

# COSTAB and Financial and Economic Analysis Training Course



2. – 6. December 2012



Food and Agriculture Organization  
of the United Nations

# Course overview

- Day 1:
  - Principles of project costing
  - Organizing costs by component and expenditure categories
  
- Day 2:
  - Data collection
  - Technical training on the software
  
- Day 3:
  - Technical training on the software

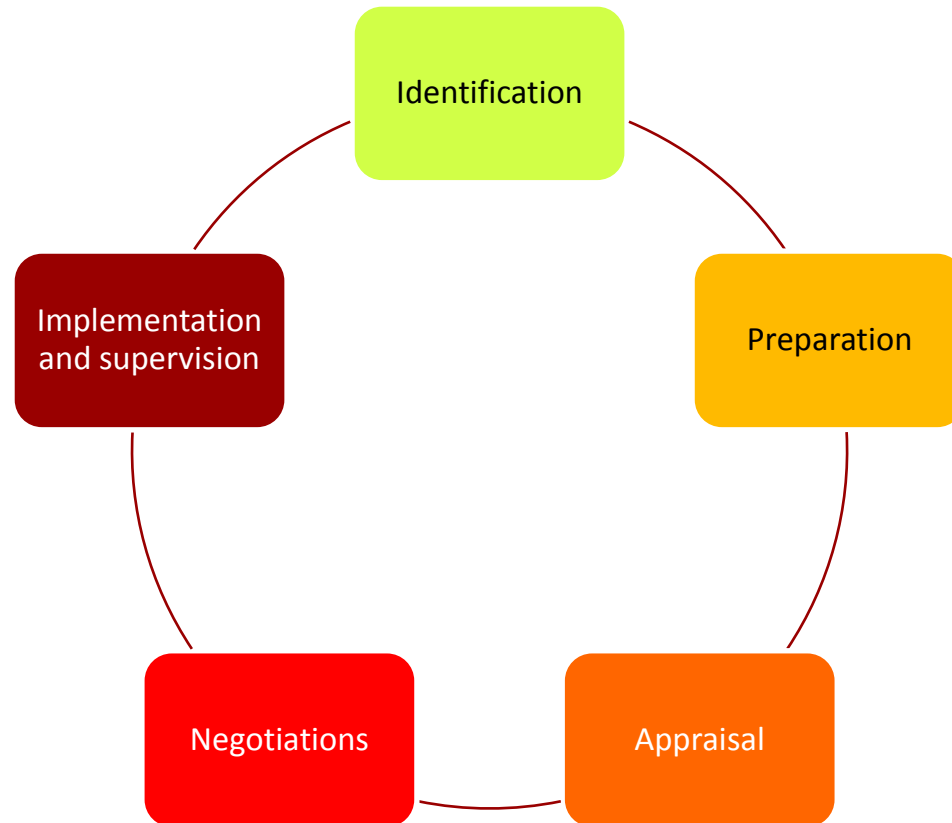
# Course overview

- Day 4:
  - Cost benefit analysis
  - Financial analysis
- Day 5:
  - Economic analysis
  - Sensitivity analysis

# Project costing

- Why project costing?
  - Finding the sum of all incremental financial costs that a project incurs during its lifetime
  - But: Not an isolated activity
  - Costing is an important part of project design
- Project costs and project cycle
  - Moving from one stage of planning to the next
  - Costs indicate feasibility
  - Costs vet design refinements

# Project cycle and costing



# Project cycle and costing

- 1. Identification
  - Basic cost information on alternative project designs and resources required to achieve main objectives
- 2. Formulation/Preparation
  - Costs are developed based on extensive consultations with stakeholders, studies etc.
  - Costs illustrate financial requirements and economic viability of the proposed design in enough detail for all financiers to be able to consider getting involved

# Project cycle and costing

## ➤ 3. Appraisal

- The costs from preparation are reviewed to take into consideration any design changes and any specific requirements from financiers
- A financing plan is developed, disbursements are scheduled, procurement methods are decided on etc.
- Costs can now be used for project implementation

## ➤ 4. Negotiations

- Borrower and financiers agree on terms of project financing. They assess whether the resources included in the design will contribute to the project's objectives, and they agree on what resources will be sourced from where.
- The project costs become basis for legal agreement and must therefore be consistent throughout

# Project cycle and costing

- 5. Implementation and supervision
  - The most detailed (subaggregated) level of costs will be used at this stage
  - Government and project staff use cost tables to create annual work plans and budgets
  - Project monitoring is done against the activities and disbursements given in the cost tables
  - The actual use of resources will be compared to the costs given in the design
  - Financiers will use the costs to keep track of loan disbursement and financial performance of the borrower



# Getting involved in costing

I am not an economist, why does this matter to me?



# Getting involved in costing

- Costing should never be left to the economist/financial analyst alone
- Each expert in the design team (agronomist, forester, livestock, business specialist) will have knowledge on the best design and the cost of these in his field
- Government and project staff can provide information from their own ministries and departments, and from other ongoing or recent projects
- If costing is done separately from the design process and without the input of the team, the result may be a poorly designed project where resources do not match the activities and stated objectives of the project

# Organizing project costs

- By organizing project costs by **components** and **expenditure accounts**, we are summarizing the **types of interventions** required to achieve the project objective and what **resources** will be required for these interventions.
- Organizing project costs in this way will take time and many rounds of work, but is absolutely essential

# Organizing project costs

Components describe 'what' the project will do

Expenditure accounts describe the 'means' needed to do it

# Components

## **Components**

Components describe a set of activities that will take place under the project. A component can be considered an intermediate objective of the project.

# Components

## Component 1:

### Improved agricultural technology

This component may include the introduction of new technology and/or training of farmers in using new techniques/technology. Costs may include a team developing or installing this technology, the cost of a trainer for the farmers, inputs used in the training course etc.

# Components

- The assumption is that when these resources are used as described, the technology will be promoted and used.
- Further, it is assumed that when this component and its objective is fulfilled, it will contribute to the overall objective of the project. This could be “Decreased poverty in the X region of Bangladesh”.
- The components will be used to evaluate the success or failure of the project upon its completion

# Expenditure accounts

- Expenditure accounts are used to describe what resources the project will require.
- They are divided into investment costs and recurrent costs.
- **Investment costs** are any one time investments, in civil works, machinery, training, consultancies etc.
- **Recurrent costs** are associated with the regular operations of the project, and include staff salaries, operations and maintenance costs etc.



# Expenditure accounts

- The number and types of expenditure accounts vary between projects, and from financier to financier
- Some expenditure accounts are however standard in most projects:

# Expenditure accounts

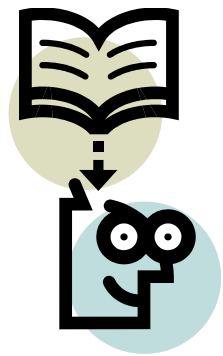
- Investments costs
  - Civil Works (can be split into construction, and design and supervision)
  - Vehicles
  - Equipment and machinery
  - Training
  - Specialist services (often called technical assistance)

# Expenditure accounts

- Recurrent costs
  - Incremental salaries
  - Operations and maintenance
  - Other

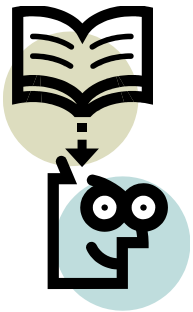
# Expenditure accounts

Place the following in the right expenditure account:



- a) Government engineer going to supervise bridge construction
- b) Seeds for a SRI demonstration
- c) Internet and telephone bills for project management unit
- d) Pipes for irrigation scheme construction
- e) Motorcycles for district project staff
- f) Fee for international livestock specialist giving a course in the MoLF

# Components and expenditure accounts



- Think about the most recent project you worked on.
- Note down which components and subcomponents the project had
- Which expenditure accounts do you think were used in each of these components?

# Component-expenditure matrix

Resources	Improved crop diversification	Access to health and sanitation	Improved project management
<b>INVESTMENT COSTS</b>			
Civil works	-	Yes	-
Equipment	Yes	-	Yes
Training	Yes	-	Yes
Specialist services	Yes	Yes	Yes
<b>RECURRENT</b>			
Operations and maintenance	Yes	Yes	Yes

# Financing plan

- The financing plan gives the sources (financiers) and uses (disbursement categories) for the project
- Financiers are the 1) international financiers (IFIs, international NGOs, private sector, bilateral donors), 2) domestic financiers (central and local government, beneficiaries, local banks, NGOs etc)

# Financing plan

Kingdom of Cambodia  
Project for Agricultural Development and Economic Empowerment  
**Disbursement Accounts by Financiers**  
(US\$ '000)

	SNV		FAO		iDE		IFAD GRANT		IFAD LOAN		Beneficiaries		Total			
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%		
<b>A. Vehicles &amp; machinery</b>																
1. Cars	-	-	-	-	-	-	-	-	-	-	-	-	304.7	100.0	304.7	0.7
2. Motorcycles	-	-	-	-	-	-	-	-	-	-	-	-	721.8	100.0	721.8	1.7
<b>Subtotal</b>	-	-	-	-	-	-	-	-	-	-	-	-	1,026.5	100.0	1,026.5	2.4
B. Equipment	-	-	-	-	-	-	-	-	295.0	28.6	-	-	736.1	71.4	1,031.1	2.4
C. Technical assistance	-	-	-	-	-	-	3,027.5	92.2	-	-	-	-	255.4	7.8	3,282.9	7.6
D. Training	-	-	-	-	-	-	6,486.3	90.0	-	-	-	-	720.7	10.0	7,207.0	16.7
E. Consulting services & studies	-	-	-	-	-	-	2,678.6	90.0	-	-	-	-	297.6	10.0	2,976.3	6.9
F. Group Conditional Capital																
Transfer Scheme	-	-	-	-	-	-	-	-	11,857.2	100.0	-	-	-	-	11,857.2	27.4
G. Operating costs	-	-	-	-	-	-	2,145.7	43.2	1,649.4	33.2	-	-	1,174.1	23.6	4,969.2	11.5
H. Priority Operating Costs	-	-	-	-	-	-	-	-	960.5	100.0	-	-	-	-	960.5	2.2
I. Rural Business Stimulus																
Facility	-	-	-	-	-	-	-	-	225.0	25.0	675.0	75.0	-	-	900.0	2.1
J. FAO Implemented activities	-	-	313.3	10.7	-	-	748.4	25.7	867.8	29.8	918.8	31.5	67.1	2.3	2,915.5	6.7
K. SNV implemented activities	668.5	15.4	-	-	-	-	1,276.5	29.4	1,557.6	35.9	600.0	13.8	234.7	5.4	4,337.3	10.0
L. iDE implemented activities	-	-	-	-	378.5	21.3	1,136.8	63.8	87.6	4.9	-	-	178.1	10.0	1,781.0	4.1
<b>Total PROJECT COSTS</b>	<b>668.5</b>	<b>1.5</b>	<b>313.3</b>	<b>0.7</b>	<b>378.5</b>	<b>0.9</b>	<b>17,500.0</b>	<b>40.5</b>	<b>17,500.1</b>	<b>40.5</b>	<b>2,193.8</b>	<b>5.1</b>	<b>4,690.3</b>	<b>10.8</b>	<b>43,244.5</b>	<b>100.0</b>



# Disbursement accounts

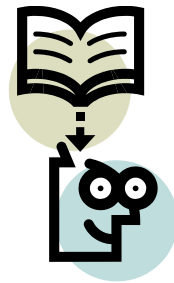
- Disbursement accounts are categories of expenses, “what is being bought and who is paying for it”
- They allow for aggregating expenditures into broader categories (combining technical assistance and training, for example) or:
- They allow for greater differentiation within a category (separating staff training and beneficiary training)

# Disbursement accounts

- Disbursement categories should be kept to a minimum to make accounting easier
- Disbursement accounts are assigned to each type of expenditure and percentages agreed for each financier (financing rules)
- It is recommended to start with:
  - Civil works
  - Equipment
  - Consulting services
  - Recurrent costs

# Disbursement accounts and financing

- Which expenditures are going to be financed by which financier depends on the agreement the financing institution has with the borrowing government
- Some financing institutions have types of expenditures they prefer to cover, and other expenditures that they are not authorized to lend funds for



In your experience, which project expenditures are covered by the government if you have a donor funded project? Which are covered by the financing institution?

# Procurement

- Describe how items are purchased
- Clear procurement arrangements are essential to good project implementation
- Procurement arrangements are set out in advance, and follow the guidelines of the government and financing institutions.

# Procurement

- What is the purpose of procurement arrangements?
  - Economy and efficiency
  - Equal opportunity for qualified firms to compete in providing goods and services
  - Incentive for the development of local contractors and manufacturers in the borrowing country

# Main procurement methods

- International competitive bidding
- Local competitive bidding
- Consulting services
- Limited international bidding
- International or local shopping
- Direct purchase
- Force account

# Detailed cost table

- Detailed cost tables outlining the activities and resources needed in each component make up the summary tables we've been going through
- They specify the tasks and resources required, and must be detailed enough for technical experts to estimate their costs
- More details are preferred over lump sums
- Where lump sums are given, a rationale must be given in footnotes to the cost



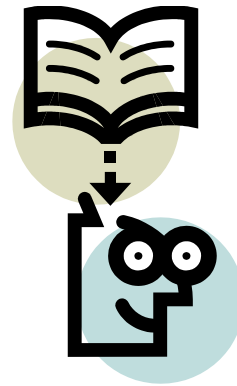
# Detailed cost tables

- In most instances, minimum one detailed table is required per component
- In projects covering several geographical areas, one detailed table per location per component is preferred
- Detailed cost tables are useful for implementation and supervision, and come in handy if costs need to be re-estimated during implementation

# Structuring detailed cost tables

- Detailed costs are best listed from most to least durable, with investment costs given before recurrent costs
- Detailed cost tables include the unit, quantities, unit cost and base costs over the life of the project
- Some costs may be given as lump sums, such as 'office equipment'
- They may also include physical contingencies, foreign exchange and tax rates

# Exercise



Explain what is meant by disbursement accounts, procurement accounts and expenditure accounts. How are they linked?

# Data collection

- Macro data
  - The economist/financial analyst will gather macro data from sources such as IMF, WB, Economist Intelligence Unit and government ministries
  - This includes data on inflation, exchange rates etc.
  
- Project management data
  - Current project management staff are in a unique position to provide the design team with updated project management costs.
  - This includes cost of salaries, DSA, transportation, commonly used vehicles, software, operations and maintenance cost.
  - These costs should be compared across projects and ministries to ensure that they are not over or underestimated

# Data collection

- Project activities data
  - For these costs, the economist/financial analyst will rely a great deal on the specialists in the team.
  - The engineer will help provide data on costs of civil works construction through consulting with government staff or private companies
  - The agronomist/forester/livestock expert will provide data on the technologies, inputs or trainings being provided through the project

# Data collection

- Once these costs have been organized and verified, the economist/financial expert must determine the amount of foreign exchange and the tax percentage included in each of the unit costs. We will discuss why later.
- He/she uses a combination of information from current or recent projects, information from project management staff, and information from relevant ministries to get this information.

# Data collection

- In sum, cost information must be:
  - Well organized
  - From reliable sources and routinely verified
  - Realistic (neither under or overestimated)
  - Gathered and used through a multi-disciplinary effort
  - Inclusive of foreign exchange percentage
  - Inclusive of tax percentage

# Types of project costs

- **Investment costs** represent the costs of goods and services that will generate benefits over many years
- **Recurrent costs** represent the costs of goods and services required to produce benefits within a single year. They usually represent the level of cost that the borrower will need to fund after the project is completed.
- **Financial charges** incurred during construction, i.e. interest payments



# Local vs. foreign currency

- All costs are expressed in both local currency and foreign currency (usually US dollars)
- It is customary to collect and present costs in local currency first
- Financiers will review the costs in the currency of their reserves, hence the two currency system

# Local vs. foreign costs

- Local costs are all costs paid for with local currency, meaning local goods and services
- Foreign costs include imported goods and services – directly imported or local goods with imported components.
- When COSTAB asks you to define % foreign exchange, it wants to know how much of the price will remain outside of the country, not the currency used to buy the good

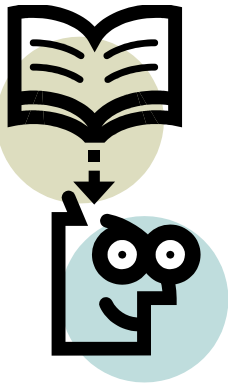
# Duties and taxes

- Duties and taxes should be included in the cost estimated
- These duties and taxes will in most cases have to be paid, and excluding them would mean underestimating the funding needed for the project
- The duty or tax rate applicable to each type of good should be explicitly stated in the cost tables

# Changes in project costs

- Base costs are our best **estimate** of project costs at a specific date
- Project costs during implementation are going to be different than the costs estimated at project preparation
- To account for this, we include price and physical contingency estimates on top of the base costs, usually as a percentage of base costs

# Changes in project costs



Take some time to consider reasons why project costs might change over time. You can use examples from projects you've worked on.

What do you think are reasonable allowances to be made for such changes?

# Price contingencies

- Allowances for price contingencies means expecting an increase in unit prices.
- This includes the impact of expected **inflation** and changes in the **exchange rate** over time
- There is usually a big difference between domestic and international inflation rates, so you will need estimates for both rates over time

# Price contingencies

- Forecasts for domestic inflation rates can be obtained from the Ministry of Finance or the Central Bank. These may be overly optimistic, so contrast them with estimates from WB, IMF, EIU
- Forecasts for international inflation rates can be obtained from the World Bank's MUV index, the "manufacturer's unit value index". Data from the UNDP, UNIDO and FAO can also be used.

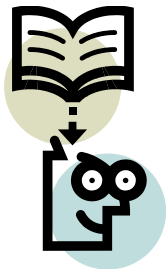
# Price contingencies

- Some goods have different inflation rates from the economy as a whole. If the difference is significant, establish a local inflation rate for these goods in your COSTAB.
- Information on exchange rate forecasts can also be obtained from MoF and Central Bank. Again, it is recommended to contrast these with information from WB, IMF or EIU to get the most accurate forecast.



# Physical contingencies

- Allowances for physical contingencies reflect expected increases in costs due to changes in **quantities** or **methods of implementation**
- Calculated and expressed as percentage of base cost
- What are potential sources of uncertainty?



# Sources of uncertainty

- Type of terrain (difficult)
- Climatic conditions
- Poor access to work site
- Amount of field work necessary
- Status and quality of design work
- Precision during cost estimates

# Sources of uncertainty (cont'd)

- Quality of supervision
- Possible design changes, addition of new items
- Poor specification of material/equipment needs
- Off the shelf or special order purchase
- The extent to which the services of the project can be accurately and fully defined in advance will vary

# Physical contingencies

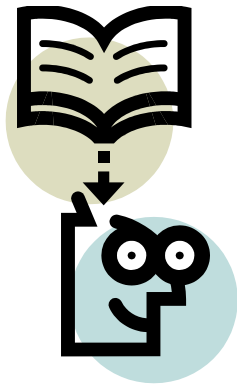
- Normal physical contingency levels for civil works (WB):
  - 5% for standard designs and highly defined works (i.e. roads surfacing, canal lining)
  - 10% for general civil works with predictable uncertainties (i.e. roads, building, pipelines)
  - 15% for processing plants, buildings, major irrigation, works in difficult terrain

# Recording costs

## Quantity versus value:

- It is most common to present base costs as physical quantities of units needed each project year, and the unit cost it can be bought for.
- Sometimes, base costs are presented as money values/lump sums. This is usually done when several items are bulked together, or there is a budget ceiling for a program of activities.

# Quantity versus lump sum



- Quantity basis is the preferred method
- Give some examples of when a lump sum would be useful. Use examples from actual projects.

# Recording costs – value basis

- Ways to record and present value basis costs:
  - Direct estimates
  - Functional relationships
    - Overhead costs
    - Operations and maintenance costs
    - Professional fees
  - Calculated cost patterns
    - Completion percentages
    - Phasing
    - Scaling

# Case study

- 1) Increased crop productivity. The key investment is in new and improved irrigation infrastructure in three project districts.
- 2) Higher value added fish farming. This includes training on fish farming, and improved transport infrastructure to access central markets.
- 3) Efficient project management. Setting up, training and running a central PMU.



# Using the COSTAB software

- COSTAB, although very useful, is not a very flexible tool – and limited edit functions are available
- It is recommended that you get all your information organized and verified before entering it into the program
- Use Excel or another spreadsheet to detail the costs per component before entering into COSTAB

# Using the COSTAB software

- Once your team has supplied/reviewed the costs in the spreadsheet, you can enter the information into COSTAB
- The program will calculate total project costs including contingencies
- It will organize your costs by components, financiers, expenditure categories, disbursement accounts, procurement methods and other categories that the government or financing institutions will require

# Using the COSTAB software

- COSTAB converts financial costs to economic costs for economic analysis
- It stores financial and economic data in Excel spreadsheets that you can link to new spreadsheets for custom calculations
- You will find that once all the information has been added and calculated, a few rounds of refinements will be necessary to allocate the funds correctly

# Basic information division

- The basic information division is where you enter information such as:
  - project name
  - country
  - local currency
  - project start up year, number of years for the project
  - exchange rates

# Price contingencies division

- This section allows you to specify the local and foreign inflation rates that Costab should use to calculate price contingencies

# Summary divisions

- This division outlines the structure for the project's components and expenditure accounts (=required resources)

# Detailed cost tables

- The detailed cost tables contain the following columns:
  - Base costs
  - Total costs including contingencies
  - Cost breakdown
  - Financing
  - Cost parameters
  - Summarizing accounts

# Summary Cost Tables

- Summary cost tables summarize the costs shown in the detailed tables:
  - Project cost summaries
  - Base costs by year
  - Total costs by year
  - Cost breakdown



# Optional cost tables

- Optional cost tables include:
  - Financing plans
  - Procurement tables
  - Loan allocation table
  - Subaggregations
  - Physical aggregations

# Case Study 1

- Dominican Republic “Haina Coal Project”
- In this case study, we will learn how summary tables, detailed tables and inflation and exchange rate tables work

# Case Study 2

- “Bangladesh Business Management Education Project”
- This case study will go further and explore the full range of tools available in Costab

# REVIEW From financial to economic costs

- We need economic costs to carry out economic analysis: assessing the costs and benefits to the economy in the borrowing country as a whole as a result of the project
- COSTAB can do this conversion for us, by removing taxes (transfer payments)

# Section 2: F&E analysis

- An important part of the project cycle and evaluating the soundness of a project (along with other considerations regarding the policy environment, institutional assessments, environmental impact assessments and gender and social concerns)
- Financial and economic analyses are the building blocks of a full project cost-benefit analysis



➤ Is economic analysis still relevant?

➤ Developed decades ago

➤ Different development paradigm

➤ Yes, if we use it to assess:

➤ Sustainability


➤ Impacts on various groups in society

➤ Risks

➤ Evaluate environmental externalities

# Financial and economic analysis



- 
- F&E analysis can help at many stages of the project cycle:
    - Defining objectives
    - Quantifying objectives
    - Quantifying inputs
    - Quantifying results



# Cost-benefit analysis

- **Why do we do it?**
- Seeking the most efficient allocation of funds:
  - How can we get the most benefits/results from a limited amount of funds available for investment
  - Are the majority of stakeholders better off due to the project?
  - Is the country as a whole better off due to the project?

# Cost-benefit analysis

- Choosing the best project given the resources at hand, by comparing:
  - Combinations of projects
  - Mutually exclusive projects
  - Alternative designs for a given project

# Choosing among projects

	<b>Costs</b>	<b>Benefits</b>	<b>Net benefits</b>
Project A	3	12	9
Project B	9	28	19
Project C	4	8	4
Project D	7	9	2
Projects C and D	9	23	14
Project E	12	10	-2
Project F	13	12	-1

Source: SOAS short course scheme

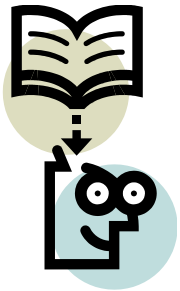
# Cost-benefit analysis

## How do we do it?

- Put a price/value on all relevant costs and benefits (insofar as possible given time and money constraints)
- Discount the net benefits to find a current value for future costs and benefits
- Compare the net benefits with the likely scenario without project

# With and without project scenarios

- When carrying out a cost benefit analysis, we compare the project scenario with the 'without project' scenario.
- Take some time to consider why we do this, and whether this is different from comparing the situation before and after the project.



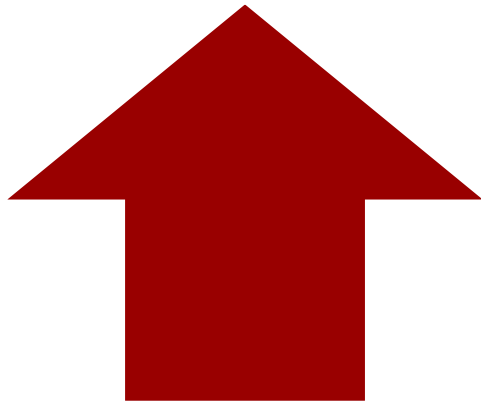
# With and without project scenarios

- A before and after comparison does not take into account any changes in production that would occur without the project and would thus lead to wrong assumptions about the benefits arising from the proposed project
- When we compare with and without project scenarios, the difference we get is the incremental net benefit – the value which we will use when deciding whether to go forward with the project or not

# With and without project scenarios

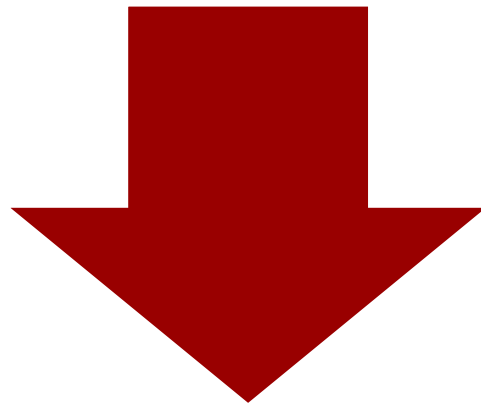
- Potential without project scenarios:
  - Slow production increase (project aims to intensify production and thus achieve a greater increase)
  - Production decline without investment (project aims to prevent decrease in production, or increase it)

# Identifying costs and benefits



## **Benefits:**

Contribute to  
project objective



## **Costs:**

Reduce the project  
objective



# Identifying costs and benefits

- We have already identified some costs when preparing our project budget. However, the costs used for financial and economic analyses extend beyond these.
- We need to identify the costs at the farm and enterprise levels and aggregate these.
- Typically, costs are easier to identify and value than benefits.

# Identifying costs and benefits

## ➤ **Physical goods:**

- Easy to identify
- Difficult to estimate quantity and timing

## ➤ **Labour:**

- Easy to identify
- Difficult to estimate quantity and timing
- Difficult to work with shadow prices, estimate values for family labour

# Identifying costs and benefits

## ➤ **Land:**

- Easy to identify
- Somewhat difficult to value

## ➤ **Taxes:**

- Costs in financial analysis
- Transfer payments in economic analysis

# Identifying costs and benefits

## ➤ **Debt service:**

- Cost in financial analysis
- Omitted from economic accounts (transfer payment)

## ➤ **Sunk costs:**

- Incurred in the past
- Never considered in project analysis

## ➤ **Contingencies**

# Identifying costs and benefits

More on types of costs:

- **Marketable:** Goods or services that have a market cost and are sold and bought
- **Unmarketable:** Goods and services that have a cost but not a market (many public goods)

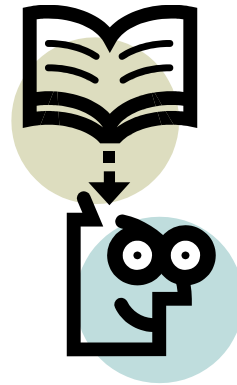
# Identifying costs and benefits

- **Commensurable:** Goods and services that can be measured and compared in a common unit, meaning their value can easily be compared
- **Incommensurable:** Goods and services that can not be compared using a common standard, but may be measurable in natural units (i.e. carbon dioxide released)

# Identifying costs and benefits

- **Tangible:** Things that are material in nature, meaning they can be touched, observed. Examples include increased yields, or reduced pollution,
- **Intangible:** Goods and services that are not material in nature, and cannot be easily valued – access to services, reduced morbidity, etc.

# Identifying costs and benefits



- Take some time to consider each of these types of goods/services, and come up with some examples of each. How should we consider these in our analysis?



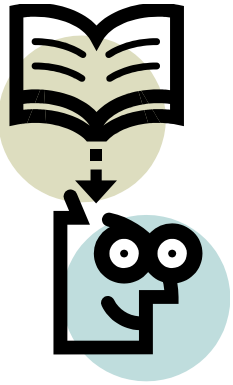
# Identifying costs and benefits

- **Tangible benefits in agriculture:**
  - Increased production
  - Quality improvement
  - Change in time of sale
  - Change in location of sale
  - Changes in product form
  - Cost reduction through mechanization
  - Reduced transport cost
  - Losses avoided

# Identifying costs and benefits

- Intangible benefits:
  - New job markets
  - Improved health
  - Reduced infant mortality
  - Increased school enrolment
- Not easily valued, but should still be identified and quantified.
- Costs of intangible benefits usually tangible
- Intangible costs include pollution as result of project, or other disruptions

# Project scope



- Who or what do we take into consideration when we look at the impact or effects of a project? Where do we draw the line?
- Does this differ between public and private projects?

# Market prices vs. farm gate prices

Market prices are those obtained for produce at local or central markets, and are often easy to collect. They do not necessarily reflect the value of the product to the farmer.

The farm gate price of a product is the price the farmer receives or pays at the boundary of his own farm. This is the first point of sale for outputs, and no transportation or marketing costs are included in the price. Farm gate prices are thus ideal for use in valuing home consumed production.

# Discounting

Year	Project A			Project B			Project C			Project D		
	B	C	Net	B	C	Net	B	C	Net	B	C	Net
1	0	90	-90	0	140	-140	0	100	-100	0	110	-110
2	115	0	115	30	10	20	150	50	100	130	50	80
3				30	0	30	150	50	100	130	20	110
4				70	0	70	50	100	-50	130	50	80
5				170	0	170				130	80	50

Source: SOAS short course scheme

# Discounting

Cost and benefits **flows** need to be comparable in order for us to choose between projects

Knowing when costs and benefits occur can be as important as knowing the size of these costs and benefits.

Cost and benefit streams occurring in the future are therefore **discounted**

# Developing a cash flow

- 1) Identify and value costs and benefits
- 2) Bind the project in time
- 3) Estimate gross annual costs and benefits
- 4) Calculate incremental costs and benefits
- 5) Compute annual cash flows

# Choosing a discount rate

- Financial analysis: Minimum the cost of borrowed funds
- Economic analysis: Opportunity cost of capital, i.e. the cost of committing investment funds to a new project
- IFI norm: 12%
- NB: High discount rates biased towards projects with low initial cost, early benefits



# Project criteria

- Either of the below criteria should give the same project decision when the same information is used
- **Benefit-cost ratio (BCR):**
  - Accept projects with a ratio of one or greater when costs and benefits are discounted at the opportunity cost of capital
  - Drawback: Netting out of costs and benefits must be done in exactly the same way for each project design being compared

# Project criteria

- **Net present value (NPV):**
  - Discounted present value of cost is subtracted from discounted present value of benefits
  - Or, incremental net benefit stream is discounted
  - Accept all independent projects with a NPV of 0 or greater
  - Drawback: Projects cannot be ranked because NPV is an absolute, not a relative, measure

# Project criteria

## ➤ Internal rate of return (IRR)

- Maximum interest rate a project could pay for resources used if it is to recover its costs and break even
- Not calculated directly
- Drawback: Cannot be calculated if all discounted NPVs in cash flow are positive
- Accept all projects with an IRR equal or greater to the opportunity cost of capital

# Financial Analysis

- 1. To evaluate the effect of the project on all stakeholders
- 2. To aggregate costs and benefits for the project as a whole

# Financial analysis

- Analyze the effect on main stakeholders
  - Farmers/beneficiaries
  - Government
  - Other financing institutions
- Will the project present a **loss** for anyone?
- Will the beneficiaries actually be **better off**?

# Financial analysis

- Do the beneficiaries have the **incentives** to take part in this project?
- Can the beneficiaries **afford** to take part in this project?
- Does the government/service provider have the **necessary funds** at all stages of project delivery?
- In sum: are the project activities **sustainable**?

# Financial analysis at the farm level

- We aim to make sure that there are enough resources available for the activities we are proposing through the project;
  - Capital
  - Labour
  - Land
- Please discuss why each one of these is important

# Farm models

- Gives an overview of the farm activities and resources with and without the project, and assumes farmers want to maximize their income/consumption
- Do the project interventions change the allocation of key resources? Does this help the farmers maximize their income/consumption?



# Creating a farm model

- Decide on a few 'average' farms that are typical of your beneficiaries (highland vs lowland, subsistence vs semi-subsistence, paddy vs vegetables)
- Map these farms' resources and activities:
  - Land holdings
  - Crops/livestock/other agricultural activities
  - Family size
  - Other non-agriculture productive activities
  - Production and income from the above

# Creating crop budgets

- For each crop on the farm, develop a production budget per hectare or other standard measurement in your country
  - Quantity of inputs used (seeds, fertilizer, pesticides, labour)
  - Price of inputs used
  - Quantity of crop produced (yield)
  - (Quantity of crop bi-product produced (yield))
  - Sales price of crop
  - (Sales price of bi-product)

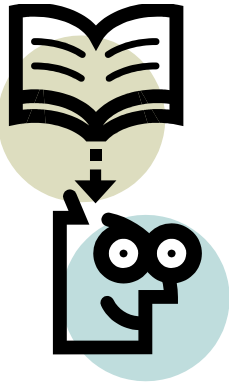
# Creating crop budgets

- Organize your information by:
  - Physical details
  - Prices
  - Financial calculations

# Crop and farm budgets

- Create one budget for the without project situation and one for the with project situation
- Incorporate the budget into the farm level budget
- From comparing the two crop budgets, you will find the incremental income derived from each crop
- Together with other crops and other activities, you will get the financial activity of the farm as a whole

# Farm models



- Farm model 1a – what is the project intervention?
- What changes in resources do you see?
- Is there a benefit to the farmers? How can you tell?

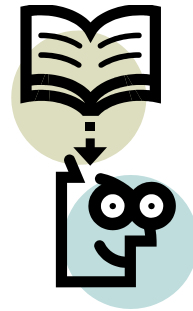
# Financial analysis of project agencies

- Analyses what capital outlays and recurrent costs the project agencies will have to cover, and what returns they can expect from the investment
- Analyses the financial ability of the agency to support/carry out the project
  - What is their current budget situation?
  - How much will they get from central government?
  - What user fees are the beneficiaries willing and able to pay?

# Financial analysis of project agencies

- What the analyst will need to see:
  - Balance sheet
    - Assets, liabilities, equity, reserves
  - Income and expenditure account
  - Cash flow statement
- Objective is to assess the stability of the agency, its income and the source of its funds

# Financial analysis of project agencies

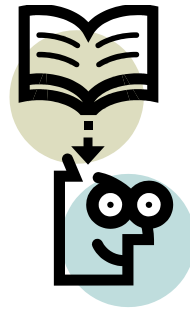


What should the project design team do in cases of lack of financial viability?



# Financial analysis of government

- For government, a project is:
  - An investment
  - Foreign exchange earner or user
  - Instrument of fiscal-financial policy
- A project should be evaluated on all of these accounts



What outflows and inflows might we find in a government project cash flow?

# Economic analysis

- Moving from stakeholders to the economy as a whole
- What is the impact of the project for the borrowing country?
- “Identify projects that contribute to the welfare of a country”

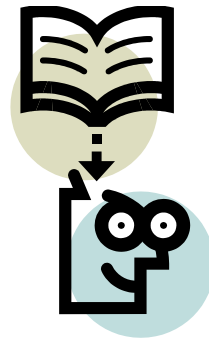
# Economic analysis

- Convert the information from the financial analysis into economic values
- Removing distortions, transfer payments etc.

# Shadow prices

- Shadow prices = social opportunity costs of resources used and outputs generated through the project
- If market prices and shadow prices do not coincide, economy is distorted
- Market imperfections and distortions mean market prices need to be adjusted to get the economic values of project inputs and outputs
- Seek to avoid investments that are only profitable under current distortions, and promote investments consistent with a long term pattern of efficient resource use

# Market distortions



Can you think of some reasons why markets may be distorted? Are developing countries more or less vulnerable to market distortions?

# Market distortions in developing countries

- High inflation -> overvalued currency -> government restrictions on import
- Government fixed prices
- Fixed wages
- Income inequality -> consumer preferences not reflected in market prices
- Fragmented capital markets, diverging interest rates

# Market distortions

1. Indirect or income taxes
2. Uncorrected externalities
3. Quantity controls
4. Controlled prices
5. Tariffs and trade controls
6. Oligopoly
7. Imperfect information, transaction costs, missing markets



# Adjustments to shadow prices

1. Base the values of all traded goods on their border prices
2. Remove the values of direct taxes and subsidies from the prices of all items
3. Make an adjustment to allow for the discontinuity between international and domestic values caused by taxes on international trade

# Adjustments to shadow prices

4. Value non-traded inputs at their long-term marginal cost of supply
5. Make allowance where necessary for the fact that wages of some kinds of labour may be higher than their opportunity cost at market prices
6. Taking account of these basic shadow-pricing requirements, calculate the border or market parity values of the goods and services used and produced by the project
7. Estimate the values of all consumer surpluses gained (and lost) in the with project situation

# Shadow prices

## World price at the border

- Cost, insurance, freight (CIF) for imports
  - FOB cost at point of export
  - Freight charges to point of import
  - Insurance charges
  - Unloading from ship to pier at dock
  
- Free on board (FOB) for exports
  - All costs to get good on board ship in harbour
  - Project boundary price/farm gate price

# Non-tradable goods and services

Commodities whose domestic price lies between the export and import price

Goods can also be non-traded due to government controls such as tariffs and quotas. This needs to be adjusted for in economic analysis.

Non-tradeable goods do not have border prices, so adjusted by conversion factors.

# Conversion factors

- Shadow pricing is most easily done by multiplying the market price value of each item by a conversion factor (CF)
- The value the CF takes is a reflection of the relationship of the shadow price to the market price
- If  $CF > 1$ , the social cost is higher than the market price
- If  $CF < 1$ , the social cost is lower than the market price

# Conversion factors

- Ratio of economic to financial price, i.e. shadow price divided by domestic market price.
- Used to convert market prices into shadow prices for economic analysis
- They are calculated using either the world price system or the domestic price system

# Uncertainty

- With and without scenarios are predictions about future values
- The predictions are not certain
- Costs and investment time are often underestimated, gross margin calculations overestimated
- Uncontrollable external forces

# Uncertainty

- What is the reliability of the assumptions we make in our analysis?
- What are the possible consequences of deviations from these assumptions?
- Sensitivity analysis tests the impact of likely variation in the project plan



# Sensitivity analysis

- Key risk factors are identified.
- Carry out a sensitivity analysis on each of these to assess what the occurrence of such a risk would mean for the project's profitability: changing one variable at a time and see how this affects NPV, EIRR
- Key variables to change usually include:
  - Delays in costs or benefits
  - Increases and decreases in costs and benefits
  - Duration of project

# Sensitivity analysis

- Other variables:
  - Changes in input prices
  - Changes in product prices
  - Changes in yields

# Switching values

- Changing the value of a variable so that NPV becomes zero
- This is the change in a variable that renders the project no longer profitable

# Assumptions

- The assumptions used for the analysis must be explicitly stated – this will allow other analysts to review your work and clarify under what circumstances your findings are valid