

**HANDS-ON TRAINING ON MARKET, FINANCIAL AND
ECONOMIC FEASIBILITY STUDY PREPARATION FOR
INFRASTRUCTURE PROJECTS OF CHARMP 2**



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Outline of Topics



- 1.0 Rationale of Financial and Economic Analysis of Projects
- 2.0 Steps in Financial and Economic Analysis
- 3.0 **Market Analysis**
- 4.0 Identification of Costs and Benefits
- 5.0 Financial and Economic Valuation of Costs and Benefits
- 6.0 Financial and Economic Comparison of Costs and Benefits
- 7.0 Sensitivity Analysis

DAY 1

	Activity/Topic
AM	Registration
	Leveling-off
	Log frame of CHARMP 2
	1.0 Rationale , Objectives and Approach of Financial and Economic Analysis of Projects
PM	1.1 Macroeconomic Analysis
	1.2 Project Level Analysis
	2.0 Steps in Financial and Economic Analysis
	2.1 Market Analysis (Supply/Demand and Price Analysis)
	<u>GROUPING</u>

RATIONALE



- ✓ The purpose of this training is to provide the general approach to be followed in the financial and economic analysis of projects.
- ✓ The focus of these guidelines is on the objective of maximizing net output or income, often referred to as the “economic” or “efficiency” objective.

OBJECTIVES AND APPROACH



Macroeconomic Analysis

- ❑ Economic analysis of a project aims at determining whether that project is consistent with overall national and sectoral objectives and whether the investment proposed is the best means of achieving the intended objectives.
- ❑ Economic analysis involves systematic evaluation of a range of options for achieving a stated set of objectives.

OBJECTIVES AND APPROACH



Macroeconomic Analysis

- ❑ While each developing country has its own socioeconomic priorities, all hold some major objectives in common.
- ❑ These include fulfilling the basic needs of all citizens, providing opportunities for gainful employment, and achieving both rapid and sustained economic growth and more equitable distribution of income.

OBJECTIVES AND APPROACH



Macroeconomic Analysis

- ❑ Macroeconomic appraisal of projects is carried out when country programs are formulated.
- ❑ Sectoral justification is reconfirmed and elaborated during the project feasibility study and appraisal stages.

OBJECTIVES AND APPROACH



Project Level Analysis

- ❑ Project analysis involves assessing technical, institutional (managerial and organizational), market, financial and economic viability.
- ❑ Both financial and economic analyses of a project are closely related, and both involve, among others, the calculation of internal rate of returns.

OBJECTIVES AND APPROACH



Analysis at the Project Level

- ❑ Both types of analysis will be conducted in monetary terms, the major difference lying in the definition of costs and benefits.
- ❑ Financial analysis evaluates the commercial viability of a project from the viewpoint of the project entity, that is, all expenditures incurred under the project and revenues resulting from it are taken into account.

OBJECTIVES AND APPROACH



Analysis at the Project Level

- ❑ Economic analysis attempts to assess the overall impact of a project in achieving the national economic objectives of the country concerned. This form of analysis thus assesses a project in context of the national economy rather than the project entity.
- ❑ Economic analysis differs from financial analysis both in terms of identification and evaluation of inputs and outputs, and therefore in the composition of costs and benefits.

OBJECTIVES AND APPROACH



Analysis at the Project Level

- ❑ The projected financial cost and benefit streams may, where relevant, be taken as the starting point for economic analysis, though these streams must be adjusted to reflect true economic costs and benefits.
- ❑ For example, all payments for wages by the project entity are financial costs.

OBJECTIVES AND APPROACH



Analysis at the Project Level

- ❑ A project may involve an economic cost that does not involve a corresponding financial cost.
- ❑ For instance, a project may impose pollution abatement costs or urban development costs on society, but such costs will often not be reflected in the financial project accounts.

STEPS IN FINANCIAL AND ECONOMIC ANALYSIS



Steps in Financial and Economic Analysis

- ❑ The first step in the financial and economic analysis of the project is the identification of the need for the project. This involves analysis of demand including analysis of the quantity, quality and price of output of the project in relation to total demand and supply (**Market Analysis**).
- ❑ The next step is to establish whether the proposed project is the least cost or the most cost-effective way of attaining the project's objectives.

STEPS IN FINANCIAL AND ECONOMIC ANALYSIS



Steps in Financial and Economic Analysis

- ❑ This involves examination of alternatives to the project in terms of design, size, location, timing and technology.
- ❑ The final step is ascertaining whether the net benefits expected from the use of resources required by the project are in excess of, or at least equal to, the net benefits to the economy expected from the use of these resources in the next best available alternative project.

STEPS IN FINANCIAL AND ECONOMIC ANALYSIS



Steps in Financial and Economic Analysis

- ❑ This step applies only to projects for which most of the costs and benefits are quantifiable.
- ❑ Benefit-cost analysis involves a numerical comparison of costs and benefits, provided that both can be quantified.
- ❑ The economic costs of projects are relatively easy to quantify, except in cases where significant externalities such as environmental impact are involved.

STEPS IN FINANCIAL AND ECONOMIC ANALYSIS



Steps in Financial and Economic Analysis

- ❑ The costs of such effects will be quantified to the extent possible. If they cannot be quantified, their implications will be described and evaluated in qualitative terms.

SUPPLEMENTS TO ECONOMIC ANALYSIS



Since social equity aspects are not to be incorporated in cost-benefit calculations, the items listed below should be evaluated to the extent possible as a supplement to benefit-cost analysis.

- i. Number of major beneficiaries. The expected beneficiaries of the project should be indentified by category.

SUPPLEMENTS TO ECONOMIC ANALYSIS



- ii. Proportion of Benefits to Target Groups. The proportion of the expected total benefits accruing to the target groups should be estimated if relevant.
- iii. Employment Creation. The number of full-time and part-time jobs measured in man-years expected to be created both during construction and during operation of the project should be estimated separately.

SUPPLEMENTS TO ECONOMIC ANALYSIS



- ✓ If data are available, these estimates should be related to regional, sectoral, and national levels of unemployment and underemployment. Where possible, the degree of labor intensiveness of the project should also be estimated.
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MARKET ANALYSIS



DEMAND ANALYSIS AND SUPPLY ANALYSIS

**Exercise A: Demand/Supply Estimation
and Market Price Analysis**

DAY 2



	Activity/Topic
AM	3.0 Identification of Financial Costs and Benefits
	Exercises B1: Constructing Financial Project Cost Tables
	3.1 Project Financial Benefits
PM	3.2 Project Financial Costs
	3.3 Classification of Costs
	Exercise B2: Incremental Benefits using Future With and Future Without Project Framework.

IDENTIFICATION OF COSTS AND BENEFITS



General Approach

- ❑ Benefit-cost analysis essentially involves three steps: (i) identification of the economic costs and benefits of a project, (ii) valuation of economic costs and benefits, and (iii) a comparison of costs and benefits.
- ❑ In identifying the costs and benefits of a project, it is useful to start with a clear definition of the benefits expected from the project.

IDENTIFICATION OF COSTS AND BENEFITS



General Approach

- In the case of industrial or agricultural projects, this is relatively straightforward since the major benefit is additional output of goods which are widely traded.
- In transportation projects, the benefit may be measured in terms of cost savings, and in public utility projects, in terms of the gain to consumers.
- In some social sector projects, benefits may be assessed only in qualitative terms.

IDENTIFICATION OF COSTS AND BENEFITS



General Approach

- ❑ Financial and Economic analysis of projects must be based on incremental benefits and costs. This requires comparison of the situation that would prevail without the project and the situation with the project.
 - This “with and without” comparison may not be the same as a “before and after” comparison.
- ❑ The project accounts are based on streams of inputs and outputs and corresponding flows of costs and benefits.

EXERCISES:



Future With and Future Without The Project Framework

Exercise B2-Irrigation Benefits

Exercise C2-Farm to Market Road Benefits

Exercise D2-Domestic Water Supply Benefits

COST TREATMENT



System Costs

- ❑ If a project is an integral part of a larger system, the expected benefits may not accrue if certain matching investments are not made in other parts of the system.
- ❑ For instance, the benefits from a power generation project may not materialize unless certain investments are made in transmission and distribution.

COST TREATMENT



Sunk Costs

❑ A project may require the use of facilities in the existence prior to appraisal of the project. The costs of such facilities are “sunk costs” and thus should not be included in project cost, provided that these facilities have no alternative use, and their use in the project involves no opportunity cost.

COST TREATMENT



Contingencies

- ❑ In estimating financial project costs, both price and physical contingencies should be included.
- ❑ Since the economic rate of return of a project is measured in constant prices, provision for **general price contingencies should be excluded from the economic cost of the project.**

COST TREATMENT



Contingencies

❑ **Physical contingencies** represent the monetary value of additional real resources that may be required beyond the base cost in order to complete the project. They should thus be **treated as part of the economic cost of the project.**

COST TREATMENT



Working Capital

□ A certain minimum amount of working capital is necessary for efficient operation of a project, and that amount should be **included in the financial and economic cost of the project.**

COST TREATMENT



Transfer Payments

- ❑ Some of the items included in the financial analysis of the project are not economic costs since they do not increase or decrease the availability of real resources to the rest of the economy.
- ❑ **Taxes, duties and subsidies are examples of transfer payments that should be excluded from the economic analysis of projects.**

COST TREATMENT



Depreciation

- ❑ The financial accounts of a project include provision for depreciation on the basis of prevailing accounting practices.
- ❑ At the end of the project's life, the assets created may have some residual value, even though they may be fully depreciated in the financial accounts.

COST TREATMENT



Depreciation

- ❑. Economic analysis requires that depreciation provisions be excluded and that expenditures for repairs, maintenance and replacement and the salvage value of assets at the end of the project life be taken into account

COST TREATMENT



Externalities

- ❑ In several cases, project effects-positive or negative- go beyond the limits of the project, but are not reflected in the financial accounts of the project.
- ❑ If these effects, known as “externalities”, involve a significant economic cost, or confer a significant economic benefit, these should be taken into account in estimating the overall economic impact of the project.

COST TREATMENT



Externalities

□ The external economic impact on the cost side, may, for instance, include increased pollution resulting from a cement or chemical plant, or the adverse effects of an irrigation scheme on health and fisheries. **For CHARMP 2 we may not include this since an ECC shall be conducted wherein cost of mitigating measures shall be incorporated in the project design itself**

EXERCISE 4



Construct Project Cost and Tables

DAY 3



	Activity/Topic
AM	4.0 Valuation of Costs and Benefits
	4.1 Financial Prices
	4.2 Economic Prices
	Exercise 5: Construct Financial Prices of Inputs and Outputs
PM	4.2.1 Economic Prices of Traded Goods and Services
	Exercise 6: Construct Economic Prices of selected Traded Inputs and Outputs

VALUATION OF ECONOMIC COSTS AND BENEFITS



General Considerations

- ❑ After the costs and benefits of a project have been identified and the size of their flows over the life of the project established, they should be valued so that they can be aggregated and compared.
- ❑ The costs and benefits should be valued according to their economic prices, which in many cases will differ from their market prices.

VALUATION OF ECONOMIC COSTS AND BENEFITS



General Considerations

□ Since the main objective of economic analysis is to assess the real contribution that a particular project is expected to make to the national economy, costs and benefits should be valued in constant prices, i.e., in terms of the prices prevailing in the year in which the project is appraised.

VALUATION OF ECONOMIC COSTS AND BENEFITS



General Considerations

- ❑ Financial and economic profitability will coincide if market prices are equal to the marginal social cost of production (the supply price) and the marginal social value (the demand price) of all inputs and outputs.
- ❑ Market prices do not always reflect social costs or social values because of a variety of market imperfections, taxes, subsidies and other interventions.

EXERCISE 5



Construct Financial Prices of Inputs and Outputs

VALUATION OF ECONOMIC COSTS AND BENEFITS



Economic Prices of Traded Goods and Services

- ❑ It is necessary to make an initial distinction between goods and services traded internationally at the margin and those that are not.
- ❑ The term “traded” means that the goods and services concerned are actually imported into or exported from the country, and are not subject to binding quantitative restrictions such as import quotas or to prohibitive trade taxes (i.e., taxes that are so high as to prevent trade from occurring).

VALUATION OF ECONOMIC COSTS AND BENEFITS



Economic Prices of Traded Goods and Services

- ❑ Traded goods and services are valued at their “border prices” i.e., net of any trade taxes or subsidies.
- ❑ These are the CIF prices in the case of imports and the FOB prices in the case of exports.
- ❑ The prices are calculated by using the official exchange rate and then are adjusted for local transport and distribution costs, though trade taxes or subsidies are not included in the prices used in economic analysis of projects.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Economic Prices of Traded Goods and Services

- ❑ Production or use of traded goods by a project generally does not affect border prices since the impact on global demand and supply may well be small.
- ❑ Changes in the price due to a project may also affect the demand and supply of goods and services elsewhere in the economy.

EXERCISE 6



Construct Economic Prices of Selected Traded Outputs
and Inputs

DAY 4



	Activity/Topic
AM	4.2.2 Economic Prices of Non-traded Goods and Services
	4.2.3 Shadow Wage Rate
PM	4.2.4 Conversion Factors
	Exercise 5: Convert Financial Prices to Economic Prices for Non-traded Outputs and Labor

VALUATION OF ECONOMIC COSTS AND BENEFITS



Economic Prices of Non-Traded Goods and Services

□ In most cases, the supply price or cost of production is used in the valuation of non-traded goods and services. However it should be noted that there are several cases in which the price of non-traded goods and services departs significantly from its marginal cost.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Shadow Wage Rate

- ❑ Among non-traded goods and services, labor is the single most important component. Hence, an appropriate procedure for the valuation of labor is important for economic analysis of projects.
- ❑ If the prevailing market wage is higher than the supply price of a particular category of labor, then there will be some unemployment for that type of labor.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Shadow Wage Rate

- ❑ The appropriate valuation for such unemployed labor will be the supply price which, by assumption, will be lower than the market wage rate.
- ❑ The market for skilled labor is generally competitive and such skills are often in short supply. The market wage for such workers should therefore be assumed to be the value of output forgone at market prices for this type of labor.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Shadow Wage Rate

- ❑ Hence, market wage rate equals economic wage rate.
- ❑ Semi-skilled and unskilled labor is employed in both the formal, or “protected” sector, where wages are regulated by the government, and in the informal, or “unprotected” sector, where regulations do not apply.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Shadow Wage Rate

- ❑ The supply of semi-skilled labor relative to demand is likely to vary from country to country. If there is a clear evidence of oversupply, then the “unprotected” wage should be adjusted downward, taking into account the extent of unemployment in the relevant skills.
- ❑ With regard to unskilled labor, many developing countries have high levels of unemployment or underemployment in both urban and rural areas.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Shadow Wage Rate

- ❑ In determining the value of unskilled labor in such cases, the “unprotected” wage should be the starting point. Adjustments should then be made to account for the extent of unemployment or underemployment in the country, particularly in the project area.
- ❑ The economic price of labor in urban areas is likely to be higher than in rural areas and also to vary from region to region.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Shadow Wage Rate

$$\text{SWR} = \frac{\text{Market Wage} \times \% \text{ Employment Rate}}{100}$$

□ If the rate of employment is 100 percent (Full Employment) then the market wage rate is equal to economic wage rate (SWR). This almost true for highly skilled labor such as an airline pilot. However if the rate of employment is less than 100% then Economic wage is less than market wage. This true for farm labor.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Other Conversion Factors

- ❑ Traded goods should be valued in terms of border prices, and non-traded goods and labor in terms of opportunity costs valued in domestic prices.
- ❑ There remains the task of bringing the two sets of prices into correct alignment.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Other Conversion Factors

- ❑ Two approaches are possible in this regard. The first is the shadow exchange rate approach, which converts the border prices of traded inputs and outputs into their domestic price equivalents.
- ❑ The second is the conversion factor approach, which is used to convert the domestic prices of non-traded goods and labor to their border price equivalents.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Other Conversion Factors

- ❑ The advantage of the conversion factor approach is that it takes into account distortions in the pricing of non-traded inputs and outputs that are specific to the project.
- ❑ A standard conversion factor (SCF) is a weighted average of the commodity conversion factors for all commodities produced or consumed in an economy.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Conversion Factors

- ❑ If an SCF is used to convert the entire cost of non-traded output valued at market prices, the approach is equivalent to using a shadow exchange rate (SER).
- ❑ The only difference is that the use of an SCF converts all values of non-traded inputs and outputs into their border price equivalents, and use of an SER expresses the values of traded inputs and outputs in terms of domestic prices.

VALUATION OF ECONOMIC COSTS AND BENEFITS



Conversion Factors

$$\text{Shadow Exchange Rate Factor} = \frac{\text{SER}}{\text{OER}} > 1$$

(SERF)

$$\text{SCF} = \frac{1}{\text{SERF}} < 1$$

EXERCISE 5



Convert Financial Prices to Economic Prices for Non-Traded Inputs and Outputs and Labor

DAY 5



	Activity/Topic
AM	5.0 Comparing Costs and Benefits
	5.1 Techniques for Comparison
	5.1.1 Economic Internal Rate of Return (EIRR)
	5.1.2 Benefit-Cost Ratio (BCR)
	5.1.3 Net Present Value (NPV)
	Exercise 6: Construct Benefits and Cost Streams Table
	Exercise 7: Compute for Base NPV and EIRR
	5.1.4 Sensitivity Analysis
	Exercise 8: Conduct a Sensitivity Test

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Techniques for Comparison

- ❑ A project must satisfy at least two conditions in order to be acceptable for investment.
 - First, it must yield benefits in excess of costs over its life. Second, the net benefit must be larger than, or at least as large as that resulting from the next best alternative project.

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Techniques for Comparison

- Three devices are commonly used for comparing cost and benefit streams in arriving at investment decisions:
 - ✓ The economic internal rate of return (EIRR), which is the rate of discount at which the cost and benefit streams over the life of the project are equalized;

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Techniques for Comparison

- ✓ The **benefit-cost ratio (BCR)**, which compares the present values of the cost and benefit streams by discounting them at a rate equal to the opportunity cost (or economic price) of capital; and
- ✓ The **net present value (NPV)**, which is the difference between the present values of the cost and benefit streams of a project which have been discounted at a rate equal to the opportunity cost of capital.

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Techniques for Comparison

- ❑ The NPV and EIRR are the two techniques most frequently used in investment decision-making.
- ❑ If the opportunity cost of capital is known, the NPV method helps identify projects that will maximize output or national welfare. However, the NPV requires the use of a discount rate, and a change in this discount rate can change the ranking of the projects.

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Economic Internal Rate of Return (EIRR)

- ❑ The major advantages of EIRR over the two techniques are that it does not require pre-selection of a discount rate and that it provides a single measure of the return of the project and allows a ready comparison among projects.

EXERCISE 6



Construct Benefit and Cost Streams Table

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Economic Internal Rate of Return (EIRR)

- ❑ A project is generally considered to be economically viable if its EIRR exceeds economic or opportunity cost of capital (OCC) in the country concerned.
- ❑ In Bank practice, 10-12 percent has been acceptable as the EIRR cut-off point: a project whose EIRR is less than 10 percent may be supported only if there is strong socioeconomic justification for it, and this should be fully described. **For RID of CHARMP 2 a hurdle rate of 15% is prescribed**

EXERCISE 7



Compute for Base NPV and EIRR

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Sensitivity Analysis

- ❑ A simple method of assessing possible adverse effects is the sensitivity test.
- ❑ The sensitivity test indicates how a possible change in events may affect a project's economic viability.
- ❑ A sensitivity indicator (SI) measures the sensitivity of the EIRR to changes in a key variable

COMPARING COSTS AND BENEFITS: INVESTMENT CRITERIA



Sensitivity Analysis

- ❑ In practice, it is neither possible nor desirable to examine the effects on the EIRR of all possible changes in project variables.
- ❑ Attention must be focused on key project variables: (i) quantities and prices of project outputs, (ii) quantities and prices of project inputs, (iii) capacity utilization, and (iv) the time-frame for project implementation.

EXERCISE 8



Conduct a Sensitivity Test

DAY 5



	Activity/Topic
PM	Finalization of Feasibility Study and Work Plan
PM	Presentation and Closing Remarks