Public Sector Financial Management

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OUTLINE

- Part 1: Scope and principles of public finance
- Part 2: Managing revenues, expenditure and debt
- Part 3: Performance based budgeting
- Part 4: Budget Execution / internal controls
- Part 5: Cost benefit analyses

Part 5: Benefit Cost Analyses
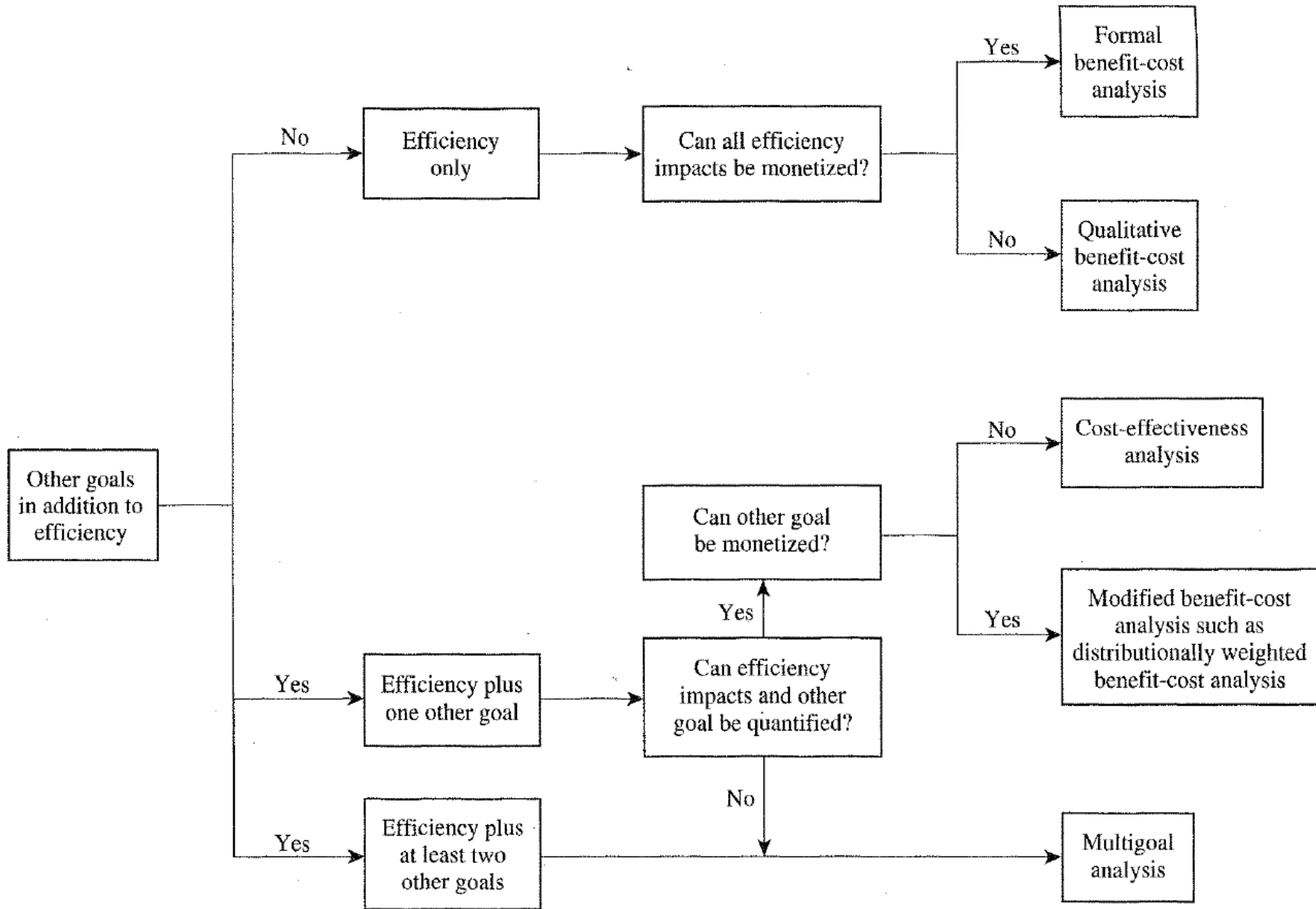
Approaches to investment decision making

Figure 10.4   Choosing a Solution Method

Steps to Benefit – Cost Analysis

- Identify and value benefits
- Identify and value costs
- Convert Financial Costs to Economic Costs
- State general assumptions/ discount rate
- Calculate Economic Rate of Return
- Calculate Net Present Value
- Perform sensitivity analyses
- Decide whether or not to invest

Step 1: Identify and value benefits

Subproject	Quantified Benefits
Water Supply	Time savings in fetching water Cost savings on non-incremental water consumption Value of increased water consumption in the with project situation
Roads	Cost savings to transport agriculture produce to market Cost savings to transport agriculture inputs to production site Reduction in post-harvest losses due to shorter marketing periods, better access to technology, and extension services
School Buildings	Higher enrollment rates and lower dropout rates increase the number of children with additional years of schooling, who will be able to realize higher future incomes as a result of higher education.
Barangay Health Facilities	Better health of the local population and work force through decreased mortality and morbidity, leading to increased productivity of labor in their economic activities (quantified by willingness to pay)
Day Care Centers	Benefits from longer schooling by reducing drop-out rates in elementary school because of better readiness for school Direct gains in future earnings because of enhanced child ability Women have free time that can be used for productive activities

Step 2: Identify and value costs

- Capital / investment costs
- Operation and maintenance costs
- Environmental costs

Step 3: Convert Financial Costs to Economic Costs

4. **_Price Adjustments_**. Financial prices were adjusted accordingly to reflect their economic values and account for distortions. The following parameters were used for price adjustments.

    4.1 **_Shadow foreign exchange rate (SER)._** The SER, currently pegged by NEDA at 1.20, was used to correct for distortions and was applied to all direct and indirect foreign exchange costs of a project. It was also used for those benefits which may be expressed in foreign exchange, particularly in the case of exports and/or import substitutes such as paddy.

    4.2 **_Shadow Wage Rate._** The shadow wage rate (SWR), currently pegged by NEDA at 0.6 of legislated wage for labor, was used to reflect the true economic value of unskilled labor employed in the project. In the watershed management and development component, the labor component accounts for 60% of total investment cost for agroforestry projects based on DENR guidelines (2001).

    4.3 **_Shadow Discount Rate._** The social discount rate (SDR), currently pegged by NEDA at 15%, was used to discount the stream of economic costs and benefits to their net present values. The SDR was also used, as required by NEDA, as the hurdle rate for the Project's EIRR.

    4.4 **_Project Costs_**. Project costs were distinguished in terms of foreign costs, local costs and taxes. Foreign cost components were valued in constant 2004 prices.

Example: Convert Financial Costs to Economic Costs

Subproject Type	Financial Cost/ SP (PHP)[1/]	Economic Cost per SP (PHP)[1/]	Economic / Financial Cost
Level II Water System – Pump	982,005	1,070,385	1.09
Level II Water System – Gravity	847,162	923,406	1.09
Road Improvement	1,505,347	1,776,310	1.18
Road Construction	1,881,406	2,163,617	1.15
School Building	691,745	767,837	1.11
Health Station	372,477	420,899	1.13
Day Care Center	301,540	334,710	1.11

Step 4: State General Assumptions

- When will full benefits be realized?
- When will benefits will occur ?
- Are O&M costs constant in project life?
- What is the discount rate (opportunity cost of capital) → Ministry of Economic Planning

Step 5: State decision rule:

- Accept investment project if:
  - Economic Internal rate of return (EIRR) of project is greater than the discount rate
  - Net present value (NPV) is greater than 0

Example: Constructing a school building

Table 12. Economic Analysis for Elementary School Buildings NPV = $42,729; IRR = 15.91%

Assumptions	Unit	Without Project	With Project	With - Without
Economic cost of construction	PHP	0.00	767,837.45	767,837.45
Social preparation / Capability Building	PHP	0.00	119,098.82	119,098.82
Total operating cost	PHP	0.00	78,323.55	78,323.55
M&E cost	PHP	0.00	2,048.20	2,048.20
Total Investment Cost	**PHP**	**0.00**	**967,308.02**	**967,308.02**
Beneficiary families (1 barangay)	families	271.00	271.00	0.00
Family size	persons	5.00	5.00	0.00
Barangay population	persons	1355.00	1355.00	0.00
Proportion of children 6-12 years	%	17.4%	17.4%	0.00
Number of children 6-12 years	children	236	236	0.00
Enrollment rate of children 6-12 years	%	85.00%	96.00%	10.00%
Drop-out rate children 6-12 years	%	20.00%	10.00%	-10.00%
No. children 6-12 yrs complete school yr	children	161	202	41
Inc NPV of earning / 1 extra yr school	PHP	4,334.97	4,334.97	0.00
Gross annual benefit	PHP	697929	875663	177734
O&M Cost - teacher	PHP/year	260,000.00	260,000.00	0.00
O&M Cost - repairs	PHP/year	2,500.00	7,500.00	5,000.00
O&M Cost - materials & supplies	PHP/year	26,000.00	26,000.00	0.00
O&M Cost - water & electricity	PHP/year	12,000.00	12,000.00	0.00
Annual net benefits	**PHP/year**	**397,429**	**570,163**	**172,734**
Project life	years	0.00	15.00	15.00
Discount rate				15.00%

Example: Rural Road Project

Table 10. Economic Analysis of Road Construction NPV=P607,402; IRR = 21.46%

Assumptions	Unit	Without Project	With Project	With – Without
Economic cost of construction	Subproject	0.00	2,163,617.11	2,163,617.11
Social Preparation	PHP	0.00	119,098.82	119,098.82
Total Operating Cost	PHP	0.00	78,323.55	78,323.55
PMO Cost	PHP	0.00	2,048.20	2,048.20
Total Investment Cost	**PHP**	**0.00**	**2,363,088**	**2,363,088**
Number of barangay households	Households	224.00	224.00	0.00
% households benefiting from road	%	40%	50%	0.10
Number of benefiting farmers	farmers	89.60	112.00	22.40
Avg. area cultivated with paddy/ farmer	hectares	1.30	1.30	0.00
Yield, Paddy (per harvest)	kg/ha	2,940.00	2,940.00	0.00
Cropping Intensity Index	harvests/year	1.36	1.36	0.00
Paddy production per year/ farmer	kg/year	5,197.92	5,197.92	0.00
Reduction in Post harvest losses	%	13.00	10.50	-2.50
Reduction in Post harvest losses	kg/year	675.73	545.78	-129.95
Paddy prod /year/ farmer + post harvest savings	kg/year	4,522.19	4,652.14	129.95
Price	PHP/kg	8.30	8.30	0.00
Annual gross benefit per farmer (total production)	PHP/year	43,142.74	38,612.75	-4,529.99
Subsistence consumption per year and farmer	kg/year	1,050.00	1,050.00	0.00
Annual quantity marketed per farmer	kg/year	4,147.92	4,147.92	0.00
Transport cost for paddy	PHP/kg	0.72	0.18	-0.54
Annual transport cost for paddy per farmer	PHP/year	2,986.50	746.63	-2,239.88
Fertilizer application per planting season	kg/ha	168.00	168.00	0.00
Transport cost for fertilizer	PHP/kg	0.72	0.61	-0.11
Annual transport cost for fertilizer per farmer	PHP/year	213.86	181.18	-32.67
Annual transport cost for paddy and fertilizer per farmer	PHP/year	3,200.36	927.81	-2,272.55
Annual O&M cost	PHP/year		50,000	50,000
Annual net benefit for all farmers	**PHP/year**	**3,578,837**	**4,170,713**	**591,876**
Project Life	years	0.00	10.00	10.00
Capital Cost / Annual Net Benefit				3.99
Discount Rate				15.00%

Example: water supply project

Table 8. Economic Analysis for Water Supply System II - Pump Driven NPV = P2,451,598; IRR = 57.78%

Assumptions	Unit	Without Project	With Project	With - Without
Economic cost of construction	PHP	0.00	1,070,385.27	1,070,385.27
Social preparation / Cap. Bldg	PHP	0.00	119,098.82	119,098.82
Total operating cost	PHP	0.00	78,323.55	78,323.55
M&E cost	PHP	0.00	2,048.20	2,048.20
Total Investment Cost	**PHP**	**0.00**	**1,269,855.83**	**1,269,855.83**
Gross Annual Benefit	PHP	0.00	776,507.34	776,507.34
Annual O&M cost	PHP/year	0.00	35,000.00	35,000.00
Annual Net Benefits	**PHP/year**	**0.00**	**741,507.34**	**741,507.34**
Project Life	years	0.00	10.00	10.00
Capital Cost / Annual Net Benefit				1.71
Discount Rate				15.00%

Sensitivity Analyses: What happens when costs and benefits increase or decrease?

Table 19. Sensitivity Analysis

Subproject Type	SCENARIO 1: 20% increase in cost			SCENARIO 2: 20% decrease in benefits		
	Expected NPV	Switching Value	Sensitivity Indicator	Expected NPV	Switching Value	Sensitivity Indicator
Level II Water Pump	2,197,627	193%	1	1,707,307	-66%	-2
Level II Water Gravity	2,343,271	229%	0	1,829,702	-69%	-17
Road Improvement	-225,237	9%	12	-259,221	-8%	-2
Road Construction	484,363	40%	2	292,967	-29%	-7
School Building	-150,732	4%	23	-159,278	-4%	-1
Health Center	109,857	38%	3	63,071	-27%	-7
Day Care Center	-5,716	19%	5	-25,940	-16%	-4
Overall Project	-136,328,532	18%	6	-330212523.3	-15%	-4

If sensitivity indicator is greater than +/-1, then project is sensitive to the parameter

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Reflection Question

- What are the 5 main lessons you take away from this module???