

Production transforms scarce resources

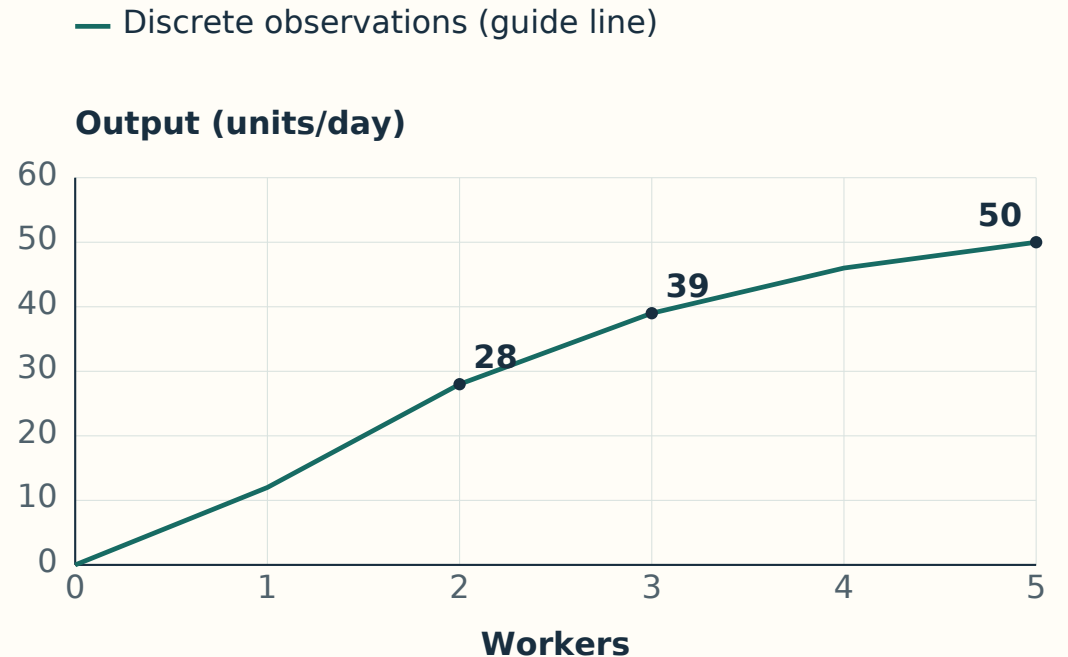
Production combines labour, equipment, materials, knowledge and time into goods or services. Output is a physical or service quantity; revenue is money received for selling it. More output is not automatically more profit or greater social value. Every business, price and production relationship in this lesson is an illustrative teaching assumption.

A production function holds some things fixed

A production function describes attainable output from specified inputs under a given technology. In a short-run example, equipment is fixed while labour can vary. “Short run” means at least one relevant input cannot adjust; it is not a universal number of months. Long-run comparisons allow all relevant inputs to change.

Worked example: marginal product

With zero through five workers, illustrative daily output is 0, 12, 28, 39, 46 and 50 units. Each additional worker therefore adds 12, 16, 11, 7 and 4 units. These increments are marginal products. Marginal product starts falling after the second worker, although total output continues rising throughout the table.



Average and marginal product differ

Average product is total output divided by the number of workers. In the same example, three workers produce thirty-nine units, so average product is thirteen units per worker. The third worker's marginal product is eleven. Adding an increment below the previous average pulls the average down; an increment above it raises the average.

Classify costs along separate dimensions

A fixed cost does not vary with output over the relevant range; a variable cost does. An avoidable cost changes if the activity is stopped; a sunk cost cannot now be recovered. These distinctions are independent. A future monthly subscription can be fixed with respect to sales yet avoidable if the business does not operate.

Cash surplus is not economic surplus

Cash surplus subtracts the stated cash outlays from receipts. Economic surplus also deducts the value of resources used instead of their best feasible alternatives. An owner's unpaid time can therefore matter. Define the measure and comparison before using "profit". Do not subtract an opportunity cost twice when comparing complete alternative plans.

Worked example: contribution per unit

An illustrative product sells for £18. Each unit needs £7 of materials and delivery plus twelve minutes of the owner's time. Alternative work pays £15 per hour. Twelve minutes is 0.2 hours, worth £3. Economic contribution per unit is therefore $£18 - £7 - £3 = £8$ before monthly fixed costs.

Worked example: build the monthly result

The same business has £90 of avoidable monthly cash costs and four maintenance hours. At £15 per hour, fixed economic costs total £150. Thirty sales give thirty times £8 minus £150, or £90 economic surplus. Cash surplus is £240, but ten total working hours have an opportunity cost of £150.

Break-even depends on the decision

With £8 contribution per unit and £150 avoidable fixed economic costs, monthly economic break-even is $150/8 = 18.75$ units. Nineteen whole sales exceed that threshold under the assumptions. The minimum price for one additional sale after fixed commitments are unavoidable is a different question from the volume needed to justify operating.

Past expenditure does not force future production

Suppose the owner previously paid £300 for a design that cannot be refunded or sold. That payment is sunk for next month's operating decision. It may matter when evaluating the original investment, but it does not change next month's alternatives. Future avoidable costs and current resale opportunities still belong in the comparison.

Capacity makes algebra conditional

The owner has twenty hours available. Four maintenance hours leave sixteen production hours. At 0.2 hours per unit, capacity is eighty units. A formula predicting profitable sales beyond eighty is outside the stated feasible set. Expansion would need another assumption about hours, equipment, productivity or outsourcing, with its associated costs.

Worked example: choose a workforce

Return to outputs 0, 12, 28, 39, 46 and 50. Output sells for £12 per unit; each worker costs £100 per day. An already committed £60 daily cost is unavoidable now. Net results for zero through five workers are –£60, –£16, £76, £108, £92 and £40. Three workers is best.

Profit guides choices under specific conditions

Economic profit can signal that resources earn more here than in their stated alternatives. It can encourage entry and imitation where feasible. Losses can encourage adjustment or exit. These mechanisms depend on information, competition and institutions; profit is not a complete measure of social contribution or proof that every cost has been borne privately.

Audit the production decision

State output units, technology, relevant period and feasible inputs. Calculate marginal and average product separately. Classify costs by what the decision changes, including opportunity costs. Reconcile contribution and complete-plan calculations. Test break-even against capacity, and distinguish a marginal order from opening, continuing or expanding an entire operation.