Economics Training Series
Introductory Course

Cost Estimation

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Project Cost Estimate: Feasibility/Detailed Design

- Identify project.
- Identify individual project components.
- Classify individual project components.
- Schedule construction and operation and maintenance of individual components within the project design.
- Engage project cost estimator to begin estimating costs in financial terms.
- Engage financial analyst to provide cost estimator with the level of detail required for financial analysis.
- Engage economist to provide cost estimator with the level of detail required for economic analysis.

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Project Cost Estimates

Choice of currency

- domestic currency (e.g., Som, Tenge, Tugrik)
- foreign currency (e.g., US$)

Categories of costs

- domestic currency costs (e.g., unskilled labor)
- foreign currency costs (e.g., imported equipment)
- tradables
- nontradables

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Project Cost Estimates: Types of Costs

a) Investment Costs

- civil works
- electrical works
- mechanical works
- engineering and other professional services
- start-up costs
- vehicles and equipment
- labor
- other
- taxes and duties

b) Recurrent Costs

salaries

operation and maintenance costs

salaries

fuel

consumables

other

c) Salvage values

d) Financial charges

- interest during construction

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Base Cost

Base Costs -- best estimates of project costs at a specified date, assuming:

- Quantities of works, goods and services and relevant prices are accurately known.
- Quantities and prices will not change during implementation.
- The project will be implemented exactly as planned.

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Contingency Allowances

- Allowance for adverse conditions which will be in addition to the base cost estimate.
- Physical contingencies – to cover physical uncertainties beyond the base case to complete the project. Often calculated and expressed as percentages of base costs.
- Price contingencies – to cover inflation and price uncertainties

Some typical levels of Physical Contingencies:

- 5% - standard equipment designs/definable civil works, e.g., road surfacing, canal lining.
- 10% - general civil works with routine and predictable uncertainties e.g, roads, buildings, pipelines, transmission lines
- 15% - plant and civil works in difficult terrain.

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Cost Scheduling - 1

- Various methodologies
- Project engineers/designers advise cost estimator on the distribution of costs over the project life.
- For example, major civil works on a hydroelectric project costing $200 million may be disbursed over a 4-5 year period, as follows:

Year	%	$ million
1	15	30
2	25	50
3	40	80
4	20	40
TOTAL:		**200**

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Cost Scheduling - 2

- Built-up for each project component in the base cost.
- Identify foreign and local currency costs separately
- Physical contingencies allotted.
- Price contingencies allotted.
- Taxes, duties, and other transfer payments quantified.
- Interest during construction calculated.
- Project cost estimate aggregated to derive total cost estimate (i.e., base costs + taxes/duties + contingencies)
- Consolidated annual cost estimate prepared (e.g., capital and O & M costs).

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Project Cost Estimates ($ million)

	Base Cost[a]			Physical Contingency[b]			Price Contingency[c]			Total		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. Preliminary Works	0	4.7	4.7	0	0.2	0.2	0	0.1	0.1	0	5.0	5.0
B. Civil Works												
Lot C1 (Dam and Desanders)	75.7	12.6	88.3	7.6	1.3	8.8	5.7	1.0	6.7	89.0	14.9	103.8
Lot C2 (Tunnel)	54.6	6.4	61.0	5.5	0.6	6.1	2.8	1.9	4.7	62.9	8.9	71.8
Lot C3 (Powerhouse)	36.2	11.6	47.8	6.5	2.1	8.6	2.9	0.9	3.8	45.6	14.6	60.2
C. Electromechanical												
Lot 4 (Hydraulic Steel Work)	21.6	0.9	22.5	1.2	0.1	1.3	1.4	0.4	1.8	24.2	1.4	25.6
Lot 5 (Electrical Equipment)	31.1	1.0	32.1	1.7	0.1	1.8	2.2	0.5	2.7	35.0	1.6	36.6
Lot 6 (Mechanical Equipment)	19.5	0.8	20.3	1.1	0	1.1	1.1	0.3	1.4	21.7	1.1	22.8
Lot 7 (Transmission System)	10.5	2.9	13.4	0.6	0.2	0.8	0.7	1.3	2.0	11.8	4.4	16.2
D. Other Project Costs												
Construction Engineering	13.0	2.1	15.1	0.7	0.1	0.8	0.9	0.1	1.0	14.6	2.3	16.9
Project Management	2.1	6.1	8.2	0.1	0.3	0.5	0.2	0.4	0.6	2.4	6.8	9.3
Environmental Mitigation	2.3	3.0	5.3	0.1	0.2	0.3	0.2	0.2	0.4	2.6	3.4	6.0
Loss Reduction Component	2.3	0.9	3.2	0.1	0.1	0.2	0.2	0.1	0.3	2.6	1.1	3.7
Total (A+B+C+D)	268.9	53.0	321.9	25.3	5.2	30.5	18.3	7.2	25.5	312.5	65.4	377.9
E. Taxes and Duties												
Contract Tax										0	16.8	16.8
Customs Duties										0	1.5	1.5
F. Interest during Construction										7.9	1.6	9.5
Total										**320.4**	**85.3**	**405.7**

[a] Base cost is based on January 1996 prices.

[b] Physical contingency: Lot C1 – 10%; Lot C2 – 10%; Lot C3 – 18%; Preliminary works – 4%; other items – 5.6%.

[c] Price contingency: 2.7% for foreign exchange costs (FC) and 6% for local currency costs (LC).

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Annual Project Cost Estimates ($ million)

Fiscal Year	Capital Costs	Operation & Maintenance Costs	Salvage Value	Total Costs
1999	1.45			1.45
2000	64.91			64.91
2001	93.38			93.38
2002	165.39			165.39
2003	57.83			57.83
2004	22.74	3.46		26.2
↓		↓		↓
2012		3.46		3.46
2013		15		15
2014		3.46		3.46
↓		↓		↓
2022		3.46		3.46
2023		3.46	-81.14	-77.68
Total	405.70	80.74	-81.14	405.30

Construction Period: 5 years (overlap in years 1 and 6)
Project Operating Life: 20 years
Salvage Value: 20% of Investment Cost

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Economic Cost Estimate - 1

- Economist advises cost estimator on the breakdown of costs required for the economic analysis.
- Level of detail contingent upon availability of conversion factors and choice of numeraire.
- Include base cost.
- Include physical contingencies.
- Exclude price contingencies
- Exclude relevant taxes, duties, subsidies, and other transfer payments.
- Classify project components as tradable or non-tradable.

Economic Cost Estimate - 2

Tradable inputs and outputs -- goods and services where production or consumption affects a country's level of imports or exports.

Nontradable inputs and outputs -- goods and services that are not imported or exported by the country in which the project is located, because by their nature, they must be produced or sold within the domestic economy, e.g., products with no international market due to their quality and/or cost.

Economic Cost Estimate - 3

Apply shadow pricing

For example, $200 million civil works on a hydroelectric project including physical contingencies (10%) using **world price numeraire**; standard conversion factor of 0.90 and no other conversion factors.

	Total	Traded	Nontraded			Total Economic
Year	Civil Works	(35%)	65%	SCF	Economic Cost	Cost
1	33	11.6	21.4	0.9	19.3	30.9
2	55	19.2	35.8	0.9	32.2	51.4
3	88	30.8	57.2	0.9	51.5	82.3
4	44	15.4	28.6	0.9	25.7	41.1
Total	220	77.0	143.0		128.7	205.7

In the above example, non-traded goods and services were adjusted by the standard conversion factor.

Step repeated for each project component and then presented in the economic resource statement.

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Economic Cost Estimate - 4

If **domestic price numeraire** used for project, result is as follows.

Shadow Exchange Rate Factor = 1.11 (i.e. 1/SCF = 1/0.9)

	Total	Traded			Nontraded	Total Economic
Year	Civil Works	(35%)	SERF	Economic Cost	65%	Cost
1	33	11.6	1.11	12.9	21.4	34.3
2	55	19.2	1.11	21.3	35.8	57.1
3	88	30.8	1.11	34.2	57.2	91.4
4	44	15.4	1.11	17.1	28.6	45.7
Total	220	77.0		85.5	143.0	228.5

Economic costs are different with different numeraire. Shows importance of ensuring numeraire is defined clearly and used consistently.

If numeraire is used consistently for costs and benefits, eventual decision on project, will not be affected by choice of numeraire.

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