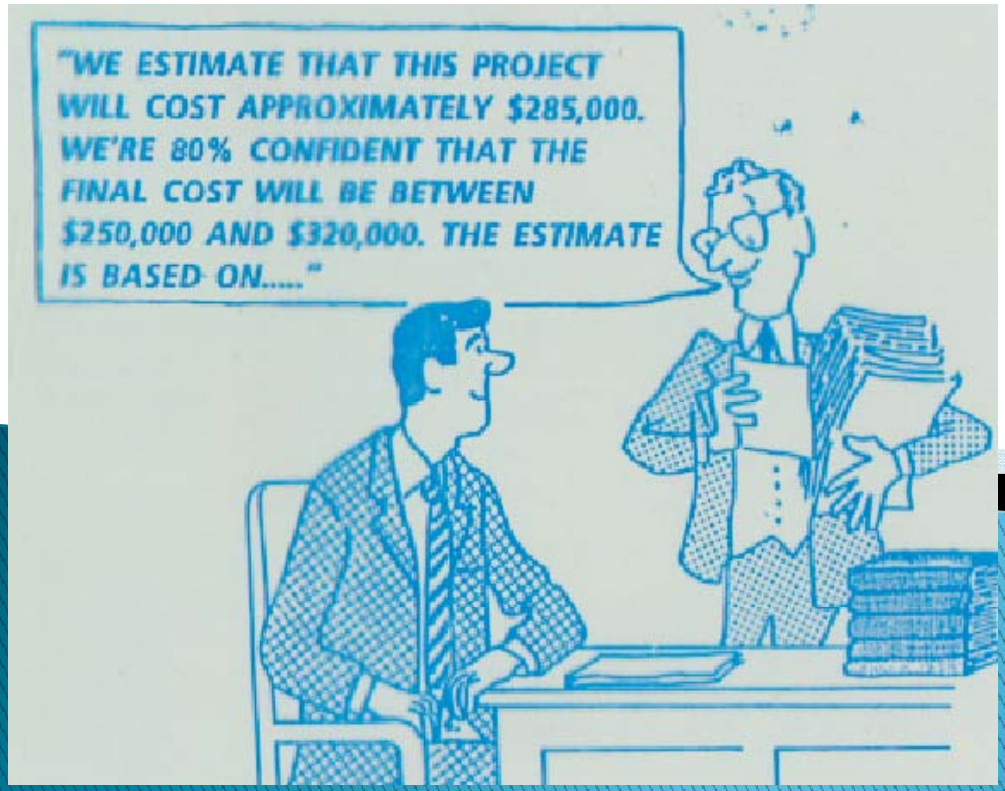
CHAPETR V
PROJECT COST ESTIMATION AND VALUATION



PROJECT COST ESTIMATION

PROJECT VALUATION

5.1. Project Cost Estimation – General

- Project Cost estimation is the process of valuing on monetary expression, including the cost of all possible entrants necessary for the planning, implementing and monitoring stages of the proposed project under consideration.
- Project Cost includes:
  - Preliminary investigation (project appraisal costs)
  - Design and supervision (consultancy cost)
  - Construction works (contractor's cost)
  - Land owning cost, and
  - Monitoring costs

5.1. Project Cost Estimation – General

- Cost due to construction is the focus of this chapter. Cost includes:
  - cost due to material,
  - cost due to labor,
  - cost due to equipment,
  - overhead costs and contractor's profit.
- Material Break Down – In order to facilitate estimation of cost due to material, it is important to know the quantities of various elements involved in construction of various parts of the building work
- Example: Material Break Down for 1m^3 C-25 concrete (1:2:3 mix)

5.1. Project Cost Estimation – General

- Wet (fresh) concrete mix … = 1m³
  - Quantity for dry base analysis…= 1.55m³
  - Volume of cement……..…= 1/6*1.55 = 0.258m³ = 0.258m³/0.035m³ per bag = 7.4 bags of cement
  - Sands ……..= 2/6* 1.55 = 0.517m³
  - Coarse aggregate……..= 3/6 *1.55 = 0.775m³
  - Water ……..= 0.16 m³ (assuming w/c 0.62)
- *Note*: – 1.5 to 1.6 times dry volume of the materials is required to get 1m³ of compact dense fresh concrete mix.
- Exercise: Do similarly for C 20 and C 30 concretes

5.1. Project Cost Estimation – General

- **Purposes of Cost Estimation**
  - determine actual cost per unit of item
  - identifying engineering estimate of the work for bidding purpose
  - work out economical use of materials, labor and equipments
  - in cases of variations to determine the extra cost to be incurred
  - when changes in cost due to legislation happens, to work out the escalation in cost

- **The following information is required to define cost per unit of work**
  - Correct information of the market price of the materials at the time of need to be used as a basic price
  - Correct information of the rates of various categories of skilled and unskilled laborers as wage rates to be used for daily work rate
  - Output of laborers per day for various types of items (productivity)
  - Correct information of the rates of various categories of equipments and tools as rental rates to be used for major items of rates
  - Up-to-date knowledge of the construction methods.

5.1. Project Cost Estimation – General

- **Factors affecting cost estimation**
  - Type and documentation of the project
  - Construction scheduling
  - Bidding environment
  - Quality and availability of material and labor (given in specification)
  - Construction facilities /tools and method of construction
  - Location of the site: Transportation charges
  - Proper management
  - Land charges (lease)
  - Nature of subsurface condition

5.2.Types of Costing or Estimation

- Estimation can be broadly classified as **preliminary** (approximate) and **detailed.**

- Preliminary /approximate costing
- This type of cost estimation is required to know the financial position of the client before costly detailed designs are carried out.

- Such estimates are based on practical knowledge and cost of similar previous works. Examples of approximate cost estimations are as follows:

5.2.Types of Costing or Estimation

- A. Cost per functional unit
- Hospital =cost per bed, Dormitory = cost per student, Cinema or theatre = cost per seat, residential buildings = cost per area, road works = cost per kilometer length, culverts or bridges = cost per meter span, water supply or sewerage projects = cost per head of population.

- B. Plinth area method – cost per m^2
- Based on PLINTH AREA – roof area or external dimensions at the plinth level (Courtyard & open area shall not be included)
- The rate per meter square is deduced from the cost of similar building projects in the locality.

- C. Cubical Content method – cost per m^3
- Based on cubical contents of various buildings, i.e. Plinth area of the building x height x cubic content rate.
- Height should be taken from the top of flat roof (or halfway of the sloped roof) to the top of concrete in foundation.

5.2.Types of Costing or Estimation

- Detailed cost estimate(based on item rate)

- This is the most reliable and accurate type of estimate.
- The quantities of items are carefully prepared from the drawings and the total cost worked out from up to date market rates.
- A detail cost estimate thus requires:
  - Quantity surveying and
  - Analysis of the different rates for the quantities prepared.

5.2.2.1 Rate Analysis

- Rate Analysis is the process of fixing cost per unit of measurement for the different item of works.
- Total cost per unit of work (TC): Direct cost (DC) + Indirect cost (IC)
- DC includes cost due to material (MC), cost due to labor (LC), cost due to equipment (EC)
- IC covers overhead costs, and contractor's profit.
- In order to facilitate estimation Material break down is essential
- Different formats, Excel sheets and softwares (like CONMIS) are used for rate analysis

5.2.2.1 Rate Analysis

PROJECT NAME	
BOQ REFERENCE	
ACTIVITY CODE	
UNIT OF MEASURE	

ACTIVITY DESCRIPTION

DIRECT MATERIAL COST					DIRECT LABOR HOURLY COST						DIRECT EQUIPMENT HOURLY COST				
Material Description	Unit	Quantity	Unit cost	Total cost	Labor by trade	No of labor	Basic salary	Labor index	UF	Total cost	Equipment description	No of equipments	Hourly cost	UF	Total cost
A – TOTAL DIRECT MATERIAL COST					B - TOTAL DIRECT LABOR HOURLY COST						C – TOTAL EQUIPMENT HOURLY COST				

D – Hourly crew productivity	Data
E – Direct material cost	A
F – Direct labor cost	B/D
G – Direct equipment cost	C/D
H – DIRECT UNIT COST	E + F + G
I – Site overhead costs	K1 * H
J – Head office overhead costs	K2 * H
K – INDIRECT UNIT COST	I + J

L – RISK ALLOWANCE	R1*E + R2*F + R3*G + R4*I +R5*J
M – GROSS PROFIT	P%/0.7 * (H + K + L)
N – TOTAL UNIT PRICE WITHOUT VAT	H + K + L + M
O – VALUE ADDED TAX (VAT)	0.15 * N
P – TOTAL UNIT PRICE WITH VAT	N + O
REMARK	

- Example: – Calculate the Unit price for C –25 concrete per m^3 of work (formwork and reinforcement rated separately). Assume 15% overhead and 20 % profit.
- Solution: –
- Total cost (TC) = Direct Cost (DC) + Indirect Cost(IC)
- IC = (15% + 20%) of DC = 35 % of DC
- Direct Cost (DC) = Material Cost (MC) + Labour Cost (LC) + Equipment Cost (EC)
- Material cost (MC)

Cement	= 7.4 Bags/ m^3 * 180/2 Birr/Bags	= 666.00 Birr/ m^3
Sand	= 0.517 m^3 * 120 Birr/ m^3	= 62.04 Birr / m^3
Aggregate	= 0.775 m^3 * 100 Birr/ m^3	= 77.50 Birr/ m^3
Water	= 0.16 m^3 * 0.25 Birr / m^3	= 0.04 Birr/ m^3
	Total	**= 681.50 Birr/ m^3**

5.2.2.1 Rate Analysis

- Labour cost (LC)
- Assuming the crew consists of a site engineer, foreman, mason, and four daily laborers and a productivity of 0.50 m^3 per hr:
- Equipment Cost (EC)
- Assuming a mixer with an hourly rate of 20.00 Birr / Hr and productivity of 0.5 m3 per hour:

LC

Personnel	Salary per hr	Utilization Factor (UF)	LC/ hr
Site Engineer	= 4,000 Birr/ Month / (22 days * 8 hrs/day) = 22.73 Birr/hr	= 1/10 = 0.1 (Assuming 10 foreman under Site Engineer)	2.27
Foreman	= 60 Birr/Day * 1/8 Day/ hr = 7.50 Birr/ hr	= 1/4 = 0.25 (Assuming 4 crew under foreman)	1.88
Mason	= 45 Birr/Day * 1/8 Day/ hr = 5.63 Birr/ hr	= 1	5.63
Daily laborers(4)	= 4 * 20 Birr/Day * 1/8 Day/ hr = 10.00 Birr/ hr	= 1	10.00
Mixer Operator	= 32 Birr/Day * 1/8 Day/ hr = 4.00 Birr/ hr	= 1	4.00
Total LC (Birr/ hr) (i.e. 0.5 m^3)		**= 23.78**	
Total LC (Birr/m^3)		**= 23.78 Birr / hr / (0. 5 m^3 / hr) = 47.56**	

EC

Mixer	= 20 Birr/hr * 1/0.5 m^3/hr	= 40.00 Birr / m3
	Total EC	**= 40.00 Birr/ m3**

5.2.2.1 Rate Analysis

- DC = MC + LC +EC
- DC = 681.50 + 47.56 + 40.00 = 769. 06 Birr/m^3
- IC = 35/100 * 769.06 = 269.17 Birr/m^3
- *TC = (769.06 + 267.17) Birr/m^3 = 1,038.23 ≅ 1, 040.00 Birr/m^3*
- *C – 25 Concrete = 1, 040.00 Birr/ m^3*

5.3. Project Valuation

- Valuation is the art of determining present value of a property such as a building, a factory or other engineering structure.
- *It is determined or decided by its selling price.*
- The value of property depends on its structure, life, maintenance, location, etc.
- **Purpose of Valuation**
  - For rent valuation –It is generally 6% to 10% per annum of the value.
  - For buying or selling
  - For Security of loans or mortgage
  - Acquisition –government compensation
  - For Tax assessment

5.3. Project Valuation

- Important Definitions
- Market Value, Taxes, Scarp Value, Salvage Value, Book Value, Assessed Value, Obsolescence, Gross Income, Net Income, Annuity, Capital Cost, Capitalized Value, and Depreciation.

5.3. Project Valuation - Valuation of Building

- Valuations of a building depends upon, the type of building, its structure, shape, size, locality, the quality of material used, present day prices of the materials, and plinth area.
- Determined after knowing the contents of each item of work, specifications and physical condition of the building.
- It can also be calculated on its cost of construction at present day rate after deducting a suitable depreciation.

- Methods of valuation:

1. Rent Return Method: based on the net rent value, capitalized for the future life of the building.

5.3. Project Valuation

- **Valuation on land and building basis**: Land + Cost of Building
- **Valuation on profit basis**: Suitable for commercial buildings like hotels, cinemas, etc.
  - Net profit =After deducting all outgoings and interest of capital invested.
  - The net profit is multiplies by future life of the building.
- **Valuation on cost basis**: Actual cost incurred in construction – depreciation.
- **Development method of valuation**: underdeveloped or partly developed or require renovations by alteration.
- Anticipated future net income is renovated and multiplied with the future life of the property to get the value.
- **Depreciation method of valuation**: the property value is determined based on the book value for the year by deducting the deprecation.

- FINAL EXAM
- PART I – Conceptual
- PART II – Computational
  - Chapter 1 –
  - Chapter 2 –
  - Chapter 3 –
  - Chapter 4 –
  - Chapter 5 –
- Please give me your comments on the course delivery with weakness and strengthens.

END OF THE COURSE!

THANK YOU VERY MUCH!