchasing concessions on advertisement and publicity. materials



External Economies: (Cairncross) benefits accrual to firm or industry due to increase in level of output of any industry. *Not firm size. When other firms expand
Types classification into three types:

1. Economies of Concentration: cluster in one location, better transport, skilled labor, financial institutions. Example: Silicon Valley
2. Economies of Information: share research, journals, market insights Example: Fashion industry trend reports

3. Economies of Disintegration: divide production processes to specialize in different stages. chains and specialized factories



Horizontal Disintegration: same product type. Ex. woolen mills blankets
Vertical Disintegration: different stages. spoool loom garment. Example: textile industry (spinning, weaving, dyeing)

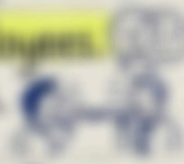
DISECONOMIES OF SCALE

- **Definition:**
  A situation where, past a min point, an **increase in production** leads to **higher per-unit costs**, not lower ones. It happens due to inefficiencies from **over-expansion** of a firm.

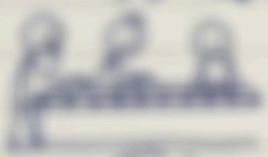
1. Internal Diseconomies of Scale

Experienced by a **PARTICULAR** firm.
Principal Cause: Management Difficulties (unwieldy mgmt).
Unphrased **large scale management difficulties**.

- ✓ Coordination Difficulties: **Coordination and decision-making**
  Example: large corporation struggles with slow approvals.
- ✓ Communication Problems: → **Mismanagement due to too many employees**
  Example: a multinational [illegible] delays due to too many employees.



- ✓ Labor Issues: → **Reduced motivation and productivity**
  Example: overworked factory employees reduce efficiency.



- ✓ Overuse of Resources: → **Machine breakdowns and delays**
  Example: [illegible] machines break down.

2. External Diseconomies of Scale

Experienced by **ALL** firms of an industry.
As the **scale** of the **ENTIRE INDUSTRY** expands.

- **Higher Input Costs:** → **Increased demand** for **raw materials**
  Example: More demand for steel raises costs for car makers.

- ✓ **Labor Shortage:** → **Competition for skilled workers**
  Example: the IT industry struggles to find software engineers.

- ✓ **Infrastructure Overload** → **Traffic congestion** delays **disruptions**
  Example: traffic congestion traffic., delays logistics in Delhi NCR.

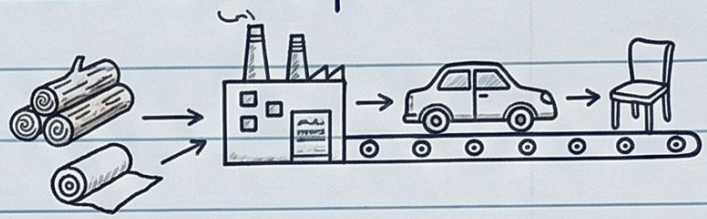
- ✓ **Environmental Issues** → **Increase production costs**
  Example: pollution laws increase costs for the chemical industry.

Concepts of Cost of Production

Cost of Production

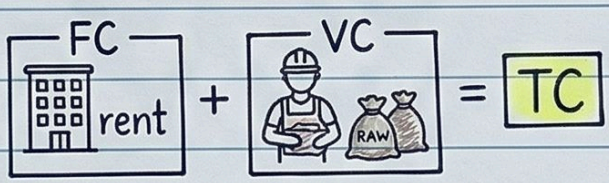
- Definition:

The cost of production refers to the total expenses incurred by a firm to manufacture goods or services. services. It includes costs of raw materials, labor, machinery, rent, utilities, and other inputs necessary for production.

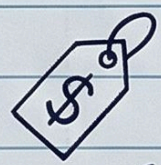


Formula:

Total Cost (TC) = Fixed Cost (FC) + Variable Cost (VC)



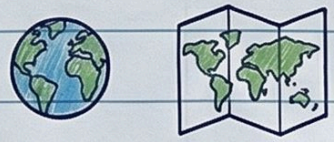
Importance of Cost of Production



✓ 1. Helps firms determine pricing strategies.

✓ 2. Affects profitability and competitiveness.

✓ 3. Guides firms in cost-cutting and efficiency improvements.



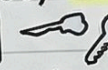
✓ 4. Influences economic decisions and resource allocation.

'DIFFERENT Types of Costs: ACCOUNTING COST, SUNK COST, MARGINAL COST, OPPORTUNITY COST'

1. Accounting Cost (Business Cost)


Definition: Cash payments firms make for input factors & depreciation.

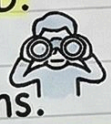
Synonyms: Actual Cost, Explicit Cost, Direct Cost.

Includes: Wages,   rent, utilities  taxes.

Example: ₹50,000 spent on rent, wages, raw materials is the accounting cost.

2. Sunk Cost


Definition: A past expense that CANNOT BE RECOVERED.

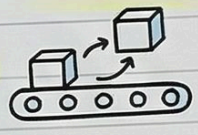



Key Point: IRRELEVANT to future decision-making.

Reason: Past losses should not dictate future actions. Decisions should base on marginal costs & expected benefits.

Example: ₹1,00,000 research on a failed project is a sunk cost. irrational to continue based on past investment.

3. Marginal Cost



Definition: Change in total cost due to producing one EXTRA unit of output.

Samuelson: Extra cost of producing one extra unit.

Formulas: *Total Cost, Quantity.*

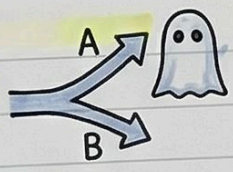
$$MC = \frac{\Delta \text{ Total Cost}}{\Delta \text{ Quantity}}$$

Formulas:

$$MC = TC_n - TC_{(n-1)}$$

Example: 10 units = ₹1,000; 11 units = ₹1,050. MC = ₹50.

4. Opportunity Cost



Definition: The value of the NEXT BEST ALTERNATIVE forgone when making a choice.

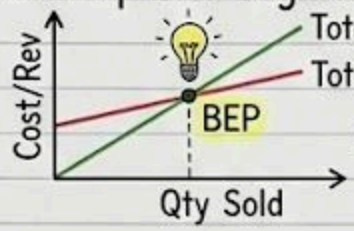
Explanation: Every decision has TRADE-OFFS. Resources (time, money, labor) are LIMITED. Choosing one means giving up another.

Helpful in efficient decision-making.

Example: Invest ₹1,00,000 in business vs. bank at 5%. Opportunity cost = ₹5,000 lost interest.

Break Even Analysis

1. **The Concept & Purpose:**
   - Breakeven analysis is a crucial financial tool used by businesses.
   - It determines the minimum level of sales required to cover all costs. Beyond this point, a business can start making a profit.
   - It helps a company understand where it stands conceptually before profit begins.



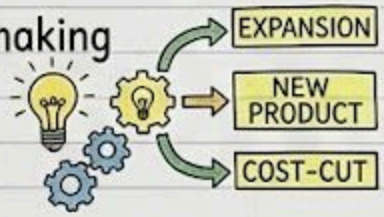
Fixed + variable and cover variables.

2. **Key Importance (Detailed):**

1) **Determines Profitability** 🏆: Identifies the point where total revenue equals total cost. Helps businesses assess when they will start earning profits.

2) **Aids Pricing Decisions** 💰: Helps in setting the right price for products by considering cost structures and profit margins. Guides in optimizing pricing strategies.

3) **Supports Cost Control** 📉: Businesses can analyze and separate fixed and variable costs to find ways to reduce expenses and improve profitability. Enables focus on efficiency.



4) **Helps in Decision-Making** 📊: Assists with making key business decisions. Useful for planning expansion, launching new products, and making cost-cutting strategies. Guides resource allocation.

5) **Risk Management** ⚖️: Helps businesses assess financial risks and plan for worst-case scenarios. Calculates the minimum sales needed to sustain operations. Ensures survival.

Make or Buy Decision in the Production System

The Make or Buy Decision in a production system refers to the strategic choice of whether to manufacture a product in-house (Make) or outsource it from an external supplier (Buy). This decision impacts costs, quality, efficiency, and business strategy.

How is the Decision Taken?

1. Cost Analysis

Compare total cost of in-house production (labor, materials, machinery) with the cost of outsourcing.
If outsourcing is cheaper, the company may opt for "Buy."

2. Quality Considerations

If maintaining high quality standards is crucial, in-house production (Make) may be preferred.

3. Availability of Resources

If the company lacks skilled labor, technology, or raw materials, outsourcing (Buy) might be a better choice.

4. Production Capacity

If the company has spare capacity, producing in-house (Make) can reduce idle resources and increase efficiency.

5. Strategic Importance

If the product is core to business success, making it in-house ensures better control over innovation and intellectual property.

6. Supplier Reliability

If trusted suppliers are available, outsourcing can reduce operational complexity and focus on core business.

📌 Conclusion:

The Make or Buy Decision is taken based on cost, quality, resource availability, production capacity, and strategic goals. A well-analyzed decision helps businesses reduce costs, improve efficiency, and maintain competitive advantage.

Relevance of Depreciation towards Industry

Depreciation: Meaning & Relevance

Meaning of Depreciation

Depreciation refers to the gradual reduction in the value of fixed assets in (machinery, buildings, vehicles, equip.) over time due to wear & tear, obsolescence, or usage.
conceptual, it is an accounting concept
helps businesses allocate the cost of an asset over its useful life.

Relevance in Industry

1) True Profit Calculation:

Deducted from revenue to get the actual profit of a business.
It ensures accurate financial reporting & prevents overstatement of earnings.

2) Asset Replacement Planning:

Industries use depreciation to accumulate funds for replacing old machinery & equipment.
Ensures continuous production without sudden financial burdens.

3) Cost Control & Pricing Strategy:

It's a part of production costs, affecting product pricing.
helps set competitive prices by considering real cost of assets.

4) Tax Benefits:

Non-cash expense, reducing taxable income.
Helps industries save on taxes, improving financial stability.

5) Investment & Decision-Making:

Companies analyze asset depreciation to decide on upgrading or replacing equip. ensures industries stay technologically advanced & efficient.

Full content is
available at
'topmate.io/saumy1905'
or you can navigate
to the specific section
of the subject on
'pyqfort.com'
to access it