Terms Used in Investment Decisionmaking
A Glossary

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A Glossary

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Foreword

This glossary of terms on investment decisionmaking has been developed for use in EDI's training activities. EDI's policy seminars and training courses include a wide variety of participants from different academic backgrounds. In some cases, the government officials, policymakers, technical specialists, journalists, parliamentarians, and trainers who participate in these activities have little formal training in economics. EDI has compiled this specialized glossary to help participants grasp the concepts essential to investment decisionmaking. The glossary contains 195 terms with definitions on cost-benefit analysis, economic analysis, financial analysis, measures of project worth, and project analysis.

EDI invites your comments and suggestions on how to make this glossary more useful to development practitioners. Please send your comments to:

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Terms Used in Investment Decisionmaking

- **accounting period**
  An accounting period is the interval between successive entries in an account. In project analysis, the accounting period is generally a year, but it could be any other convenient time period.
  Reference: Gittinger

- **accounts payable**
  Accounts payable are the amounts an enterprise owes to the suppliers of goods or services purchased on credit.
  Reference: Gittinger

- **accounts receivable**
  Accounts receivable are the amounts customers owe an enterprise for goods or services purchased on credit.
  Reference: Gittinger

- **accrual accounting**
  Accrual accounting is a method of recording accounting transactions that records revenues in financial statements for the period during which the revenues are earned or realized, and that records expenses in the period incurred, regardless of whether the corresponding cash transactions took place previously or subsequently. This method should be distinguished from cash basis accounting, which is a method of recording transactions only when cash receipts or expenditures actually occur.
  *See: cash basis accounting*
  Reference: Gittinger

- **amortization**
  Amortization refers to the gradual repayment or writing off of an original amount. Depreciation is a form of amortization. The capital recovery factor consists of an interest component and an amortization component.
  *See: capital recovery factor, depreciation, interest*
  Reference: Gittinger

1. See the reference list for complete citations.
• annuity

An annuity is an amount paid or received annually or at other regular intervals for a stated period of time. Annuities are described as certain where payment is specified for a fixed number of years. A life annuity payment continues until the death of the person for whom it was purchased. Annuities may be immediate, where payment commences on purchase, or deferred, where payment starts at a future specified date. The price of an annuity is based on the present value of the stream of income payments it provides and varies with rates of interest, and in the case of life annuities, the age and sex of the person who will draw the annuity.

See: equal installments

Reference: Bannock, Baxter, and Davis; Gittinger

• appraisal

Appraisal refers to the analysis of a proposed investment project to determine its merit and acceptability in accordance with established decisionmaking criteria.

See: investment

Reference: Gittinger

• assets

Assets is a business accounting term. On a company’s balance sheet, everything that the company owns and that has a monetary value is classified as an asset, with total assets being equal to total liabilities. Assets fall into the following categories, roughly in order of the extent to which realizing their money value would disrupt the company’s business:

- **Current assets:** cash, bank deposits and other items that can readily be turned into cash, for example, bills receivable, stock and work in progress, marketable securities
- **Trade investments:** investment’s in subsidiaries or associated companies
- **Fixed assets:** land, buildings, plant and machinery, vehicles, and furniture, usually at cost less depreciation written off
- **Intangible assets:** goodwill, patents, and so on.

An individual’s assets are those possessions or the liabilities of others to him or her that have a positive money value.

Financial assets are titles to cash, such as a bank deposit, or income, and/or capital gains. Financial assets may be classified according to their liquidity, the protection they offer against inflation, or changes in exchange rates and the risk of default. Some financial assets are income-certain (for example, gilt edged securities), while some are not (for example, ordinary shares). Some assets are capital-certain, for example, a fixed-interest security that is redeemable at par, but ordinary shares are subject to a price risk.

Reference: Bannock, Baxter, and Davis

• balance sheet

For a particular time, usually the end of an accounting period, a balance sheet refers to a tabulation of the assets of an enterprise in one column, and its liabilities and owners’
equity on the opposite side. The two columns are always equal, and therefore the accounting equation (assets = liabilities + owners' equity) must always hold true.

See: assets, liabilities, equity
Reference: Gittinger

- basic needs

Basic needs are essentially merit goods. The market demand for basic needs generally reflects the existing income distribution, while the government may wish to ensure that the basic needs of each member of society are met, regardless of that person's ability to pay. Examples of merit goods include (a) the provision of basic consumer goods such as food, clothing, and shelter, (b) access to basic services such as water, education, and health facilities, (c) the right to employment which would yield an income sufficient to meet the basic consumption needs, and (d) an infrastructure capable of meeting the requirements to obtain the basic goods and services.

See: merit good
Reference: Ward, Deren, and D'Silva; Pearce, 1992a

- benefit

In project analysis, a benefit is any good or service produced by a project that furthers the objective of the entity from whose standpoint the analysis is being undertaken. When valuing benefits is possible, the increase in benefits is valued either at market prices in financial analysis or at economic values in economic analysis. Intangible benefits cannot be incorporated in the benefit-cost framework, even though they are accepted as valuable and must be dealt with subjectively or indirectly, often through a cost-effectiveness analysis.

See: cost-effectiveness analysis
Reference: Gittinger

- benefit-cost ratio

The benefit-cost ratio (B/C ratio) is a discounted measure of project worth. It is the present value of the benefit stream divided by the present value of the cost stream. When the benefit-cost ratio is used, the selection criterion is to accept all independent projects with a benefit-cost ratio of one or greater when discounted at a suitable discount rate, most often the opportunity cost of capital. The benefit-cost ratio may give incorrect ranking among independent projects, and cannot be used for choosing among mutually exclusive alternatives.

See: benefit stream, cost stream, opportunity cost of capital, mutually exclusive projects
Reference: Gittinger

- benefit stream

A benefit stream is a series of benefit values extending over a period of time, generally several years.
book value

Book value refers to the value of assets in a firm's balance sheet. This is often the purchase price, and may be less than the market price.

See: assets, balance sheet
Reference: Bannock, Baxter, and Davis

border price

The border price is the unit price of a traded good at the country's border. For exports, it is the f.o.b. (free on board) price, and for imports, it is the c.i.f. (cost, insurance, and freight) price. In common usage, the term border pricing may refer to one of the following:

- The process of deriving a border price for a particular good or service, that is the c.i.f., f.o.b., or the good's equivalent parity price.
- The process of conducting project economic analysis by using either the foreign exchange numeraire or using the willingness to pay numeraire denominated in border prices.

See: c.i.f., f.o.b., price, parity price
Reference: Gittinger; Ward, Deren, and D'Silva

capital

In an economic sense, capital refers to goods created by the process of investment that are capable of producing economic wealth. Capital in this sense is one of the three classic factors of production (along with labor and land, whose productivity capital enhances). In an accounting sense, capital is the stock of funds and other assets an enterprise owns. It is the total funds provided by owners or shareholders plus retained earnings, that is, equity. Capital also refers to an investment that yields a service over a long period of time, to distinguish it from consumer expenditures.

See: assets, equity, investment
Reference: Gittinger; Ward, Deren, and D'Silva

capitalize

In credit transactions, to capitalize means to add interest due during the grace period to the principal of a loan so that the borrower need not pay any interest during the grace period. When repayment begins, the amount borrowed plus the interest becomes the principal that must be repaid.

See: interest, grace period, principal
Reference: Gittinger
• capital budgeting

Capital budgeting is the process of allocating investible funds to capital projects. It involves searching for suitable investment opportunities, evaluating particular investment projects, raising long-term capital to finance investments, assessing the cost of capital, dealing with capital rationing problems, applying suitable expenditure controls to ensure that investment outlays conform with the expenditures authorized, and ensuring that adequate funds are available when required for investments. As major investments are risky and irreversible, capital budgeting is a crucial managerial activity of firms. Many techniques are used for this purpose, such as the net present value and internal rate of return based on discounted cash flow analysis.

See: net present value, internal rate of return
Reference: Eatwell, Milgate, and Newman; Pearce, 1986b

• capital recovery factor

The capital recovery factor is the annual payment that will repay a loan of one currency unit in \( x \) years with compound interest on the unpaid balance. It is also called the partial payment factor. The expression is \( \frac{i(1 + i)^n}{(1 + i)^n - 1} \), where \( i \) is the rate of interest and \( n \) is the number of years. It is generally obtained from a set of compounding and discounting tables. This factor permits calculating the equal installments necessary to pay (amortize) a loan over a given period at a stated interest rate. The total payment is a varying combination of the interest and repayment (amortization) of principal.

See: interest, annuity, equal installments, principal
Reference: Gittinger

• cash basis accounting

Cash basis accounting is a method of recording accounting transactions only when cash receipts or expenditures occur, and should be distinguished from accrual accounting.

See: accrual accounting
Reference: Gittinger

• cash flow

Cash flow refers to the flow of money payments to or from a firm. Expenditure is sometimes referred to as a negative cash flow. A business's gross cash flow is the gross profit (after payment of a fixed rate of interest) plus depreciation provisions in any trading period, that is, the sum of money that is available for investment, dividends, or payments of taxes. The net cash flow is retained earnings and depreciation provisions before or after tax. The net cash flows of a particular project are usually defined as those arising after the project has paid taxes, carried out expenditure on repairs and maintenance, made any adjustments to working capital, and taken account of any residual value of assets at the end of a particular project's life or other miscellaneous income accruing to the project or business. This term is important in investment appraisal.
See: depreciation, assets, investment, investment appraisal
Reference: Bannock, Baxter, and Davis

- c.i.f. (cost, insurance, and freight)
C.i.f. refers to the landed cost of an import on the dock or other entry point in the receiving country. It includes the cost of international freight and insurance, and often includes the cost of unloading onto the dock. It excludes any charges after the import is on dock, and also excludes all domestic tariffs and other taxes or fees.
See: tariff, f.o.b.
Reference: Gittinger

- compensated demand
When consumers face a price change under a given nominal income, their utility (or real income) level as well as their demand changes. Suppose, however, that their income level is simultaneously changed as the price is changed so as to keep their utility at the initial level. This operation may be regarded as compensation for the price change, and we call the resulting demand vector the compensated demand for the new price. Thus the compensated demand is a function of the price vector and the utility level, and we may write it as

\[ x = h(p, \mu) \]

where \( x \) and \( p \) are the consumption and price vectors, while \( \mu \) is the utility level. We call \( h \) the compensated (or Hicks) demand function.
See: price, demand, utility
Reference: Eatwell, Milgate, and Newman

- complementary goods
Complementary goods are pairs of goods for which consumption is interdependent. For example, cars and gasoline or cups and saucers are known as complements or complementary goods. Thus changes in the demand for one will have a complementary effect upon the demand for the other. Complements have a negative cross-price elasticity of demand: if the price of one good rises, the demand for both goods may fall.
Reference: Bannock, Baxter, and Davis

- compounding
Compounding is the process of finding the value in some future year of a present amount growing at compound interest. The future value is determined by multiplying the present amount by the expression \((1 + i)^n\), where \( i \) is the interest rate and \( n \) is the number of years from the present. This expression is usually obtained in the form of a compounding factor for one from a set of compounding and discounting tables.
See: interest, compounding factor for one
Reference: Gittinger
• compounding factor for one

The compounding factor for one is what an initial amount of one becomes when growing at compound interest. It is also called the compound interest factor and the amount of one. It is the expression $(1 + i)^n$, where $i$ is the interest rate and $n$ is the number of years from the present. It is generally obtained from a set of compounding and discounting tables. This factor permits calculating the value to which a constant amount deposited at the end of each year will grow by the end of a stated period at a stated interest rate.

See: interest
Reference: Gittinger

• compounding factor for one per annum

The compounding factor for one per annum is the growth of equal year-end deposits of one, all growing at compound interest. It is also called the compound interest factor for one per annum and the amount of one per annum. The expression is $[(1 + i)^n - 1] / i$ where $i$ is the rate of interest and $n$ is the number of years. It is the reciprocal of the sinking fund factor, and is generally obtained from a set of compounding and discounting tables. This factor permits calculating the value to which a constant amount deposited at the end of each year will grow by the end of a stated period at a stated interest rate.

See: interest, sinking fund factor
Reference: Gittinger

• constant price

A constant refers to a value, most often a price, from which the overall effect of a general price inflation has been removed. A constant price is a price that has been deflated to real terms by an appropriate price index, which is a series that records changes in a group of prices relative to a given, or base, period. It may refer either to a market price or a shadow price. A constant price should be distinguished from current prices.

See: real terms, current prices, market price, shadow price.
Reference: Gittinger

• consumer surplus

Consumer surplus is the difference between the amount that a consumer would be willing to pay for a commodity and the amount actually paid. In other words, it is the gap between the total utility of a good and its total market value. In simplified cases, one can measure consumer surplus as the area between the demand curve and the price line. This concept is relevant for many public decisions, such as deciding when the community should incur the heavy expense of building a road or a bridge.

The concept of consumer surplus is widely used in cost-benefit analysis and in other areas of applied economics as an approximate measure of changes in welfare, in particular, of compensating variation and equivalent variation. Compensating variation is a measure of the change in an individual's welfare following, for example, a change in prices. The compensating variation is the maximum amount of income that could be
taken from someone who gains from a particular change while leaving him no worse off than before the change. The compensating variation of the loser from some change is the minimum amount he would require following the change to leave him as well off as he was prior to the change. The equivalent variation is the minimum amount that someone who gains from a particular change would be willing to accept to forego the change. The equivalent variation of the loser from some change is the maximum he would be willing to pay to prevent the change.

See: demand curve
Reference: Eatwell, Milgate, and Newman; Samuelson and Nordhaus; Pearce, 1992a

- contingency allowance
Contingency allowance is an amount included in a project account to allow for adverse conditions that would add to baseline costs. Physical contingencies allow for physical events, such as adverse weather during construction. They are included both in the economic and financial analysis. Price contingencies allow for general inflation; in project analysis they are omitted from both the financial and economic analysis when the analysis is done in constant prices.

See: economic analysis, financial analysis, project analysis, constant price
Reference: Gittinger

- contingent valuation method
The contingent valuation method is used in cases where markets for environmental goods and services either do not exist or are not well developed or where there are no alternative markets. This method was proposed and first used in developed countries for the valuation of public goods like access to parks, clean air or water, endangered species or unobstructed views. This method uses surveys to obtain information on the demand for public goods. People are generally asked what they are willing to pay for a benefit or what they are willing to accept to tolerate its loss. This method is sometimes the only way to estimate the benefits of common property resources for which no direct or related market exists, for example, scenic or ecological characteristics. For example, an assessment of the economic value of elephants in Kenya found that the average per capita willingness to pay of safari visitors to maintain the elephant population at current levels through increased enforcement was US$89, while the median was US$100. This yields an annual viewing value of US$22 million to US$27 million, based on an estimate of 250,000 adult safari visitors a year.

See: willingness to pay
Reference: Dixon, 1994b

- conversion factor
After a financial cash flow for a project is derived and initial adjustments are made, then other values in the cash flow must be adjusted for the remaining distortions in border and domestic prices. These adjustments may be made by multiplying the financial values by appropriate conversion factors. Conversion factors refer to the ratio of the economic
value to the financial value of items in the project cash flow. Thus, a conversion factor is a number, usually less than one, that can be multiplied by the domestic market price, opportunity cost, or value in use of a nontraded item to convert it to an equivalent border price that reflects the effect of trade distortions on domestic prices of that good or service. A standard conversion factor is the reciprocal of one plus the foreign exchange premium stated in decimal form.

See: border price, economic analysis, financial analysis, market price, opportunity cost, nontraded, foreign exchange premium

Reference: Gittinger; Ward, Deren, and D'Silva

- cost

Cost refers to the value of factors of production a firm uses to produce or distribute goods and services or to engage in both activities. The cost of a factor unit to the firm equals the maximum amount that the factor could earn in alternative employment. For this reason, the terms alternative cost or opportunity cost are used in economic theory instead of cost alone. A firm's costs include expenditures, or outlay costs, which are its ordinary business expenses, and nonexpenditures, or implicit costs, which are not paid out by the firm, but which accrue directly to the firm itself or to its owners.

In project analysis, cost is any good or service a project uses that reduces progress toward the objective of the entity from whose standpoint the analysis is undertaken. When it is possible to value a cost, it is valued at market prices in financial analysis or at an economic value in economic analysis. Intangible costs cannot be incorporated in the cost benefit framework, even though they are accepted as important, and so must be dealt with subjectively, or indirectly, often through a cost-effectiveness analysis. Baseline costs are costs at some period at or before the beginning of a project and become the basis for later evaluation of the effects of the project.

See: opportunity cost

Reference: McGraw-Hill Book Company; Gittinger

- cost-benefit analysis

Cost-benefit analysis is a conceptual framework applied to any systematic, quantitative appraisal of a public or private project to determine whether, or to what extent, that project is worthwhile from a public or social perspective. It is thus a technique for enumerating and evaluating the total social costs and total social benefits associated with the project. This generally means that sponsoring bodies must take a broader and longer-term view of a project than an organization concentrating on project profitability alone would do. Essentially a cost-benefit analysis attempts to determine whether the benefits of the project justify its costs. In this context, a project may range from conventional public investments in flood control or transportation, to social programs in health and education or to the passage of laws or regulations. In all cases, the hallmark of cost-benefit analysis is the systematic comparison of alternative sources of action. Cost-benefit analysis also draws much of its theoretical basis from applied welfare economics.
Cost-benefit analysis differs from a straightforward financial appraisal in that it considers all gains (benefits) and losses (costs) regardless of to whom they accrue. A benefit is any gain in utility and the cost is any loss of utility as measured by the opportunity cost of the project in question. In practice, the analyst will not be able to quantify in money terms, for example, the loss of wildlife or destruction of natural beauty while the costs will be measured in terms of the project’s actual money costs. However, both should be corrected for any divergence between the shadow price and the market price.

The field of project appraisal abounds with other terms similar to cost-benefit analysis. Capital budgeting analysis is the private sector equivalent of cost-benefit analysis. It is project appraisal from a firm’s point of view. Cost-effectiveness analysis is a special case of cost-benefit analysis in which, among the alternatives under consideration, either the cost of each or the benefit of each is the same, and the purpose of the study is to identify the alternative with the greatest effectiveness (benefit) or the least cost. Social impact assessment, economic impact assessment, environmental impact analysis, and technology assessment can all be considered partial cost-benefit analyses in the sense that each typically considers only a subset of the whole range of project effects.

See: cost, benefit, shadow price, market price, conversion factor
Reference: Greenwald

- **cost of capital**

  The cost of capital is the cost, measured as a percentage rate, of the various sources of capital required to finance capital expenditure. At any time a company’s cost of capital will be the weighted average of the cost of each type of capital. The weight is determined by the ratio of the value of each type of capital to the total value of reserves and all securities issued by the company. These would include all ordinary shares, preference shares, and long-term debt. The weighted costs are then added together. The cost of capital is also used as the discount rate to find the net present value of new projects and is compared with the internal rate of return from projects.

  See: discount rate, net present value, internal rate of return
Reference: Pearce, 1986b

- **cost-effectiveness analysis**

  Cost-effectiveness analysis is an appraisal and program monitoring technique used primarily in social programs and in projects in health, population, nutrition, and related sectors, in which benefits cannot be reasonably measured in money terms. It may also be used to choose among technologies considered for use within a project. Cost-effectiveness analysis is used in the following two forms:
  - The *constant effects method*, which uses least-cost analysis to determine the least-cost alternative for meeting a stated level of benefits, including intangible benefits.
  - The *constant cost method*, which calculates the cost per unit of benefit, or the cost effectiveness ratio, and requires that means exist for quantifying benefits, but not necessarily for attaching a monetary price or economic value to the benefits. Quantitative measures, such as couple-years-of-protection, are used in population
projects, for example, to quantify project outputs rather than to place monetary values on the outputs. The preferred project alternative usually either minimizes the discounted present worth of cost per unit or maximizes the discounted present worth of units of output per unit of currency. The discounting is normally done at the opportunity cost of capital. If cost-effectiveness analysis is used within a project to choose among alternative technologies to determine the most cost-effective means to produce intermediate project outputs, it is most often done in the form of the constant effects method and called least-cost analysis. The preferred alternative is one that has the lowest present value, and the preference may change when different interest rates are used to determine present value. The interest rate at which the present value of two different alternatives are the same is known as the crossover discount rate.

See: appraisal, cost-benefit analysis, opportunity cost of capital, intangible, interest, crossover discount rate
Reference: Gittinger

- cost stream
A cost stream is a series of cost values extending over a period of time, generally several years.

See: cost
Reference: Gittinger

- creditworthiness
Creditworthiness refers to the ability of an individual, firm, or nation to meet its debt service obligations. For a firm, a judgment about creditworthiness is often formed on the basis of one or another financial ratio.

See: debt service, financial ratio
Reference: Gittinger

- crossover discount rate
The crossover discount rate is the rate that equalizes the present values of the cost streams of two alternatives producing the same result. It is usually used to choose between two technological alternatives or alternative project designs with different time streams. The preferred alternative is the one with the lowest discounted present value. At some discount rate, alternatives with different time streams may have equal present values; at a higher discount rate, a different alternative is preferred from that at a lower rate. It is also called the equalizing discount rate. It may be determined graphically by plotting the present worth of two alternatives at different discount rates, or it may be computed by finding the internal rate of return to the differences year by year between the cash flows of the alternative with the higher undiscounted cost less the alternative with the lower undiscounted cost.

See: discount rate, internal rate of return
Reference: Gittinger
• current prices

Current prices refer to prices that include the effects of general price inflation. In economic literature, a constant price is usually specified if it is intended, otherwise one infers that a current price is intended. Thus, current prices denote the measurement of variables at the prices of the period for which data were collected. For example, consumption at current prices would show for years X, Y, and Z the actual cost of purchasing such goods and services at the prices prevalent in years X, Y, and Z, respectively.

See: inflation, constant prices
Reference: Gittinger; Rutherford

• cut-off rate

The cut-off rate is the rate below which a project is considered unacceptable. It is often taken to be the opportunity cost of capital. The cut-off rate would be the minimum acceptable internal rate of return for a project or the discount rate used to calculate the net present value, the net-benefit investment ratio, or the benefit-cost ratio.

See: opportunity cost of capital, internal rate of return, net present value, net-benefit investment ratio, benefit-cost ratio.
Reference: Gittinger

• deadweight loss

Deadweight loss refers to the loss in social welfare deriving from a policy or action that has no corresponding gain. Deadweight losses represent economic inefficiency and result when the price-setting mechanism is somehow flawed. For example, congestion on roads imposes costs on road users, and the costs are deadweight losses because the inconvenience of congestion to one driver is not matched by a reduction in inconvenience to another. If road space was allocated by setting high prices for road access, the costs that would be borne by the drivers that pay for them would be matched by an increase in government revenues to the benefit of everyone else.

Society often finds it worth bearing certain deadweight losses to promote social objectives. A deadweight loss can also be viewed as a loss in real income or as a consumer and producer surplus that arises because of monopoly, tariffs and quotas, taxes, or other distortions. For example, when a monopolist raises its price, the loss in consumer satisfaction is more than the gain in the monopolist’s revenue, with the difference being the deadweight loss to society because of the monopoly.

See: economic efficiency, consumer surplus, producer’s surplus
Reference: Bannock, Baxter, and Davis; Samuelson and Nordhaus

• debt service

Debt service is a payment made by a borrower to a lender. It may include one or all of payment of interest, repayment of principal, and loan commitment fee.

See: equal installments, interest, principal
Glossary

- **debt service ratio**
  The debt service ratio is a financial ratio used to judge creditworthiness. It is equal to \((\text{net income} + \text{depreciation} + \text{interest paid}) - (\text{interest paid} + \text{repayment of long term loans})\).
  See: creditworthiness, income, depreciation, interest
  Reference: Gittinger

- **deflation**
  Deflation refers to a sustained reduction in the general level of prices. Deflation is often, though not inevitably, accompanied by a decline in output and employment, and is distinct from disinflation which means a reduction in the rate of inflation. Deflation can be brought about by either internal or external forces in an open economy.
  Deflation can also be a deliberate policy of reducing aggregate demand and output so as to reduce prices and imports and lower the exchange rate, thereby improving export performance and the balance of payments. Aggregate demand may be reduced by fiscal policy (increasing taxes or reducing government expenditure) or monetary policy (increases in the rate of interest and slower growth or contraction in the money supply).
  In economic statistics, deflation can also refer to adjustment by index numbers or economic aggregates to eliminate the effects of price changes, as in dividing an index of the gross domestic product (GDP) at current prices by a price index to give an index of GDP in real terms. Two alternative methods are available for estimating changes in net output in real terms. One is to deflate the series of the value of net output at current prices by a single index of output prices, and the other is to deflate separately the inputs by appropriate indices of the prices of materials, fuels, and so on, and to subtract the sum of these from the value of gross output deflated in the same way by indices of output prices. The second method is called double deflation, which has the advantage of capturing changes in the ratio of net to gross outputs in real terms. This may be important where, for example, profit margins are being squeezed by faster increases in input than in output prices. To deflate net output directly by output prices in these circumstances would lead to an overstatement of the real rise in net output.
  See: inflation
  Reference: Bannock, Baxter, and Davis

- **delphi method**
  The delphi method is a way of obtaining forecasts of future developments. For example, for market research a number of experts can be asked to give their individual forecasts. These are collected and summarized, a summary of all forecasts is sent to all the experts, and they are asked whether they would reconsider their views in light of what others have said. The process is repeated until the predictions are satisfactorily uniform. This method is named after the ancient Greek religious site at which the gods were believed to answer people’s questions about the future.
  Reference: French and Saward
• demand
Demand is the quantity of a good or service which an individual or group desires at the ruling price. The total demand in an economy is referred to as aggregate demand.
See: demand curve
Reference: Pearce, 1992a

• demand curve
A demand curve is a graphical representation of a demand schedule that lists the quantities of a commodity a consumer would be willing to buy at various prices (Walrasian demand curve). It is also a schedule showing the prices that consumers would be willing to pay for specified quantities (Marshallian demand curve). The schedule is drawn up on the assumption that other economic factors remain the same between the consideration of one price and another. Such factors are the good’s own price; average income; population; prices of related goods (substitutes or complements); tastes; and special influences, such as credit terms or expectations of future price increases. In most cases, the demand curve slopes downward from left to right, reflecting the fact that the higher is the price of the commodity, the lower will be the demand for it. However, the response of demand to a change in the price (elasticity) will also influence the slope and shape of the demand curve.
See: demand schedule, elasticity, income effect, substitution effect
Reference: Bannock, Baxter, and Davis

• demand function
The demand function is an algebraic expression of a demand schedule, and includes all factors affecting demand. Thus, a generic form of a demand function might be:

\[ Q_i = f(P_i, P_j, \ldots, P_n, Y, T) \]

where \( Q_i \) is the quantity demanded of good \( i \), \( P_i \) is the price of good \( i \) (the ‘own’ price), \( P_j, \ldots, P_n \) are the prices of other goods \( j \) to \( n \), \( Y \) is income and \( T \) is some measure of tastes.
See: demand curve
Reference: Pearce, 1992a; Samuelson and Nordhaus

• demand schedule
A demand schedule is a table showing the level of demand for a particular good at various price levels. The schedule relates to a specific period of time, for example, per month, per year, and is drawn up on the assumption that other factors affecting the level of demand—income, tastes, the prices of other goods—are held constant.
Reference: Pearce, 1992a

• depreciation
Depreciation is the anticipated reduction in the value of an asset over time that is brought about through physical use or obsolescence. Conventional accounting seeks to allocate
the decline in the value of the asset over its projected economic life. In accounting, depreciation is the process of allocating a portion of the original cost of a fixed asset to each accounting period so that the value is gradually used up (written-off) during the course of the asset's estimated useful life. An allowance may be made for the ultimate estimated resale value of the fixed asset (its residual value) that will remain at the end of its useful life to the enterprise. There are two principal types of depreciation methods: straight-line depreciation, which allocates the cost of a fixed asset in equal amounts for each accounting period, and accelerated depreciation, which allocates a larger proportion of the original cost to earlier accounting periods and a smaller proportion to later periods. In discounted cash flow analysis, depreciation is not treated as a cost. Instead, the cost of an asset is shown in the year it is occurred and the benefits are shown in the year they are realized. Because this is done over the life of the project, no depreciation allowance is needed to show the proportion of the value of the asset used in any given year.

Reference: Gittinger

- derived demand

Derived demand refers to the demand for a factor of production, where the demand for the factor is derived indirectly from the demand for the finished product to which the factor has contributed in production.

Reference: Bannock, Baxter, and Davis

- discounted cash flow analysis

The discounted cash flow analysis is based on the net incremental costs and benefits that form the incremental cash flow. It yields a discounted measure of project worth, such as the net present value, internal rate of return, or net benefit-investment ratio.

See: costs, benefits, net present value, internal rate or return, net benefit-investment ratio

Reference: Gittinger

- discount factor

The discount factor refers to how much one at a future date is worth today. The expression is \(1 + (1 + i)^n\), where \(i\) is the rate of interest (discount rate) and \(n\) is the number of years. It is the reciprocal of the compounding factor for one, and is generally obtained from a set of compounding and discounting tables. This factor permits determining the value today of an amount received or paid out in the future. The process of finding the present value of some future value is generally referred to as discounting. Because the discount factor is the reciprocal of the compounding factor for one, it is common to hear expressions such as "discounted at an interest rate of 14 percent."

See: interest rate, discount rate, compounding factor for one

Reference: Gittinger
**discount rate**

The discount rate is the rate used to calculate the net present value of a time stream of benefits and costs. The rate at which future amounts are discounted is called the discount rate. For example, if US$100 accrues each year to an individual, the US$100 next year is worth less than US$100 in the present. This is because the individual prefers to receive the benefit now rather than later, or because US$100 now can be invested at the rate of interest \( r \), to become US$100 \((1 + r)\) in one year's time. Hence the individual is indifferent between US$100 now and the US$100 \((1 + r)\) in one year's time. It follows that the individual is also indifferent between US$100 \(\div (1 + r)\) now and US$100 next year (dividing both sides of the previous option by \([1 + r]\)). The sum US$100 + US$100 \((1 + r)\) is the net present value and \( r \) is the discount rate. The procedure is widely used to appraise projects in which benefits and costs are spread over a number of years. It permits a comparison of projects of different lives and different time profiles of benefits and costs.

*See: interest, cost of capital*

Reference: Pearce, 1986b

**diseconomies of scale**

Diseconomies of scale refer to the possible increase in long-run unit or average costs that may occur as the scale of the firms output is increased beyond some critical point. As output is increased, long-run average costs may at first decline, reflecting the presence of economies of scale, but after a certain point long-run average costs may begin to rise.

![Diseconomies of Scale Diagram](image)

In the figure, in the range of output beyond point \( x \), the firm is experiencing diseconomies of scale, with average costs increasing as output increases. The most frequently cited sources of such diseconomies are the managerial and administrative problems of controlling and coordinating large-scale operations and labor problems in large plants.

*See: economies of scale*

Reference: Pass and others
• distortion
A distortion refers to a state in which the market price of an item differs from the price it would bring in the absence of government policy failures or market failures. In project analysis, the principal distortion that is considered is the trade tariff, which permits domestic market prices to exceed border prices (allowing for domestic transfer costs).
Reference: Gittinger

• distribution weight
Distribution weight refers to the relative importance attached to various income groups among the beneficiaries of a project. Income received by one or another group is adjusted by the weight, so that the final measure of project worth will favor those groups accorded greater importance.
Reference: Gittinger

• domestic resource cost
This is the cost in domestic currency required to earn a unit of foreign exchange through a proposed project. In discounted cash flow analysis, it is the present value of the domestic currency cost of realizing a foreign exchange saving divided by the present value of the net foreign exchange saving. A project is accepted if the domestic resource cost is less than the official exchange rate in financial analysis or less than the shadow exchange rate in economic analysis. Stated another way, the domestic resource cost is the opportunity cost of using a factor of production to produce one unit of output, divided by the international value added by producing that unit.

See: official exchange rate, shadow exchange rate
Reference: Gittinger

• domestic value added
Domestic value added is the value added to a product by local or domestic activities. In an indirectly traded item, domestic value added is the total value of the product less the border price of imported components.

See: indirectly traded, border price, value added
Reference: Gittinger

• economic analysis
Economic analysis is analysis that is undertaken using economic values. Financial analysis, on the other hand, uses market values. Economic values reflect the values that society would be willing to pay for a good or service. In general, economic analysis omits transfer payments, including credit transactions, and values all items at their value in use or their opportunity cost to society (often a border price for tradable items).

In conducting economic analysis, one of the first things to do is to delete taxes from the accounts, because they do not represent real resource flows. Similarly, subsidies, such as
export subsidies, also do not represent real resource flows, and therefore should also be ignored. Such taxes and subsidies constitute transfer payments, not real flows of resources.

See: economic value, financial value, opportunity cost
Reference: Gittinger

- economic efficiency

Economic efficiency refers to the state of an economy in which no one can be made better off without someone being made worse off. For this to be the case, three types of efficiency must hold. The first is productive efficiency, in which the economy's output is being produced at the lowest cost. The second is allocative efficiency, in which resources are being allocated to the production of those goods and services that society requires. The third is distributional efficiency, in which output is distributed in such a way that given consumers' disposable income and market prices, they would not wish to spend their incomes in a different way.

In a two-person, two-product economy with two factors of production, these three types of efficiency are achieved when three conditions hold. The first is that productive efficiency demands that the rate of technical substitution for the two products must be equal, to ensure that a unit of one factor of production is worth the same amount in terms of the other factor, whichever product it is used in. Otherwise, factors could be swapped between products and extra output gained. The second condition is that the marginal rate of substitution must be equal for both consumers, otherwise, consumers could swap commodities to their mutual benefit. The third condition is that allocative efficiency requires that the marginal rate of transformation must equal the marginal rate of substitution. If consumers think that one banana is worth two apples and producers can grow one extra banana at the sacrifice of only one apple, it will pay society for them to produce one apple less and one extra banana, and to go on making that switch until eventually consumers tire of bananas and value apples more highly than they did, and land suitable for banana production will be so marginal that for every bit of land removed from apples, hardly any bananas will be produced. At this stage, the two rates of substitution will be equal. Economic efficiency will exist in an economy in which perfect competition characterizes every sector.

See: marginal rate of substitution, marginal-cost pricing
Reference: Bannock, Baxter, and Davis

- economic rent

Rent is the payment for the use of a resource, whether it be land, labor, equipment, ideas, or even money. It is the return for the use of a factor of production in excess of the minimum required to bring forth the service of the factor. Typically the rent for labor is called wages, the payment for land and equipment is often called rent, the payment for using an idea is a royalty, and the payment for using money is called interest. In economic theory, the payment for a resource where the availability of the resource is insensitive to the size of the payment received for its use is called economic rent.
Economic rent is the difference between the return made by a factor of production and the return necessary to keep the factor in its current occupation. A firm making excess profits is earning economic rent.

In perfect competition, no rents are made by any factor, because changes in supply bid the prices of inputs and labor down to the level necessary to keep them employed. In general, economic rents accrue where changes in supply are not possible, especially in the short run, for example, to a neurosurgeon with rare skills that are difficult to emulate, or to a monopoly protected by barriers to entry.

Reference: Bannock, Baxter, and Davis; Eatwell, Milgate, and Newman; Gittinger

- **economic value**
  
  Economic value is the amount by which production of a project output or use of a project input changes national income (or other national objective in project analysis). It may be a market price or it may be an estimate of opportunity cost that differs from the market price, in which case it is a shadow price.

  See: market price, opportunity cost, shadow price

  Reference: Gittinger

- **economies of scale**
  
  Economies of scale refer to factors that cause the average cost of producing a commodity to fall as output of the commodity rises. For example, a firm or industry that would less than double its costs if it doubled its output enjoys economies of scale. Economies of scale can be divided into two types. The first, called *internal economies*, accrue to the individual firm regardless of the size of its industry. They generally result from technological factors that ensure the optimal size of production is large, namely:

  - With high fixed costs in plant and machinery, the larger the firm's production, the lower the cost per unit of the fixed inputs. For example, producing steel without a blast furnace is possible, but very expensive. Once a blast furnace is built, using it only to make small quantities of steel is inefficient, hence steel companies tend to be large.
  
  - Large firms can also arrange for the specialization of labor and machines, as in production line techniques, which can increase productivity.

  - Only large firms can afford the high costs of research and development. Nontechnological factors are important too. For example, by buying inputs in bulk, large firms can get discounts from their suppliers, who grant them because of economies of scale in distributing the supplies.

  A second type of economies of scale, called *external economies*, arise because the development of an industry or an investment could lead to the development of ancillary services of benefit to all firms, such as a labor force skilled in the crafts of the industry, a components industry equipped to supply precisely the right parts, or a trade magazine in which all firms can advertise cheaply.

  See: diseconomies of scale

  Reference: Bannock, Baxter, and Davis
* effective rate of protection

The effective rate of protection is the real amount of protection accorded to domestic suppliers of a final product when a tariff is applied to a competing imported final product, but either no tariff or a lower rate of tariff is applied on factor inputs imported to produce that product. For example, assume that initially the same domestic final product and the imported final product are priced at US$100. Assume further that the price of the domestic product is made up of 50 percent value added by domestic inputs and 50 percent by imported raw materials. If an ad velorem tax of 10 percent is now applied to the imported final product, its price will increase to US$110. If no tariff is applied to imported raw materials, however, the import price of these materials will remain at US$50. This allows domestic value added and prices to increase by up to US$10, with the domestic final product still remaining fully competitive with the imported final product. The effective rate of protection accorded to domestic suppliers is thus 20 percent, that is, US$10 additional value added ÷ US$50 existing value added.

It is possible for the effective protection rate to be negative if the imported inputs are subject to higher rates of duty than the final good. Although the nominal rate of protection will always be positive, an industry can be "antiprotected" by the tariff structure and have a negative effective rate.

Reference: Pass and others; Pearce, 1986b

* efficiency price

The efficiency price is the economic value used in economic analysis that reflects the opportunity cost of a good or service used or produced by a project. It may be a market price or a shadow price. Efficiency prices are the values used in economic analysis when the objective is to maximize national income. Hence, economic analysis done using efficiency prices is sometimes called efficiency analysis. When the objective of a project is something other than national income, as might be the case in analyses that formally incorporate income distribution or savings objectives, the efficiency price may be adjusted by an appropriate distribution weight.

See: economic value, opportunity cost, market price, shadow price, distribution weight

Reference: Gittinger

* elasticity

The term elasticity denotes the responsiveness of one variable to changes in another. Thus the elasticity of X with respect to Y means the percentage change in X for every one percent change in Y. Important examples of elasticities include the price elasticity of demand and the price elasticity of supply.

Price elasticity of demand is a measure of the extent to which quantity demanded responds to a price change. The elasticity coefficient is the percentage change in quantity demanded divided by the percentage change in price. Price-elastic demand (or elastic demand) is a situation in which the price elasticity of demand exceeds one in absolute value. This signifies that the percentage change in quantity demanded is greater than the percentage change in price. In addition, elastic demand implies that total revenue (price
times quantity) rises when price falls, because the increase in quantity demanded is so large. Price-inelastic demand (or inelastic demand) is a situation in which the price elasticity of demand is below one in absolute value. In this case, when price declines, total revenue declines, and when the price increases, total revenue goes up. Perfectly inelastic demand means that no change occurs in quantity demanded when the price goes increases or decreases. Unitary elastic demand refers to a situation between price-elastic demand and price-inelastic demand: total revenue does not change with a change in price. In this case, price elasticity is just equal to one in absolute value.

Price elasticity of supply measures the supply responsiveness to a price change. More precisely, the price elasticity of supply measures the percentage change in quantity supplied divided by the percentage change in price.

Cross-elasticity of demand is a measure of the influence of a change in one good’s price on the demand for another good. More precisely, the cross-elasticity of demand equals the percentage change in demand for good A when the price of good B changes by one percent, assuming other variables are held constant.

See: demand curve
Reference: Samuelson and Nordhaus

• environmental economics

Environmental economics is the area of economics concerned with issues relating to the use of natural resources. Environmental problems are frequently characterized by the existence of externalities and public goods. In these areas, it is hard for the price system to operate in such a way as to allocate scarce resources—such as clean air—in an efficient way. Many of the problems in this area derive from the lack of clearly defined property rights over natural resources, which makes environmental abuse likely in the absence of governmental control (Coase theorem). Much of environmental economics is concerned with the relative merits of different policy responses to the various flaws of the market mechanism in these areas. For example, should emissions be stopped by regulation or should they be taxed? Problems also arise from the depletable nature of some resources.

See: economic efficiency, public goods
Reference: Bannock, Baxter, and Davis

• environmental impact analysis

Environmental impact analysis seeks to identify the effects on the environment of any investment project. This would include the forecasting of potential pollution emissions, loss of visual amenity, and so on.

Reference: Pearce, 1992a

• equal installments

Equal installments refers to the amount of debt service when a loan is repaid in a series of payments of the same total amount but of varying proportions of principal and interest.
The equal installment is computed by multiplying the principal by the capital recovery factor. It is also called a level payment or an equated annuity.

*See: annuity, principal, capital recovery factor*

Reference: Gittinger

- **equity**

  Equity refers to an ownership right or risk interest in an enterprise. Equity capital is the residual amount left after deducting total liabilities (excluding stockholders' claims) from total assets. In a balance sheet, owners' equity is the share capital paid by the owners of the enterprise plus retained earnings.

*See: assets, liabilities, project worth*

Reference: Gittinger

- **exchange rate**

  The exchange rate is the price of one currency in terms of another currency. Exchange rates are regularly quoted between all major currencies, but frequently one currency, for example, the dollar is used as a standard in which to express and compare all rates. The exchange rate of all fully convertible currencies is determined, like any price, by the supply and demand conditions in the foreign exchange market. More fundamentally, such supply and demand conditions are determined by whether the country's basic balance of payments position is in surplus or deficit.

Reference: Pearce, 1992a

- **external and internal efficiency (in education)**

  Investment decisions, especially in education, need to consider both external and internal efficiency. Educational output is too complex to allow us to adopt a single index of either external or internal efficiency. Society's objectives are used to measure external efficiency, which can be judged by the balance between social costs and social benefits, or the extent to which education satisfies manpower and employment needs. More specifically, the external efficiency of schools may be judged by how well schools prepare pupils and students for their roles in society, as indicated by their employment prospects and earnings. Such measures depend on external criteria rather than on results entirely within the school.

In contrast, internal efficiency is concerned with the relationship between inputs and outputs within the education system or within individual institutions. Output in this case is measured in relation to internal institutional goals rather than to the wider objectives of society. Clearly the two concepts are closely linked, but it would be possible to envisage a school that was extremely efficient in developing skills and attitudes that were not highly valued by markets or by society as a whole. In such circumstances, the criteria of internal and external efficiency would conflict, and the school would be judged to be internally efficient but externally inefficient. Because internal efficiency is measured in relation to the objectives of education, judgments about efficiency will depend on the way
educational output is defined and measured. In other words, both the quality and the quantity of inputs and outputs will have to be considered. The quality of output, however, is hard to measure where education is concerned. Internal efficiency measures include dropout and transition or failure rates.

To assess the internal efficiency of education we need a statement of its aims and objectives, together with a range of measures of output that reflect these various objectives and the success with which they are achieved. Measuring the success with which the wider objectives of education are achieved is, of course, extremely difficult, but some analysts have used such measures as examination scores; cognitive tests in a wide range of subjects; the length of time needed for pupils to reach a required standard; scores on standardized tests of reading ability and of language, mathematics, and science skills; and noncognitive tests designed to measure pupils' attitudes and motivation.

Reference: Psacharopoulos and Woodhall

- externalities

Externalities are factors that are not fully reflected in market prices. They are consequences for welfare that are not fully accounted for in the price and market system. Externalities arise because of the nonexistence or imperfections of markets. In project analysis, an externality is an effect of a project felt outside the project, and consequently not included in the valuation of the project. In general, an externality is said to exist when the production or consumption of a good or service by one economic unit has a direct effect on the welfare of producers or consumers in another unit.

Externalities may be positive or negative, and are quite diverse. A beneficial externality, known as an external economy, is where an externality-generating activity raises the production or utility of the externally-affected party. For example, external economies arise because the development of an industry or an investment could lead to the development of ancillary services of benefit to all firms: a labor force skilled in the crafts of the industry, a components industry equipped to supply precisely the right parts, or a trade magazine in which all firms can advertise cheaply. Defense or other public expenditure on research and development is sometimes justified on the grounds that it stimulates the development of new technologies that may become freely available to all. This is usually called a spillover effect, an alternative term for externality.

An external diseconomy is where the externality-generating activity lowers the production or utility of the externally affected party. External diseconomies of production include traffic congestion and the numerous forms of environmental pollution, such as the pollution created by a manufacturing plant. These reduce the welfare of people living near the factory, and perhaps increase costs to adjacent factories, which might need to purify water taken from a local river. Because the third parties receive no compensation for these external diseconomies, there are costs of production not accounted for in the price system.

Externalities may also either be technological or pecuniary externalities. An example of an technological externality might be silting downstream caused by opening a land settlement project or training project workers who can be subsequently employed by
others. Project analysis usually tries to accommodate technological externalities, especially costs, within the project accounts, and thus to change them from externalities to project costs and benefits. For example, an increase in the cost of harbor dredging caused by increased siltation might be calculated and assigned to the land settlement project. Pecuniary externalities arise when the project affects the prices paid or received by others outside the project, for example, when other users of fertilizers must pay higher prices because of increased demand by project farmers. Pecuniary externalities are usually excluded from both financial and economic analysis.

See: economic analysis, financial analysis, project analysis, market price

Reference: Bannock, Baxter, and Davis; Pearce, 1986b; Eatwell, Milgate, and Newman; Gittinger

• factor of production

A factor of production is an input required to produce some output. Primary factors of production are land, labor, and capital; secondary factors of production include materials, irrigation pumps, and the like.

Reference: Gittinger

• feasibility study

A feasibility study is a study of a proposed project to indicate whether the proposal is attractive enough to justify more detailed preparation.

Reference: Gittinger

• final goods

Final goods are goods used for purposes of consumption and are not utilized as inputs by firms in the process of production. As such, final goods should be distinguished from intermediate goods.

See: intermediate goods and services

Reference: Pearce, 1992a

• financial analysis

Financial analysis is analysis using market prices, as opposed to economic analysis, which uses economic values. Economic values reflect the values that society would be willing to pay for a good or service, whereas financial values are the prices that people actually pay for the good or service. In project analysis, the task is to convert financial values into economic values or to adjust the financial prices so that they more or less represent economic values.

The costs that enter into financial analysis include the capital outlays for the project investment and the project's incremental operating and administrative expenditures over its lifetime. Changes in the level of assets such as inventories are included, but depreciation is not, because capital expenditures are entered in the year that they are incurred. Interest on funds borrowed for the project is also excluded, because the financial
rate of return itself measures the return, or interest earned on the capital invested in the project. The benefit stream covers the incremental inflow of funds arising from the project, with the principal item being income or receipts from the sale of the project’s output or services. Subsidies are included as inflows, just as customs duties and taxes appear as outflows.

See: economic analysis, market prices
Reference: Baum and Tolbert; Ward, Deren, and D’Silva

- financial rate of return

The financial rate of return is the internal rate of return calculated using financial values. It is the internal rate of return used in financial analysis.

See: internal rate of return, financial analysis
Reference: Gittinger

- financial ratio

The financial ratio is one of a group of ratios based on an enterprise’s financial statements that enable the project analyst to judge the efficiency of an enterprise, its return on key aggregates, and its liquidity. It is also used in the analysis of creditworthiness.

See: creditworthiness, liquidity
Reference: Gittinger

- fixed cost

For a firm, the short run is defined as the period of time over which some factors of production cannot be varied. These factors are known as fixed factors, and the costs associated with them are known as fixed costs. Fixed costs do not vary with output. An example would be the cost of a factory which, in the short run, cannot be expanded to meet increased demand. Only labor and perhaps other inputs can be varied – these are the variable factors, the costs of which are variable costs.

See: variable costs
Reference: Pearce, 1992a

- f.o.b. (free on board) prices

F.o.b. prices refer to the price of an export loaded in the ship or other conveyance that will carry it to foreign buyers.
Reference: Gittinger

- foreign exchange numeraire

The foreign exchange numeraire measures all benefits and all costs in units of foreign exchange. A generic foreign exchange numeraire does not take account of who in the society gains or loses from the use of incremental units of foreign exchange. In the foreign exchange numeraire, the conversion factor is the ratio of border price values to financial
values, where the border value of each item represents the impact that the good has had on the foreign exchange.

Reference: Ward, Deren, and D'Silva

- foreign exchange premium

The foreign exchange premium is the amount by which the official exchange rate overstates the real value of local currency or of nontraded goods and services relative to traded goods and services, and is stated as a percentage. In project analysis the foreign exchange premium is generally the ratio of domestic prices to border prices. It is used to calculate the shadow exchange rate and the standard conversion factor for economic analysis, usually based on a weighted average tariff calculation in which the premium equals the rate of the weighted average tariff. The shadow exchange rate is derived by multiplying one plus the foreign exchange premium stated in decimal form by the official exchange rate.

The foreign exchange premium is a form of price index in which the market basket varies according to the use for which the index is intended. Specific conversion factors are similar indexes, but are narrowly defined to include smaller market baskets and are applied to specific prices in the economic analysis of projects. Mathematically, the standard conversion factor is the weighted average of all specific conversion factors; thus, the standard conversion factor and the shadow exchange rate incorporate more aggregated estimates of the effects of trade distortions on the project than do specific conversion factors or disaggregated measures of applying shadow exchange rates. In project analysis, the foreign exchange premium focuses only on the trade component of international payments; in other uses, the foreign exchange premium may be defined to include other payments as well.

See: efficiency price, border price, indirectly traded item, conversion factor, official exchange rate, shadow exchange rate, traded, nontraded

Reference: Gittinger

- free-rider problem

The free-rider problem is a phenomenon arising from the characteristic of public goods. It arises when individuals are not willing to contribute toward the cost of something, but hope that someone else will bear the cost instead. The fact that public goods are non-rival means that the provision of the good to one person entails its provision to another person. If potential consumers are faced with the issue of financing the provision of the good, each one has an incentive not to state his true willingness to pay since he can gamble on the good being provided to others who will express some willingness to pay. Where the good cannot be varied in size, the good may be provided and those who falsely stated their preference will nonetheless benefit from the existence of the good. If the size of the good can be varied, for example, variable amounts of clean air, then understatement of preferences will cause less of the good to be provided than would otherwise be the case. Those understating their preference may still gain, since they will receive the amount of the good in question, and will still not pay for it. They are thus known as free-riders. If the
free-rider phenomenon is a strong one, public goods will be systematically under-provided, and there is a prima facie case for the good to be provided through government action.

See: public good, willingness to pay
Reference: Pearce, 1992a; Bannock, Baxter, and Davis

- government failure

Government failure describes a situation where government intervention in the economy either fails to correct adequately for, or exacerbates, market failure or directly causes market distortions. Examples of government intervention include imposing price controls, exchange rate controls, and land use controls; managing market outlets; imposing compulsory sales of a proportion of food output to government agencies; intervening in the labor market; and failing to enforce property rights. Government failure can be divided into two categories:
- Interventions designed to correct for market failure that are inappropriate, insufficient, or excessive
- Interventions that disrupt otherwise efficiently functioning markets.

Reference: Ward, Deren, and D'Silva

- grace period

In credit transactions, the grace period is a period during which a borrower need not repay the principal (the amount of a loan), and sometimes the interest. Depending on the lending conditions, the borrower may or may not be required to pay interest, which may be capitalized during the grace period. The grace period begins at the time the loan is extended and continues for a specific accounting period. Thus, a four-year grace period for a loan received at the end of project year one would mean that the grace period would be project years two through five, and the first repayment of principal would be due at the end of project year six.

See: interest, accounting period
Reference: Gittinger

- hedonic method

The hedonic method uses market prices for goods and services to estimate an environmental value that is embedded in the observed price. Property and land prices and wages are both used to place implicit values on environmental factors that are difficult to value in the abstract. For example, differences in property values are used to estimate people's willingness to pay for scenic views or lower air pollution levels. Thus, where public goods affect the prices of market goods (usually land values), the hedonic method assumes that variations in prices of the market goods, other things being equal, must be caused by observable characteristics of the public good. Hiking trails, fishing streams, and game can affect the value of proximate properties, for example, while the improved water quality provided by a protected forest can raise the productivity of farms
downstream. Studies of residential property have consistently found that proximity to undeveloped public spaces increases their value.

See: public goods, willingness to pay

Reference: Dixon, 1994a, 1994b

• hedonic price

A hedonic price is the implicit or shadow price of a characteristic of a commodity. The quantity of a particular commodity may be resolved into a number of constituent characteristics which determine its quality. A part of the price of that commodity may be associated with each characteristic and variations in quality may thus be valued. The application of hedonic price theory to quality changes has found use in the analysis of housing demand and environmental economics.

See: shadow price

Reference: Pearce, 1992a

• human capital

Human capital refers to the productive capacities of human beings as income-producing agents in the economy. Capital is a stock that has value as a source of current and future flows of output and income. Human capital is the stock of skills and productive knowledge embodied in people. The yield or return on human capital investments lies in enhancing a person’s skills and earning power, and in increasing the efficiency of economic decisionmaking, both within and outside the market economy.

The essence of human capital is that investments are made in human resources to improve their productivity. Costs are incurred in the expectation of further benefits; hence, the term ‘investment in human resources.’ Like all investments, the key question is: are they economically worthwhile? The answer to this question depends on whether or not benefits exceed costs by a sufficient amount, and whether the standard investment criteria apply. Although there are differences, there is a direct analogy between investment in human capital and investment in physical capital. In particular, human capital is not collateral because it cannot be sold. Moreover, an individual cannot spread or diversify his risk in the manner that owners of physical capital can.

The concept of man investing in himself is very wide, and covers not only investments in formal schooling and post-school training, but also home investments in the form of family care in the pre-school years, the acquisition of improved health, and investments in labor-market information via job search. Human capital theory underpins many of the important developments in modern economics and provides one of the main explanations for wage and salary differentials by age and occupation, the uneven incidence of unemployment by skill, the job regulatory practices of trade unions, and so on, as well as contributing to policy decisions on say, the allocation of resources to schooling and training vis-à-vis other claims on resources.

Reference: Eatwell, Milgate, and Newman; Pearce, 1992a; Becker
• income

Income refers to the flow of goods and services accruing to an individual or a group of individuals. National income is the sum of the final goods and services produced by an economy in a given time period. In accounting, income is revenues less expenses. Income may be stated before tax (gross income) or after tax (net income).

Reference: Gittinger

• income effect

The income effect is the change in demand for a good or service caused by the impact of a change in the spending power of consumers brought about either indirectly by a change in prices, or directly by a change in real income. The change in price of a good or service leads to a change in the real income of individuals. In the case of a price increase they may no longer be able to afford the basket of goods and services that they previously bought, and in the case of a price decrease, they may be able to afford the old basket with cash left over to spend on extra items. The income effect is the impact of this change in spending power on the demand for the product whose price has changed. It can be added to the substitution effect to derive the total effect of the price change on the demand for the product.

The main factor determining the size of the income effect of a product is the proportion of total spending that item comprises. The effect on total spending of a change in the price of matches, for example, is trivial, but for a change in the price of food it is large. Unlike the substitution effect, the income effect can move in either direction. If demand for a product increases as incomes fall, it is called an inferior good. If, as is usually the case, demand increases as incomes rise, it is called a normal good.

See: substitution effect, inferior good, normal good

Reference: Bannock, Baxter, and Davis

• independent projects

Independent projects refer to projects or project design options that can all be undertaken. These projects should be distinguished from mutually exclusive projects or project design options for which accepting one alternative necessarily excludes accepting another.

See: mutually exclusive projects

Reference: Gittinger

• indifference curve

An indifference curve is a graphical representation of sets of different combinations of commodities which each yield the same level of satisfaction to the consumer. Indifference curves can be plotted on graphs called indifference maps. On each axis of the map, a quantity of some commodity is represented. To produce such a curve, any point can be taken to start with, representing a basket of two goods (though the analysis can be extended to more than two very easily). One unit of the first commodity, say, books could be removed from the basket and units of the second commodity, for example, cassettes,
could be added until a point was found at which the consumer felt that the new cassettes exactly compensated for the loss of the book. This new basket, with perhaps two more cassettes in it but one less book, is the second point on the same indifference curve as the first. The exercise can be repeated with steadily fewer books and increasing numbers of cassettes and then again with increasing numbers of books and correspondingly falling numbers of cassettes. A new indifference curve altogether could be derived by taking a starting-point with both more cassettes and books than the previous basket and repeating the whole process again.

Indifference curves can never intersect. If a point A lies on two intersecting indifference curves then all the points on each curve must have the same utility as Point A, and the two curves must both represent bundles of goods of equal utility. It is then logically impossible for them to be separate indifference curves. As a result of this, every point on the indifference map lies on one and only one indifference curve. Normally, various assumptions are made about consumers and their tastes, with the result that indifference curves have the following properties. Firstly, they slope downwards. As the consumer loses some of one commodity, he must receive more of another if he is to remain as satisfied as he was prior to the change. Similarly, a consumer should always prefer a basket with more of both commodities than another. Secondly, they are convex to the origin. This is because, as units of the first commodity are removed from the basket, increasing amounts of the second commodity will be required to compensate. A consumer may start off valuing cassettes and books equally, but after he has piled up a basket of books with only a tiny selection of cassettes remaining, he will want a large number of extra books in return for one cassette. Various extreme forms of indifference curve can be drawn without the usual properties described above. Perfect substitutes have indifference curves which are straight downward-sloping lines. At no stage will the consumer change the rate at which he swaps one item for the other. Perfect complements on the other hand, have L-shaped indifference curves; increasing quantities of a left shoe will derive for no extra utility for a consumer unless extra right shoes are found to match.

See: demand curve, marginal rate of substitution
Reference: Bannock, Baxter, and Davis

indirectly traded item

An indirectly traded item is a nontraded item that has a high import content. Examples of indirectly traded items include locally assembled tractors that use some foreign components, and construction that uses imported reinforcing rods. Indirectly traded items are valued by decomposition. The factors of production used in indirectly traded items are broken down into traded and nontraded components, and then valued separately in economic analysis, using either a shadow exchange rate or a conversion factor to allow for the foreign exchange premium. Specific conversion factors are sometimes calculated for major indirectly traded items commonly used in projects.

See: nontraded, traded, shadow exchange rate, conversion factor, foreign exchange premium
Reference: Gittinger
infant industry argument

An infant industry is an industry in its early stages of development whose share of the domestic market is currently small because of competition from overseas competitors. This can mean that domestic firms are producing at output levels considerably below their minimum efficient scale. One can argue that for such an industry tariffs will be beneficial as they will provide protection from international competition while the industry grows and achieves cost competitiveness through the acquisition of economies of scale.

The infant industry argument supports the establishment or retention of a protective import tariff or other protective measure. One of the oldest arguments for protection, it is justified on the grounds that an industry new to a country and of below optimum size may be unable to withstand foreign competition during its infancy. An industry does not operate at a minimum least-cost output until it has reached a sufficient size to obtain significant economies of scale. Thus a new industry in, say, a small developing country would be in a competitively vulnerable position in relation to imports from an already established industry in another country. The argument concludes that protection is necessary until the industry has reached its optimum size.

Reference: Bannock, Baxter, and Davis; Pearce, 1986a

inferior good

An inferior good is one whose consumption decreases as income increases, that is, its income elasticity of demand is negative. If demand rises as income rises the good is termed a normal good. Giffen goods are a special case of inferior goods where the negative income effect resulting from a fall in the price of the good is strong enough to outweigh the substitution effect of the price fall. As a result, demand falls as price of the good falls.

Reference: Bannock, Baxter, and Davis; Pearce, 1992a

inflation

Inflation is an increase in an economy’s general price level. Inflation occurs when the quantity of money in circulation rises relative to the quantity of goods and services offered. The result is too much money chasing too few goods, and prices are bid up. Inflation is associated with a rise in gross national expenditure at current prices that is greater than the increase in the real supply of goods and services available. In project analysis, the customary analytical approach is to work in constant prices rather than in current prices and to assume that inflation will affect the prices of all costs and benefits equally, except for specified costs and benefits that vary in comparison with the others so that the relative prices of these specified costs and benefits change. Using constant prices allows the analyst to avoid making risky estimates of future inflation rates and to simplify the procedures involved in economic analysis.

Reference: Gittinger
intangible

In project analysis, intangible refers to a cost or benefit that, although having value, cannot realistically be assessed in actual or approximate money terms. Intangible benefits include health, education, employment generation, electricity used for home lighting, and domestic water supply. Intangible costs are often the absence of the related benefit—disease, illiteracy, and so forth—but may also be such items as environmental degradation or inconvenience. Intangible benefits are sometimes valued as being at least equal to the estimated cost of the best alternative method of providing the same benefit. Thus, the benefit of supplying electricity for home lighting from a multipurpose river basin project may be taken to be the cost of providing the electricity by diesel generators. This method of alternative valuation should be used only in cases where the alternative actually would be undertaken in the absence of the project. The tangible cost of avoiding an intangible cost may also be included in the cost of a project. Thus, the cost of avoiding downstream pollution from excessive fertilizer runoff may be included in the cost of a project as a means of dealing with the intangible costs of pollution. However, the nature of intangible costs and benefits is such that the real value of the cost to those bearing it or of the benefit to project participants cannot be determined. When intangible costs or benefits are encountered in project analysis, the analyst should identify them and quantify them to the extent possible. Projects in which a substantial amount of the benefit is intangible may be evaluated using cost-effectiveness analysis.

See: cost-effectiveness analysis
Reference: Gittinger

interest

Interest is a payment for use of money, generally stated as a percentage of the amount (principal) borrowed. The rate of interest is also used for discounting, when it is generally referred to as the discount rate. Simple interest is the interest paid in one period. Compound interest is interest paid not only on the amount borrowed, but also on the interest earned in previous periods.

See: discount rate
Reference: Gittinger

intermediate goods and services

Intermediate goods and services are those that are used as an input for further transformation by some other production activity—not for consumption or as an addition to the stock of fixed capital. Intermediate goods are an output of one economic enterprise that have not yet reached the final form in which they will be used as an item of consumption or as an addition to the stock of fixed capital. Such goods proceed further through the production system and other enterprises use them as an input. They need to be distinguished from final goods and services, which have reached their ultimate form for use in consumption or are an addition to fixed capital. A particular good or service may be either final or intermediate depending on the use to which reference is made.
Thus, an orange is an intermediate good if used to make orange juice and a final good if consumed directly.

See: final goods

Reference: Gittinger

- **internal rate of return**

The internal rate of return of an investment project is that discount rate or rate of interest that makes the stream of net returns associated with the project equal to a present value of zero. It is equivalent to the discount rate \( r \) that satisfies the following relationship:

\[
\sum_{t=1}^{N} \frac{B_t - C_t}{(1+r)^t} = 0
\]

where \( B_t \) is the benefit stream, and \( C_t \) is the cost stream. The internal rate of return is then compared with the market rate of interest to determine whether or not a proposed project should be undertaken.

Among the criteria used to determine the profitability of an investment project are the payback period and the net present value (NPV). Whereas the payback period criterion is a crude rule of thumb that ignores much of the time pattern of receipts, the NPV criterion is the most relevant rule for optimal investment behavior. The NPV rule and the internal rate of return rule lead to identical results in the two-period case and in the perpetuity case, but may lead to different results in the multiperiod case.

The failure of the internal rate of return criterion is the consequence of the implicit assumption that all intermediate receipts, positive or negative, are treated as if they could be compounded at the internal rate of return, whereas the only appropriate external discounting rate is the market rate of interest. When investment projects are independent and with a perfect capital market (in which the lending and borrowing rates of interest are identical), the net present value is, in general, the only universally correct criterion for appraising investment projects. For the multiperiod case, the internal rate of return criterion is not generally correct. Furthermore, there may be multiple rates of return that will equate the present value of the project to zero.

See: net present value, discount rate

Reference: Eatwell, Milgate, and Newman

- **inventories**

Inventories are stocks and refer to the holding of goods by firms to enable them to meet temporary and unexpected fluctuations in production or sales. They are thus a form of investment, and may be either intended or unintended.

Reference: Pearce, 1992a
investment

Investment is most commonly used to describe the flow of expenditures devoted to increasing or maintaining the real capital stock. It is the flow of expenditures devoted to projects producing goods which are not intended for immediate consumption. These investment projects may take the form of adding to both physical and human capital, as well as inventories. Investment is a flow, the volume of which is determined by all those projects which yield a positive net present value, or an internal rate of return greater than the interest rate.

In project analysis, investment refers to the use of resources for a productive activity from which an income is expected to flow at a future time. In discounted cash flow analysis, investment is defined mathematically as a negative incremental net benefit, or incremental cash flow, occurring in any accounting period.

See: inventories, human capital, net present value, internal rate of return
Reference: Gittinger; Pearce, 1992a

investment appraisal

Investment appraisal refers to the evaluation of the prospective costs and revenues generated by an investment in a capital project over its expected life. Such appraisal includes the assessment of the risks of forecasting errors, and the sensitivity of the project’s viability to such errors. The appraisal enables a judgment to be made as to whether or not to commit resources to the project.

See: internal rate of return, net present value
Reference: Bannock, Baxter, and Davis

investment period

With respect to a project, an investment period is the period when the major project investments are undertaken.

Reference: Gittinger

law of diminishing marginal utility

The law of diminishing marginal utility states that, as the amount of a good consumed increases, the marginal utility from the consumption of that good tends to diminish.

Reference: Samuelson and Nordhaus

law of diminishing returns

The law of diminishing returns is an economic principle that states that successive additions of quantities of variable factors of production to fixed factors of production will result in diminishing marginal productivity, at least after some point. This means that as extra units of one factor of production are employed, with all others held constant, the output generated by each additional unit will eventually fall. Thus, successive additions of capital to a fixed quantity of labor will result in an increase in output, but subsequently
the marginal output, and then the average production associated with the variable factor, will begin to drop. The fixed factor decreases in proportion to the variable factor, so that each unit of the variable factor has a diminishing quantity of the fixed factor to work with.

See: diseconomies of scale
Reference: Bannock, Baxter, and Davis; McGraw-Hill Book Company

- liabilities

Liabilities refer to the debts or amounts of money an individual, partnership, or corporation owes to others. Considered from another point of view, liabilities are the claims or rights, expressed in monetary terms, of an individual’s or corporation’s creditors. In accounting, liabilities are classified either as short-term or long-term liabilities or as secured or unsecured liabilities. Short-term liabilities are those that will be satisfied or paid within one year’s time. Examples are payroll obligations, accounts payable, taxes due, accrued interest, and short-term notes (maturing within one year). Long-term liabilities are those that will not be satisfied within one year, such as mortgages, long-term notes, and bonds. Secured liabilities are claims that have specific assets pledged to ensure satisfaction. Unsecured liabilities are debts that depend on the firm’s general resources for satisfaction.

See: assets
Reference: McGraw-Hill Book Company

- liquidity

Liquidity is the readiness with which an asset can be converted into cash. Money is by definition completely liquid. Other assets vary in degree of liquidity, depending upon whether they meet two criteria. An asset is more liquid, the more readily—in terms of time and other transactions costs involved—it may be converted into money. The second characteristic of liquidity, emphasized more strongly in recent times, is the degree of freedom from the risk of fluctuations in capital value (in monetary terms). By the convertibility criteria, a deposit withdrawable at short notice may be only fractionally more liquid than a five year gilt-edged stock which is readily salable in a highly organized market. But by the criterion of capital risk, the stock is decidedly less liquid than a deposit or a short term bill.

See: asset, money
Reference: Gittinger; Pearce, 1992a

- long run

Long run refers to a time period relating to the process of production during which there is time to vary all factors of production, but not sufficient time to change the basic technological processes being used. In the very long run, it is possible to totally change the type of technology being used. Its most common application can be found in the theory of the firm, in which it is the period of time in which the quantities of all factors of
production employed are allowed to vary and all entry and exit that can occur into or from an industry has occurred. The duration of the long term will clearly vary with the context in which the term is applied, depending on the speed with which the variables spoken for change.

Reference: Pearce, 1992a

- manpower planning

Manpower planning refers to the continuing managerial process of identifying the requirements for human resources and implementing a strategy to develop and use labor resources in line with strategic objectives. Education planners also make wide use of this technique. It is similar to interindustry analysis, in that it bases projections of future manpower needs on fixed relationships between future output and the inputs of labor skills needed to produce it. In this respect, manpower planning makes an opposite assumption to that of cost-benefit analysis. To maintain the rigid relationship between output and required skills, manpower planning implicitly assumes that the demand for each type of skill is perfectly inelastic. Thus, if supply shifts, wages will shift also, but the same number of workers with such skills will be employed.

Reference: Pass and others; Roemer and Stern

- marginal analysis

Marginal analysis is the examination of the effects of adding one unit to or taking one unit from an economic variable.

Reference: Pass and others

- marginal cost

Marginal costs reflect the increase in a firm’s total costs caused by increasing its output by one extra unit. In the short run the marginal cost curve slopes upwards due to the law of diminishing returns. The marginal cost cannot be affected by the level of fixed costs. If an extra unit of output is produced, fixed costs do not change. It follows that marginal cost is determined by variable costs only. In the long run, marginal costs may rise, fall or stay constant depending on the presence of economies or diseconomies of scale.

See: fixed cost, variable costs, economies of scale, diseconomies of scale

Reference: Bannock, Baxter, and Davis; Pass and others; Pearce, 1992a

- marginal cost pricing

Marginal cost pricing is a pricing practice that private firms or public corporations pursue in which price is made equal to marginal cost. Given continuous revenue and cost curves, this implies setting the price at the point at which the demand curve cuts the marginal cost curve. The market conditions prevailing in perfect competition ensure marginal cost pricing since average and marginal revenue are the same. Hence the requirement for profit maximization, that marginal cost be equal to marginal revenue, means that price equals marginal cost. Under imperfect competition, however, profits will not be maximized with price equal to marginal cost, because average revenue will
exceed marginal revenue. Thus under imperfect competition, marginal cost pricing will only come about through some form of regulation or taxation.

In the public sector, nationalized industries are recommended to use marginal cost pricing, the rationale being that it maximizes economic welfare. This is because buyers put a valuation on the last unit consumed which is just equal to the resource cost of the last unit produced, a condition necessary for the optimal allocation of resources.

*See: marginal cost, marginal revenue*
Reference: Pearce, 1986b, 1992a

- **marginal product**

  Marginal product is the extra output obtained by employing one extra unit of a given input (factor of production). The term should thus be qualified with respect to which input is in question, for example, the marginal product of labor, the marginal product of capital, and so on.

  *See: law of diminishing returns*
Reference: Pearce, 1992a

- **marginal rate of substitution (MRS)**

  The marginal rate of substitution is the rate at which a consumer substitutes one commodity for another to maintain constant total utility from the commodities taken together. If a consumer values two apples equally to one orange, the marginal rate of substitution of apples for oranges is two, because if one orange were taken away from the consumer, two apples would have to be provided to compensate. The MRS between commodities A and B usually diminishes as consumption of commodity A increases. Graphically, the MRS is the slope of an indifference curve, and this concept is important in indifference curve analysis. Mathematically, it is the ratio of the marginal utilities of two items. As long as the MRS declines with increased consumption of an item, the indifference curves are convex to the origin of an indifference map.

Reference: Bannock, Baxter, and Davis

- **marginal rate of technical substitution**

  The marginal rate of technical substitution of two inputs, for example, of labor for capital is the amount of labor that needs to be substituted for a very small reduction in the amount of capital employed in order to maintain the level of output. Its value is equal to the ratio of the marginal product of capital to the marginal product of labor.

Reference: Pearce, 1992a

- **marginal rate of transformation**

  The marginal rate of transformation of good A into good B is the fall in the rate of output of good A which permits an additional unit of good B to be produced. It is equal to the ratio of the marginal cost of good B to the marginal cost of good A. It is also the numerical value of the slope of the production possibility frontier.
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Reference: Pearce, 1992a

- **marginal revenue**
  Marginal revenue is the increase in the total revenue a firm receives from the sale of one extra unit of its output. For a small firm that cannot influence market price, the extra revenue gained is equal to the price of the sale. For a firm with a large share of the total market (monopoly), however, putting an extra item on sale drives down the market price slightly, so that the revenue gain equals the cash gained on the new sale minus the loss that occurs on all sales that would otherwise have been made at the previous higher price.
  Reference: Bannock, Baxter, and Davis

- **marginal utility**
  Marginal utility is the extra satisfaction a consumer gains from a small increment in the consumption of a commodity. It is a concept of central importance to demand theory, one approach to which holds that marginal utility diminishes as consumption of an item increases. The notion of diminishing marginal utility is an often cited explanation for the downward sloping demand curve. The hypothesis is that consumers receive less and less additional satisfaction from buying more and more of a particular commodity. The observed need for lower prices to induce buyers to make additional purchases makes sense if consumers receive less and less additional satisfaction from additional purchases.
  *See: law of diminishing marginal utility*
  Reference: Bannock, Baxter, and Davis; McGraw-Hill Book Company

- **marginal value product**
  The marginal value product is the market value of the output generated by the employment of one additional unit of a factor of production. It is equal to the marginal product of a factor multiplied by the unit selling price of the output produced. It is thus comparable to the marginal revenue product, which is marginal product multiplied by marginal revenue. In perfect competition, where price is equal to marginal revenue, the two concepts are identical.
  Reference: Bannock, Baxter, and Davis

- **market failure**
  Market failure refers to a situation in which economic efficiency has not been achieved because of imperfections in the market mechanism. Market failure may manifest itself either by the system's inability to produce goods that consumers want or by a maldistribution of resources that could be improved in such a way that some consumers would be better off and none would be worse off, that is, resource allocation is not Pareto optimal.

  The best way to understand market failure is to understand market success, which is the ability of a collection of idealized competitive markets to achieve the Pareto optimal
allocation of resources. The theorems of modern welfare economics provide the clearest explanation of this characteristic of markets. The First Fundamental Theorem of Welfare Economics is of most interest. Simply stated it reads as follows: (a) if there are enough markets, (b) if all consumers and producers behave competitively, and (c) if an equilibrium exists, then the allocation of resources in that equilibrium will be Pareto optimal. Market failure is said to occur when the conclusion of this theorem is false, that is, when allocations achieved with markets are not efficient.

Markets will also fail when important costs, such as pollution, are not reflected in prices (externalities); when monopoly or oligopoly exists; or when government actions, for example, the imposition of taxation, distort markets. Economic theory predicts that markets will usually fail in some sense except under conditions of perfect competition, so the term is reserved for cases where economists believe that a serious maldistribution of resources has occurred. In these circumstances there may be a case for government intervention.

See: economic efficiency, externalities, Pareto optimal, public goods
Reference: Bannock, Baxter, and Davis; Eatwell, Milgate, and Newman

- **market price**
  The market price is defined as the actual price paid for a commodity during a certain period of time. It is the price at which a good or service is actually exchanged for another good or service or for money, in which case it is a financial price. A market price refers to a transaction that occurs at any location, not necessarily a village or wholesale market.

  Reference: Gittinger

- **Marshallian demand curve**
  The Marshallian demand curve is a curve in which the responsiveness of quantity demanded to price incorporates both the income effect and the substitution effect. This is in contrast to the compensated demand curve where income effects are netted out.

  See: income effect, substitution effect, compensated demand

  Reference: Pearce, 1992a

- **maximum sustainable yield**
  Maximum sustainable yield is the maximum rate of exploitation that can be sustained without depleting future supply. It is another way of looking at the carrying capacity of a particular ecosystem. Because one can improve the supply of at least some renewable resources by making appropriate investments, for example, aquaculture for fisheries or afforestation for wood supply, the objective of a sustainable development policy may relate not to a fixed level of exploitation, but to an expanded one. Obviously, the maximum sustainable yield is not a constraint with regard to renewable resources such as solar energy and hydropower, the future supply of which is unlikely to be affected by the rate of current exploitation.

  Reference: Baum and Tolbert
• merit good

A merit good is a commodity or service, the consumption of which is regarded as socially desirable. In the case of such goods it is argued that consumer sovereignty does not hold and that if consumers are unwilling to purchase adequate quantities of such goods, they should be encouraged to do so. This argument is sometimes deployed where governments subsidize the provision of certain goods and services, for example, compulsory education, or ‘free’ tax-financed health services.

Reference: Pearce, 1992a; Ward, Deren, and D’Silva

• mutually exclusive projects

In project analysis, mutually exclusive projects refer to projects or project design options that, by their nature, are such that if one is chosen the other cannot be undertaken. Examples include the development of surface irrigation which rules out tubewell irrigation. Mutually exclusive projects should be distinguished from independent projects or project design options.

See: independent projects

Reference: Gittinger

• net benefit

In project analysis, the net benefit is the amount remaining after all outflows have been subtracted from all inflows. Net benefits may be positive or negative. The incremental net benefit is the increase in net benefit with the project as opposed to the case without the project. In the early years of a project, the net incremental benefit is usually negative. The net incremental benefit is the basis for calculating measures of project worth, the most important of which are the discounted measures of net present value and internal rate of return. In calculating these measures (a process usually called discounted cash flow analysis), costs are entered in the year they are incurred and benefits are entered in the year they are realized. As a result, no depreciation is deducted before arriving at the net incremental benefit.

In building project accounts for financial analysis, the net benefit and the incremental net benefit may be derived as the net or incremental net benefit before financing, in which case any financing transaction is excluded, and as the net or incremental net benefit after financing, in which case loans or other financial receipts are added to the net and incremental net benefits, and debt service or other financial payments are subtracted from the net and incremental net benefits. Discounting the incremental net benefit before financing gives a measure of project worth of all resources engaged; discounting the incremental net benefit after financing gives a measure of project worth of the entity’s own resources or equity.

See: net present value, internal rate of return, discount rate, equity

Reference: Gittinger
• **net benefit-investment ratio (N/K ratio)**

The net benefit-investment ratio is a discounted measure of project worth. It is the present value of the net benefits divided by the present value of the investment. When using the N/K ratio, the selection criterion is to accept all projects with an N/K ratio of one or greater when discounted at a suitable discount rate, most often the opportunity cost of capital, in order of ratio value until all available investment funds are exhausted. The N/K ratio may be used to rank independent projects and generally cannot be used directly to choose among mutually exclusive alternatives.

*See: measure of project worth, benefit-cost ratio, discount rate, opportunity cost of capital*

Reference: Gittinger

• **net present value (NPV)**

The net present value is the sum that results when the discounted value of the expected costs of an investment are deducted from the discounted value of the expected benefits or the expected returns. That is, if the discount rate is \( r \), the benefit in year 1 is \( B_1 \), the benefit in year 2 is \( B_2 \), and so on, and the cost in year 1 is \( C_1 \) and so on, then the NPV is given by:

\[
NPV = \sum_{t=1}^{N} \frac{B_t - C_t}{(1+r)^t}
\]

where \( B_t \) is the benefits in year \( t \), \( C_t \) is the costs in year \( t \), \( r \) is the discount rate and \( N \) is the time horizon.

Calculating the NPV requires determining the appropriate discount rate. A general rule is that if the NPV is positive the project in question may be worth undertaking. Therefore, when using the NPV, the selection criterion is to accept all independent projects with an NPV of zero or greater when discounted at a suitable discount rate, most often the opportunity cost of capital. This criterion does not give any ranking for the order of implementation. Thus, the precise rule for acceptance or rejection will depend on the method of ranking all available options that have a positive NPV, which can require the use of programming techniques. When analyzing mutually exclusive alternatives, one can accept the alternative with the greatest NPV.

*See: discount rate, internal rate of return*

Reference: Eatwell, Milgate, and Newman; Pearce, 1986b

• **net worth**

Net worth represents the excess of assets over liabilities. A business’s net worth represents the equity of the owners (proprietors and stockholders) in it. Thus, a statement of net worth shows the total investment of the owners in the business (capital) and the profits that have been allowed to remain in the business and increase the owners’ equity (surplus). Net worth is affected by the owners’ original investment, additional investments, subsequent profits and losses of the business, and withdrawals from accumulated profits or investments. Only tangible assets are included when net worth is calculated for the purpose of judging credit risks, but intangible assets are included for accounting computations.
See: assets, liabilities
Reference: McGraw-Hill Book Company

• nominal price
Nominal prices refer to the measurement of prices in terms of current prices. Because of price changes from year to year, observations based on current prices can obscure an underlying trend.
See: current prices
Reference: Pass and others

• nontraded
A nontraded project input or output is one that is not tradable across the national boundaries of a particular country. Common examples of nontraded items are unskilled labor and land. In project analysis, nontraded refers to goods and services not traded by the country in which the project is located. In economic analysis, nontraded items are valued at their marginal value product if they are intermediate goods or services or according to the willingness to pay criterion if they are final goods or services. Nontraded goods should be distinguished from traded goods.
See: traded good
Reference: Gittinger

• normal good
A normal good is a good the demand for which decreases as income falls. For normal goods, a price fall gives rise to an increase in real income such that the income effect always has the same sign with respect to the price change as the substitution effect: both are negative. Where income and substitution effects have different signs, the reaction to the price change is determined by the relative absolute size of the two effects, such that the good may be an inferior good in which case demand will still rise as price falls, but the rise will be smaller than in the case of a normal good. If, however, the income effect is very strong, demand may fall as price falls—the condition for a giffen good.
See: inferior good
Reference: Pearce, 1992a

• numeraire
A numeraire is a unit of account or an expression of a standard of value. Money is a numeraire, by which the values of different commodities can be compared. In project analysis, the numeraire is the unit that measures the objective being maximized. In cost-benefit analysis, the numeraire is the common denominator for measuring benefits and costs. Thus, if projects are to be judged on the basis of their contribution to national economic efficiency, then the contributions must be measured by some common denominator or a numeraire. Two types of numeraires are widely used: the willingness to pay or aggregate consumption numeraire, and the foreign exchange numeraire.
• official exchange rate

The official exchange rate is the rate, established by the monetary authorities of a country, at which domestic currency may be exchanged for foreign currency. In the absence of currency controls, the official exchange rate is taken to be the market rate.

See: foreign exchange premium

Reference: Gittinger

• opportunity cost

Opportunity cost refers to the benefit foregone by using a scarce resource for one purpose instead of its next best alternative use. For example, suppose a farmer produces both rice and maize, but applies all available fertilizer to the rice crop. If instead he transferred some of the fertilizer to maize, he would reduce the value of his rice production somewhat, but he might gain a much higher value of increased maize production. The value of his rice production foregone would be the opportunity cost of the fertilizer used for maize production. In this example, therefore, the opportunity cost is the marginal value product of the fertilizer in its next best alternative use. In a perfectly competitive market with many buyers and sellers, all of whom have perfect information, the market price will equal the marginal value product of an item, and thus market price, opportunity cost, and marginal value product will all be equal. In any enterprise net benefit, or profit, will be maximized when the use of an input is adjusted to the point where its marginal value product is equal to its opportunity cost.

In project evaluation, for the financial analysis the opportunity cost of a purchased input is always its market price. In economic analysis, however, the opportunity cost of a purchased input is always either its marginal value product in its best nonproject alternative use for intermediate goods and services, or its value in use (as measured by willingness to pay) if it is a final good or service. Because the price of a factor of production is equal to marginal value product in a perfectly competitive market, in economic analysis if an input is purchased in a reasonably competitive market, the price is at least an initial estimate of the marginal value product of the input and, hence of its opportunity cost. However, if because of market imperfections or other reasons the market price of an input does not closely approximate the marginal value product in its next best alternative nonproject use, the marginal value product is estimated directly, and that estimate becomes the shadow price of the item. The concept of opportunity cost is a cornerstone of project analysis and a central concept underlying the valuation of project inputs.

See: marginal value product, market price, net benefit, intermediate goods, willingness to pay, shadow price

Reference: Gittinger
- **opportunity cost of capital**
  
The opportunity cost of capital is the opportunity cost of using investment resources in a project rather than in their next best alternative use. It is usually expressed in the form of an interest rate. In practice, it is usually a weighted average calculation of the cost of securing project capital from various sources. In economic analysis, it is usually the weighted average cost of capital to the economy as a whole, but sometimes the weighted average cost of capital to the public sector. It is also the rate at which benefits and costs are discounted in calculating the net present value or the benefit-cost ratio.

*See: opportunity cost, present worth, internal rate of return*

*Reference: Gittinger*

- **pareto conditions**
  
Pareto conditions are a set of rules devised in welfare economics, which when fulfilled will give rise to a pareto optimum. These rules are that:
  
  - The marginal rate of substitution in consumption (the rate at which a consumer can exchange one good for another without being made better or worse off) between any two commodities must be the same for all consumers.
  
  - The marginal rate of technical substitution (the rate at which one factor of production can be substituted for another while maintaining output levels) between any two factors of production must be the same wherever these factors are used.
  
  - The marginal rate of transformation (the rate at which the economy as a whole must forego the production of any one good to increase output of another) for any two goods must equal the marginal rate of substitution in consumption of those goods.

*See: pareto optimal*

*Reference: Pearce, 1992a*

- **pareto optimal**
  
The concept of the pareto optimal was originated by Vilfredo Pareto (1848-1923). According to Pareto, an allocation of resources in the economy is optimal if no other productively feasible allocation exists that would make all individuals in the economy at least as well-off, and at least one strictly better off, than they were initially. Although Pareto actually used the word optimal, this is really a definition of efficiency, as a pareto optimal allocation of resources is good only in the limited sense that not everybody can be made better off. It is not surprising, therefore, that the term pareto optimal has gradually been replaced by pareto efficient.

There are several points to note about this definition. First, it is only well defined within a neoclassical framework, that is, where individuals' preferences and the technical possibilities of production are taken as the ultimate data of economic analysis. Second, even within this framework, it is an ordinal concept of efficiency, as it does not rely on any intensity of preference, interpersonal comparability of utilities, or commensurability of different inputs or outputs for its definition. Third, while it provides a ranking of allocations of economic goods between individuals, it does not permit a ranking of all
such allocations, that is, many different allocations are pareto optimal and differ with respect to the distribution of real income (utility) among individuals in society.

See: economic efficiency
Reference: Eatwell, Milgate, and Newman

- parity
  In project analysis, a parity price or parity economic value is the price or value of a project input that is based on a border price adjusted for expenses between the border and the project boundary.
  Reference: Gittinger

- participation
  An important condition for the success of a project is to find means to enlist the commitment, support, and active participation of the target population and, in so doing, to build up the capacity of local people and their organizations to operate and maintain the project. Participation is extremely important in projects that seek to bring about social change. People must be convinced that the risks are worth taking and that a sustained effort to achieve the project’s goal is worthwhile. Participation can—and should—characterize all stages of the project cycle. It can assume a variety of forms, such as having project beneficiaries provide advice on selecting and planning investments; contribute labor, materials or cash; and monitor project execution. When intended beneficiaries participate actively, they increase the chance that they will benefit from the project on their own terms. Such participation also enables the project authorities to extend the benefits to more people for the same expenditure of funds. Consultation before taking steps that affect people’s lives helps to forestall or minimize opposition, mobilize support, and increase the positive impact and sustainability of projects.
  Reference: Baum and Tolbert

- payback period
  The payback period is the time required for an investment to generate sufficient increments of cash to recover the initial capital expenditure on the project. It takes into account the capital expenditure on a new project and relates it to the net cash flow of that project. According to this criterion, projects are ranked according to the length of the payback period, with preference being given to those projects which have the shortest paybacks. This method has been subject to criticism by economists as it does not take into account the cash flows emanating after the payback period or the pattern of flows within that period.
  Reference: Pearce, 1992a

- price
  Price is the amount (usually of money) that must be exchanged for a good or service. Price generally refers to the market price or a financial price discussed as part of financial
analysis, as distinct from an economic value, which is used for amounts discussed in connection with economic analysis.

See: economic value, market price
Reference: Gittinger

• principal
  Principal refers to the amount of a loan.
  Reference: Gittinger

• producer's surplus
  Producer's surplus is the excess of the revenue a supplier of a commodity receives over the minimum the supplier would be willing to accept to maintain the same level of supply. The traditional measure of producer's surplus is the area above the product supply curve and below the price.
  Reference: Bannock, Baxter, and Davis; Pearce, 1992a

• project
  A project generally refers to an investment activity upon which resources (costs) are expended to create capital assets that will produce benefits over an extended period of time, and that logically lends itself to planning, financing, and implementing as a unit. A project is thus a specific activity, with a specific starting point and a specific ending point, that is intended to accomplish a specific objective. It can also be thought of as the smallest operational element prepared and implemented as a separate entity in a national plan or program. It is generally unique in that it is not a segment of an ongoing program, although it may be a time slice—a portion lasting several years—of a long-term program. A project may produce benefits that can be valued in money terms or it may produce benefits that are intangible.
  See: investment
  Reference: Gittinger

• project analysis
  Project analysis is an analytical system that compares costs with benefits to determine if, given the alternatives, a proposed project will sufficiently advance the objectives of the entity from whose standpoint the analysis is being undertaken to justify undertaking the project.
  Reference: Gittinger

• project cycle
  The project cycle refers to the sequence of phases through which a project passes, such as project identification, preparation and analysis, appraisal, implementation, and evaluation. Each phase leads to the next, and the last phases, in turn, produce new project
approaches and ideas and lead to the identification of new projects, making the cycle self-renewing.

The first phase of the project cycle is concerned with identifying projects that have a high priority. After a project has been identified, the process of project preparation begins. A project brief is prepared for each project that describes its objectives, identifies principal issues, and establishes the timetable for its further processing. A critical element of preparation is identifying and comparing technical and institutional alternatives for achieving the project's objectives. As the project takes shape, it is scheduled for appraisal.

Project appraisal, perhaps the best known phase of project work (in part, because it is the culmination of preparatory work), provides a comprehensive review of all aspects of the project and lays the foundation for implementing the project and evaluating it when it is completed. Technical appraisal is concerned with questions of physical scale, layout, and location of facilities; what technology is to be used, including types of equipment or processes and their appropriateness for local conditions; what approach will be followed for the provision of services; how realistic implementation schedules are; and what the likelihood is of achieving expected levels of output. A critical part of technical appraisal is a review of the cost estimates and the engineering or other data on which they are based to determine whether they are accurate within an acceptable margin and whether allowances for physical contingencies and expected price increases during implementation are adequate. In addition, technical appraisal is concerned with estimating the costs of operating project facilities and services and with the availability of necessary raw materials or other inputs. During economic appraisal, the project is studied in its sectoral setting. The investment program for the sector, the strengths and weaknesses of public and private institutions, and key government policies are all examined. Through cost-benefit analysis of alternative project designs, the one that contributes most to the country's development objectives may be selected. This analysis is usually done in successive stages during project preparation, but appraisal is the point at which the final review and assessment are made. Whether qualitative or quantitative, economic analysis always aims at assessing the project's contribution to the country's development objectives. This remains the basic criterion for project selection and appraisal. An important element of financial appraisal is to ensure that a financing plan exists that will make funds available to implement the project on schedule.

The next stage in the life of the project is its actual implementation during the period of construction and subsequent operation.

The last phase is project evaluation. While projects may be subject to ongoing monitoring and evaluation, a more comprehensive approach to evaluating project results is also needed. The evaluation procedure can include an ex post audit and a completion report. The evaluation results can be a gold mine of information, supplementing and complementing the information provided by the broader stream of project supervision reports. These reports help to ensure that the lessons of experience are being built into the design and preparation of future projects.

See: project analysis, project evaluation

Reference: Baum


- **project evaluation**

From the point of view of national planners, in choosing investment projects they have to ascertain which best satisfy the country's interests and objectives. This is complex, not only because national objectives and interests are not easy to define, but also because planners' opinions may vary. In addition, to assess how an investment project affects national objectives, planners must have some understanding of how the economy will respond to the project, that is, what the project's impact is likely to be. The term project evaluation thus refers to a branch of applied welfare economics concerned with how national planners should choose among alternative investment projects. It is part of a larger field of inquiry called social cost-benefit analysis, which addresses the problem of evaluating all varieties of government activities, not just investment, with a view to providing a means of choosing among them.

The quality of project evaluation depends on the quality of data used and of the forecasts of costs and benefits made. Unrealistic assumptions about yields, entrepreneurs' responses to incentives, the trend of future prices and the relative effect of inflation upon them, market shares, or the quality of project management can ruin the results of the analysis. By and large, project evaluation is more useful when it is applied to unique investment activities. The project works best where a clear investment-return cycle exists and a geographical area or clientele is clearly defined.

*See: project analysis*

Reference: Eatwell, Milgate, and Newman

- **public goods**

Public goods are commodities, the consumption of which has to be decided by society as a whole, rather than by each individual. Public goods have three characteristics. The first is that they yield nonrivalous consumption: one person's use of them does not deprive others from using them. The second is that they are nonexcludable: if one person consumes them then restricting others from consuming them is impossible. Third, public goods are often nonrejectable: individuals cannot abstain from their consumption even if they want to. National defense is an example of a public good. Many items are partly public and partly private goods. A developed patent system, for example, has public good properties, because it benefits not only the community as a whole, but especially inventors who take out patents.

Reference: Bannock, Baxter, and Davis

- **quota**

A quota is an imposed limit on the quantity of goods produced or purchased. Import quotas can be used to restrict the purchase of goods from foreign origins, while export quotas can be used to stabilize the export earnings of countries producing primary products by restricting supply, and thereby sustaining prices. The protection afforded by quotas is more certain than can be obtained by raising import tariffs as the effect of the latter will depend upon the price elasticities of the imported commodities. Quotas, like tariffs, can also be used to favor preferred sources of supply. The term also applies to
quantitative restrictions on production which may be set by cartels or colluding oligopolists.

See: tariff

Reference: Bannock, Baxter, and Davis; Pearce, 1992a

• rate of return

The rate of return is the remuneration to investment stated as a proportion or percentage. It is often the internal rate of return. The financial rate of return is the internal rate of return based on market prices; the economic rate of return is the internal rate of return based on economic values.

See: internal rate of return

Reference: Gittinger

• real terms

Real terms refers to money value adjusted for changes in prices. For example, the nominal value of the national income may rise by 10 percent over a year with a similar increase in personal expenditure, but if consumer prices have risen by 8 percent the quantity of goods and services that are purchased by the consumer will have increased only by about 2 percent. Thus to convert current money values to constant values or real terms it is necessary to deflate data at current prices by an appropriate index number. In the same way money wages or other forms of income can be adjusted to real wages or real income to allow for changes in the purchasing power of earnings.

Reference: Bannock, Baxter, and Davis

• replacement cost approach

The basic premise of the replacement cost approach is that the costs incurred in replacing productive assets damaged by a project can be measured, and that these costs can be interpreted as an estimate of the benefits presumed to flow from measures taken to prevent that damage from occurring. Replacement costs are not a subjective valuation of the potential damages, but rather, are the true costs of replacement if damage has actually occurred. The approach may thus be interpreted as an ‘accounting procedure’ used to work out whether it is more efficient to let damage happen and then to repair it or to prevent it from happening in the first place. It gives an estimate of the upper limit but does not really measure the benefits of environmental protection per se. The assumptions implicit in this type of analysis are:

- The magnitude of the damage is measurable
- The replacement costs are calculable and are not greater than the value of the productive resources destroyed; and therefore it is economically efficient to make the replacement. If this assumption is not true, it would not make sense to replace the resource lost
- There are no secondary benefits associated with the expenditures.
In general, the replacement cost approach can be useful when an effect on the environment has caused, or will cause, money to be spent on replacing a physical asset. When that asset is a road, dam, or bridge, the technique is straightforward. When it is soil, water, or aquatic life, its application is the same but the problems of measurement are greater. When impacts on the environment result in physical economic externalities, then this approach can frequently be used to bring those externalities into the analysis. This technique thus uses information on potential expenditures to value a development impact on the environment. It examines the costs that would be involved if an environmental impact were to be mitigated by replacing the environmental services that were damaged or destroyed. This information is then used to decide whether it is more efficient to take preventive measures beforehand or compensatory measures after the event.

Reference: Dixon, 1994a

- return of capital

Return of capital is the return to the investor of part or all of the initial investment of capital in a project. The incremental net benefit, or incremental cash flow, is an undifferentiated stream of amounts consisting of the return of capital and return to capital.

See: return to capital

Reference: Gittinger

- return to capital

Return to capital is the rate of return received by the investor on capital engaged in a project. The incremental net benefit, or incremental cash flow, is an undifferentiated stream of values consisting of the return to capital and return of capital. The internal rate of return is a measure of the return to capital. When the internal rate of return is zero, all capital is returned by the cash flow, but there is no return to capital.

See: return of capital

Reference: Gittinger

- risk analysis

Risk analysis incorporates evidence or assumptions about the probability distribution of the values of variables used in project analysis, and takes account of the extent to which changes in different variables are correlated with one another. The resulting probability distribution of the net present value (or rate of return) provides a better picture of the degree of risk than a single value calculation does. On the basis of such a distribution, judgments can be made as to the existence of, for instance, an x percent chance that the project will result in a negative net present value, or a y percent chance of a surplus exceeding US$N million. There is a danger, however, in reading too much into the numbers resulting from these apparently sophisticated tools. Ultimately, the quality of the results can be no better than the accuracy with which the probabilities have been estimated and the correlation between different variables has been captured by the model.
Also, although risk analysis provides a better basis than sensitivity analysis for judging the riskiness of an individual project or the relative riskiness of alternative projects, it does nothing to diminish the risks themselves.

*See: sensitivity analysis*

Reference: Baum and Tolbert

- **scarcity**

  Scarcity refers to a limit in the availability of a productive resource during a given time period. In a system of voluntary exchange, a resource will be allocated to uses that return the greatest value to the owner, but in a market system, when property rights are conflicting or when incentives are distorted because of taxation and regulation, resources may not be allocated efficiently, thereby causing scarcity. In the presence of scarcity, choices have to be made between those wants that can be satisfied and those that cannot be. The available resources must be rationed in some way, either through the price mechanism or through some central distribution system.

  Reference: McGraw-Hill Book Company

- **second best**

  The theory of second best was formulated by Lipsey and Lancaster in *The General Theory of Second Best* (1956). This theory says that in the absence of being able to attain all the conditions necessary for the existence of the most desirable possible economic situation, the second-best position is not necessarily one in which the remaining conditions will hold. In an efficient economy, for example, price will equal marginal cost in all industries. This will ensure that no consumer who values a commodity more than it costs to society to produce will be deterred from buying it. If in one industry, however, price is higher than marginal cost, the theory of second best suggests that it is not efficient for price to be equal to marginal cost in all other industries, for this would encourage too much consumption of those items relative to the more highly priced one. In the second-best world, all other items would be taxed so that everything was priced in excess of marginal cost, and consumers would allocate their budgets almost identically to the way they would in a world of full marginal-cost pricing.

  *See: marginal-cost pricing*

  Reference: Bannock, Baxter, and Davis; Lipsey and Lancaster

- **sensitivity analysis**

  The economic analysis of projects is necessarily based on uncertain future events and imperfect data, and therefore calls for judgments about probabilities, whether made explicitly or not. A simple method of doing this is to use sensitivity analysis, that is, to determine how sensitive the net present value (or internal rate of return) is to variations in selected costs and benefits. Sensitivity analysis is an analytical technique to test systematically what happens to a project's earning capacity if events differ from the estimates made about them in planning. It is a means of dealing with uncertainty about future events and values. Sensitivity analysis is carried out by varying one element or a
combination of elements and determining the effect of that change on the outcome, most often on the measure of project worth. In agricultural project analysis, most projects should be tested at least for the effects on earning capacity of changes in prices, cost overruns, delays in implementation, and yield.

A variation of sensitivity analysis is to determine the switching value. Here one can measure how much an element must vary for the net present value to be reduced to zero (or for the internal rate of return to be reduced to the opportunity cost of capital). The percentage change in a variable at which this takes place is called its switching or crossover value (that is, the percentage change in the variable needed to switch the project from acceptable to unacceptable). The use of switching values is preferable to the more common practice of testing sensitivity to a fixed variation (such as 10 or 15 percent) in individual project parameters, because the switching values enable the decisionmaker to focus better on the likely project risks. Switching value tests are particularly helpful in identifying the critical elements on which the outcome of the project depends. They focus attention on variables that warrant further effort to firm up the estimates and narrow the range of uncertainty. They may also help the management of the project by indicating critical areas that require close supervision.

See: risk analysis
Reference: Baum and Tolbert; Gittinger

- shadow exchange rate
The shadow exchange rate is the shadow price of foreign exchange and reflects the foreign exchange premium. It is the official exchange rate multiplied by one plus the foreign exchange premium stated in decimal form.

Reference: Gittinger

- shadow price
A shadow price is the opportunity cost to society of engaging in some economic activity. It is a concept applied to situations where actual prices cannot be charged, or where actual prices charged do not reflect the real sacrifice made when some activity is pursued. Stated in another way, it is the value used in economic terms for a cost or a benefit when the market price is felt to be a poor estimate of economic value. It is generally used as a synonym for accounting price. Shadow price technically implies a price that has been derived from a complex mathematical model, for example, from linear programming, whereas an accounting price simply indicates that the price is not a market price. In current usage, this distinction has largely been lost, and shadow price is generally used for both purposes.

The shadow price can thus be described as the imputed price or value of a good or service where such a price or value cannot be determined accurately. To impute a price or value is to make the best estimate of what that price or value would be if a well-functioning market existed. In a perfectly functioning economy, market prices will be equal to marginal cost, which itself represents the full cost to society of producing one extra unit of a commodity. It is equivalent to the value of those items that could have been made as
alternatives to the last unit of the commodity produced with the same resources. In the perfectly competitive economy, therefore, the market price of an item is equal to the opportunity cost of producing that item. In an economy that does not function perfectly, however, this is not so. Suppose there is unemployed labor in the economy. The opportunity cost to society of using that labor is virtually zero, because by employing it no sacrifice is made in terms of other goods produced. The shadow price of labor is zero, even though the workers, if employed, would have to be paid a wage. Alternatively, suppose that there is excess demand for labor; at the going wage rate, labor is in short supply. In this case, employing a worker may cost a firm only the going wage, but the cost to society of that firm employing that worker is the production the worker could have produced in an alternative occupation. This will be worth more than the wage rate if labor is in excess demand. The shadow price of labor in this case is higher than the wage rate. More generally, shadow prices are used in valuing any item that is implicitly rationed or constrained in some way. Shadow prices can be used in cost-benefit analysis, which attempts to achieve an optimal resource allocation in the absence of an effective price system.

See: conversion factor
Reference: Bannock, Baxter, and Davis; Pass and others

- short run

Short run is the time period in the production process during which the fixed factors of production cannot be changed, but the level of utilization of variable factors can be altered.
Reference: Pearce, 1992a

- sinking fund factor

The sinking fund factor is the level of deposit required each year to reach one by a given year. The expression \( i \times \left(1 + i^n\right) - 1 \), where \( i \) is the rate of interest and \( n \) is the number of years. It is the reciprocal of the compounding factor for one per annum, and is generally obtained from a set of compounding and discounting tables. This factor permits calculating the equal installment that must be set aside each year, to be invested at compound interest, so as to have a predetermined sum at a given time. It is primarily used to determine how much must be put into a fund so as to recover the amount of an investment at the end of its useful life. It must be noted, however, that this is a mechanistic depreciation rule and may not be good management practice in many circumstances.

See: compounding factor for one per annum, equal installments
Reference: Gittinger

- social cost

Social costs represent the total cost to society of an economic activity. It is the sum of the opportunity costs of the resources an agent uses to carry out the activity plus any additional costs imposed on society from the activity. The idea underlying the notion of
social cost is a simple one. A person initiating an action does not necessarily bear all the costs (or reap all the benefits) herself. Those that she does bear are private costs, those that she does not bear are external costs. The sum of the two constitutes the social cost. For example, when people drive their cars they incur the private cost of petrol and wear and tear on the vehicle, but the social cost of them driving includes wear and tear on the roads and the congestion and pollution they cause, which they do not pay for directly. Social costs can be incorporated into private costs through taxation, so that market prices properly represent the true costs to the community.

See: opportunity cost, shadow price, externality
Reference: Bannock, Baxter, and Davis; Eatwell, Milgate, and Newman

- **social safety net**

Guaranteeing social protection for everybody is widely considered to be a critical function of the state, that is, providing its citizens with the means for or access to minimal living standards, at least in countries that can afford to do so. The guarantee may be generally provided in two ways. First, citizens may be entitled to income transfers because of prior contributions to a social insurance scheme. Second, some programs give social assistance to persons who, for whatever reason, require additional income support. These include the working poor, the homeless, and newly arrived refugees. Social assistance schemes may become increasingly important in countries as a market economy develops. Strengthening the safety net in these countries will require three main steps: extending coverage to assist all those in need, ensuring that the programs provide enough protection, and guaranteeing support for the unemployed.

Reference: World Bank internal source

- **social time preference rate**

The social time preference rate is a rate, usually expressed in the form of a percentage, that expresses the preference of society as a whole for present returns rather than future returns. It is sometimes also proposed as a discount rate for project analysis. It is generally considered to be less than the opportunity cost of capital, which expresses a summation of individual time preferences.

See: discount rate, opportunity cost of capital
Reference: Gittinger

- **strategic planning**

Strategic planning involves three elements: a clear definition of goals and objectives, a determination of resources available to accomplish the objectives, and an identification of alternatives for using available resources to meet the stated objectives. Cost-benefit analysis adds a quantitative, optimizing model to the process of evaluating project alternatives in light of the stated objectives.

To elaborate, the common elements in strategic planning are planning in terms of clearly conceived goals and objectives, identifying for analysis those sets of alternative
Interventions (policies and projects) that are intended to have an impact on the strategic planning objectives, and judging each alternative in terms of its relative impacts on the planning objectives. Cost-benefit analysis may be thought of as the highest form of the strategic planning model. It can be described in this way, because it puts the strategic planning process into a format that clarifies the decision criteria and makes the decision process less arbitrary and less ambiguous. The technique appears to meet these objectives because it is a quantitative form of a planning model, and because it is directed toward optimizing in terms of the planning objectives that, presumably, policymakers have selected and senior managers have clarified. In principle, cost-benefit analysis represents a mathematical statement of the strategic planning approach to decision-making.

Reference: Ward, Deren, and D'Silva

- **structural adjustment**
  Adjustment lending helps countries tackle macroeconomic difficulties usually manifested by rising inflation and current or projected balance of payments problems. Typical adjustment policies involve reallocating and reducing public spending; opening an economy to external or domestic competition; freeing prices to allow them to reflect economic values; improving government delivery of infrastructure and social services; and developing the institutions required in a well-functioning market economy, notably, a sound financial system. Structural adjustment programs have helped countries increase their exports and overall economic growth. However, the speed of response to structural adjustment varies. Only in a few countries—The Republic of Korea, Indonesia, and Thailand—did the adjustment process involve a swift transition to a new growth path, with only a short recession. For most other middle-income countries, adjustment has taken longer, and countries have undergone a period of declining output and labor demand before new sources of growth take them onto a sustainable growth path. Chile, Mexico, and Morocco are such examples as these countries started off with worse macroeconomic imbalances—including a heavy debt burden—and more extensive structural problems. However, the effectiveness of adjustment has been uneven across countries. Economic responses have often been weaker in low-income countries than in middle-income countries. This is partly because of the external environment that low-income countries have faced: weak commodity prices, and more recently, recession in the industrial countries. The adjustment process has also been prolonged because domestic policy reforms have proven to be more difficult, and institutional capacity has been weaker than expected. Policy reforms have been interrupted, and in several cases reversals have occurred, even in politically stable countries.

Reference: World Bank internal source

- **subsidy**
  A subsidy refers to government grants to suppliers of goods and services. A subsidy may be intended to keep prices down, that is, to raise the real incomes of buyers; to maintain incomes of producers, for example, farmers; or to maintain a service or employment, for example, subsidies to the railways. An essential characteristic of a subsidy, as distinct from a transfer payment, is that it has the object of keeping prices below the factor cost of
production. By distorting market prices and opportunity costs, subsidies may lead to a misallocation of resources, although they may be justified in certain circumstances, for example, to correct for externalities, and may be used instead of tariffs to protect new industry (infant industry argument) where not banned by international agreements.

See: transfer payments
Reference: Bannock, Baxter, and Davis

- substitutes
Substitutes are goods that compete with each other. For example, goods A and B are substitutes if an increase in the price of good A will increase the demand for good B. For example, a higher price for coffee will increase the demand for substitutes like tea. Thus, coffee and tea are substitute products.

See: complementary goods
Reference: Samuelson and Nordhaus

- substitution effect
The substitution effect of a price change reflects consumers' tendency to consume more of a good when its relative price falls (to substitute in favor of that good), and to consume less of the good when its relative price increases (to substitute away from that good). This substitution effect of a price change leads to a downward-sloping demand curve. The substitution effect is always negative: consumers switch spending away from items whose prices rise as they attempt to shield their living standards from the impact of the price change. If the price of butter rises by 10 percent, consumers who can switch to margarine incur no great loss.

See: income effect
Reference: Samuelson and Nordhaus

- sunk cost
A sunk cost is a cost incurred in the past that cannot be retrieved as a residual value from an earlier investment. A sunk cost is not an opportunity cost, and thus is not included among the costs when a proposed project or other investment is analyzed.

See: investment
Reference: Gittinger

- switching value
The switching value is the value an element of a project would have to reach as a result of a change in an unfavorable direction before the project no longer meets the minimum level of acceptability as indicated by one of the measures of project worth, such as net present value or internal rate of return.

See: sensitivity analysis
Reference: Gittinger
• **tariff**
  A tariff is a tax imposed on a good imported into a country. A tariff may be specific, when it is levied as a fixed sum per unit of the imported good, or ad valorem, when applied as a percentage rate on the value of the import.
  Reference: Pearce, 1992a

• **time value of money**
  Time value of money is an expression that refers to the concept that values received earlier are worth more than values received later. It is the concept underlying discounting.
  See: discounting
  Reference: Gittinger

• **tradables**
  Tradables are those goods and services that can be traded. Tradable but nontraded goods and services are those that are not traded because of government regulations.
  See: traded good
  Reference: Gittinger

• **traded good**
  A traded good is a good that is internationally tradable (a) in fact, and (b) at the margin by the country on whose behalf a project or policy is being conducted. The trade may occur either because the good is tradable in principle and no government failure is present, or because the good is nontradable in principle and government intervention of some form leads to international trade in that good by the country. In project and policy analysis, the terms tradable, nontradable, and nontraded always refer to trade at the margin.
  See: tradable
  Reference: Ward, Deren, and D'Silva

• **transfer payments**
  Transfer payments are any expenditure made by a government for which it receives no goods or services in return. Such payments generally involve the transfer of income from one group of individuals (taxpayers) to other groups of individuals in the form of welfare, unemployment, or social security benefits and old-age pensions. Transfer payments are a form of income redistribution, not a return to the factors of production. Because transfer payments are not made in return for goods and services, they do not add to total output. They are therefore not included as factor payments in the national income accounts, which measure the money value of national output. They are also omitted when converting accounts used in financial analysis to economic values used in economic analysis.
travel cost approach

The travel cost approach has been used extensively in developed countries to value recreational goods and services. It is based on the proposition that observed behavior can be used to derive a demand curve and to estimate a value (including consumer surplus) for an unpriced environmental good by treating increasing travel costs as a surrogate for variable admission prices. Although this approach would not at first seem applicable to many projects, it can often be used to place a value on a component of a larger project. The value of cultural and historical sites threatened by development projects could also be analyzed by this method. It is, however, most commonly used to value recreational benefits.

For example, a recent study on the economics of establishing the proposed Mantadia National Park in Madagascar, (Kramer and others, 1992, 1993) used a modified travel cost approach to estimate the importance of different attractions at an international travel destination (in this case, the country of Madagascar) to international tourists. Kramer found that the average increased willingness-to-pay per trip as a result of the enhanced animal viewing and information facilities to be provided by the new park was about US$24 per visitor. Using a conservative assumption of about 3,900 annual foreign visitors, this translated to an annual benefit of about US$93,000, or, at a 10 percent discount rate, a net present value associated with the park of about US$800,000 over a 20-year period.

The Madagascar study used the travel cost approach to estimate the addition to consumer surplus from diversifying and enhancing facilities in a locale. In all cases the values obtained should be clearly identified as a minimum valuation of only part of the total value of the resource. The travel cost method only measures recreation benefits of the site, or natural resources being valued. Option values, related to future uses, or existence values are not included in the value estimated by the travel-cost method. These less tangible values may be significant for unique areas, habitats, and species.

utility

Utility refers to the pleasure or satisfaction an individual derives from consuming goods and services. Utility is defined as the ultimate goal of all economic activity, but it is not a label for any particular set of pursuits, such as the acquisition and use of material goods. As no single measure of utility exists, it is by their choices of combinations of available commodities that consumers reveal what generates utility for them.

value

Value represents the worth of something to its owner. Economics distinguishes between two concepts of value. The first is value in use or the pleasure that a commodity generates.
for its owner. The second is value in exchange or the quantity of other commodities (or more usually money) that a commodity can be exchanged for. Water, for example, has high value in use, but low value in exchange.

Value can also be the price a good or service commands in the market. The value in exchange of a good is expressed as a quantity of other goods or money that must be exchanged to obtain one unit of the given good. The value of a commodity depends upon two elements: its desirability and its scarcity. If a good is desirable because of its usefulness, its aesthetically pleasing qualities, or any other reason, it has value for the individual. However, because the worth of a good to an individual decreases as it becomes more abundant because of the law of diminishing utility, value also depends upon the good's scarcity. To have value in exchange, a good must be both desirable and scarce. If no one desires it, no one would be willing to exchange any good or money for it no matter how scarce it is, and its exchange value would be zero. If the good is abundant, no matter how desirable it is (for example, air) people will have as much of it as they want, and no one will pay for it. Thus, it will have no exchange value.

Reference: Bannock, Baxter, and Davis; McGraw-Hill Book Company

- value added

Value added is the amount of economic value generated by an activity carried on within each production unit in the economy. Each unit generates its own value added: every farm, every factory, every hospital and school, every road and shop. The sum of all the value added generated by all production units equals the total production of the country, its national income measured as gross domestic product or gross national product. In any production unit, value added is measured by the difference between the value of the firm's output and the value of all inputs purchased from outside the firm. Thus, the value of output minus the value of externally purchased inputs equals the value added. The capital and labor attached to each firm are considered internal inputs, not externally purchased inputs.

Gross value added represents the pool of income generated by production, that is, distributed to the factors of production attached to the firm, including income taxes and depreciation. Deducting depreciation gives the net value added. The sum of all the net value added generated by production units in the economy is the net domestic product. Domestic value added refers to the value added by local or domestic activities to components imported from abroad. Domestic value added in an indirectly traded item is the total value of the product less the border price of the imported components. A value added tax is an indirect tax (also known as an ad velorum tax) levied at the time of each exchange of goods and services from primary production to consumption, generally stated as a proportion of the value added at each stage of production.

See: economic value, capital, factors of production, depreciation, border price

Reference: Gittinger
• **value of marginal product**

The value of marginal product is a valuation methodology used for potential market goods, that is, goods that are not currently traded but might be in the future. Where a nonmarketed product is an input into a secondary, marketed product, an implicit value for the product can be derived from changes in the price of the secondary product. This approach has most commonly been used in the valuation of fodder, whereby an implicit price is derived by calculating the additional production of milk that results from feeding fodder to livestock, for instance, estimating the value of the marginal product of fodder as an input. In Nepal, for instance, the economic value of increased milk production resulting from a ton of fresh leaf fodder has been estimated to be about US$3.60, thus providing a marginal value for tree leaf fodder.

*See: valuation methodologies*

Reference: Dixon, 1994b

• **variable costs**

Variable costs are costs that vary with the level of output, for example, labor costs. In the short run some costs will be fixed and some variable. In the long run, all costs are likely to be variable.

Reference: Pearce, 1992a

• **welfare economics**

Welfare economics is the study of the social desirability of alternative arrangements of economic activities and allocations of resources. It is, in effect, the analysis of the optimal behavior of individual consumers at the level of society as a whole. Just as, at the level of the individual, there is a need for a subjective ranking of bundles of goods dependent on the consumer's taste, at the level of a society there is a need for a ranking of economic states, and this will usually rely on subjective or normative criteria: judgments of taste about how society should look.

The study of welfare economics consists of the following: first, the determination of efficient states in which no individual can be made better off without an offsetting loss to another individual; secondly, the choice between the many efficient states that can exist, either through a decision imposed by a dictator, or through democratically determined decisions; thirdly, coverage of a number of other topics such as the optimal provision of public goods, externalities, and the theory of second best. All these topics share the common aim of helping to show when it is desirable to move from one economic state to another.

*See: public goods, externalities, theory of second best*

Reference: Bannock, Baxter, and Davis

• **willingness to pay**

Willingness to pay refers to the amount consumers are prepared to pay for a final good or service.
The willingness to pay numeraire, also called the consumption numeraire, is one in which all benefits and all costs are valued in terms of impacts on society's consumption over time. The accounting price for each unit of output is based on the marginal willingness of the market to pay for the good. Future consumption is discounted to present values by using a discount rate that reflects the rate of fall of the value of consumption over time. Thus, when we work with the willingness to pay numeraire, we attempt to value all inputs and outputs on the basis of what society would be willing to pay for each unit of the good or service being valued. In this approach, units of output are valued at prices reflecting the marginal willingness to pay, and units of input are valued at the marginal willingness to pay for the foregone outputs that the inputs would have produced without the project.

Reference: Ward, Deren, and D'Silva

All projects make use of some scarce inputs to produce an output of goods and services valued by society. In general, without the project the availability of these inputs and outputs to the rest of the economy would be different. Comparing the situation with and without the project constitutes the basic method of measuring the additional benefits that can be attributed to the project. In most cases, the situation without the project is not simply a continuation of the status quo, because some changes in input and output levels and prices are likely to take place anyway. In agricultural projects, for instance, cropping patterns, yields, output levels, and commodity prices may be expected to change substantially from their base levels even without the project as a result of market conditions or other factors. Conceivably, situations could arise that are even worse after a project is completed than before. The project may, nevertheless, be justified if without it the deterioration would have been much greater. Thus, an accurate comparison of the situations expected to prevail with and without the project may call for difficult judgments.

Reference: Baum and Tolbert; Gittinger

Working capital is the capital necessary to purchase goods and services that are used for an enterprise's production activities and that are turned over during the production cycle. For example, for farms, working capital is the capital necessary to purchase supplies (such as seed and fertilizer) and services (such as agricultural labor) needed during the
production of crops or livestock. The working capital is then recovered when the crops or livestock are sold, and so is available for use in a subsequent production cycle.

See: capital, assets
Reference: Gittinger

- **X-efficiency**

  X-efficiency refers to the effectiveness of a firm’s management in minimizing the cost of producing a given output or maximizing the output produced by a given set of inputs. A discrepancy is often apparent between the efficient behavior of firms as implied by economic theory and their observed behavior in practice. This outcome is also termed a situation of technical inefficiency. X-efficiency is a function of monopoly or market power in which competitive pressures are weakened. The term was originally applied to the manager-worker relationship but can also be extended to deal with manager-owner relationship.

  Reference: Bannock, Baxter, and Davis; Pearce, 1992a

- **Y-efficiency**

  Y efficiency is the effectiveness with which existing profitable market opportunities are exploited. It is conceivable that the lack of competitive market pressures induces a failure by firms to supply potential customers who are willing to pay a price which yields a profit. Thus though a firm may be minimizing the cost of producing a given output, and therefore be X-efficient, it can be failing to maximize profits due to this slackness with regard to market opportunities. Though in principle this could be the case, Y-efficiency and X-efficiency are likely to occur together given their similar origins.

  Reference: Pearce, 1992a
References


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