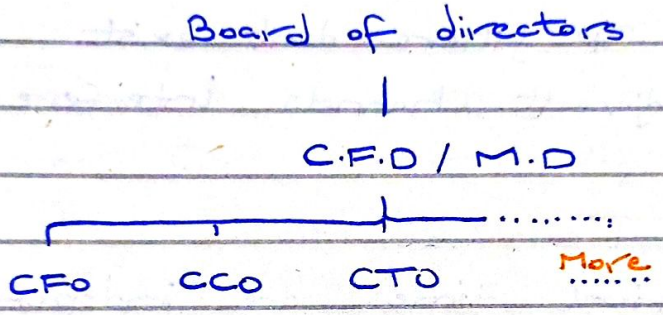
14/09/23

- **Engineering Project Management**

- Planning ~ 5 years
  Budget ~ Operational Plan ~ 1 year

- Organisation Structure



- Projects are necessary for organisations to grow
  - remain competitive
  - innovate

  } ↑ market share

- Line Organisation ~ Heirarchy
- Project Life Cycle
  - Conceptualization → Planning → Execution → Termination

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Engineering Project Management

- Read up on differences b/w :
  Functional organization &
  Projectized organization
  ↳ develop loyalty to project, not to functional manager

- Management Process

Input → Process → output
Process ↻ Tools

Stakeholder
└ whosoever is interested in the outcome of the process

- Groups
  - Initiating Process Group
  - Planning "
  - Executing "
  - Controlling / Monitoring "
  - Termination "

- Grapevine ⟶ informal communication channel

2/10/23

Engineering Project Management

WBS - Work Breakdown Structure

- Knowledge Areas
  - Scope
  - Time
  - Cost
  - Quality
  - HR
  - Communications
  - Procurement

  From slides — detailed

Just-in-Time

Expenses go up due to on-demand purchases but decrease evaporative (stealing/damaged) losses

refer ~o

Scope Management

- all work (products/processes) used to get the product to completion
  - c↑project

→ Audits
- Internal: head reports to the CEO
- External: CA firm audits external company to the stakeholders

→ Charter: Formally authorizes a project

e.g. Quran → Hadith ; Any hadith that contradicts Quran is to be rejected

Do the rest thoroughly from slides

- Scope ~ Project Charter
  - Requirements Collection 1
  - Scope Definition 2
  - WBS 3
  - Verification 4
  - Control 5

① :
- documented needs & expectations of stakeholders
- stakeholder register

② :
- project's deliverables & work required to create those deliverables
- also includes risks / assumptions and exclusions

③ :
- subdividing project deliverables into smaller & more manageable components
- defines the total scope of the project
- each element of WBS is identified by a unique ID ; chart of account

Dictionary : contains the description of WBS level and details regarding the activities in the work package.

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Engineering Project Management

Scope Baseline

- scope statement
- WBS
- WBS Dictionary

Verification vs. QC

- Verification → acceptance
- QC → correctness

↳ QC usually predates verification in order to generate validated deliverables

→ near completion
- pre-final inspection
- final inspection

outsource {procurement} contracted external vendors / businesses to accomplish goals of the project

2/10, n/30

↳ something related to discounts, read by yourself

- Trade Discount
- Cash Discount

FoB
- shipping
- destination

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Engineering Project Management

partnership ~ firm

Procurement Management

- processes to acquire {products, services, results}
  - from OUTSIDE the project team
  - involves contracts ~ legally binding

- earnest money ~ one that is deposited in advance (buyer → seller)
  - usually confiscated if buyer fails to meet contract demands
  - also has repurcussions on the seller's side

- plan ~ documentation; identifying sellers
- conduct
- administer
- close

expenditure
- revenue: minor purchases, within a year
- capital: collective purchase, with approvals, major

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Engineering Project Management

NTN ~ National → Tax Number
STN ~ Sale

- Tender Calls can be called off without legal repercussions

↳ Outsource ~ when in-house processes are busy, we outsource to external vendors

↳ Just-in-Time ~ on-demand delivery
+ agreements made in advance
+ incurred cost: of JIT itself
+ saved cost: on ~ obsolete product
  - risk
  - evaporative losses

↳ Procurement Management
+ selection criteria
+ SoW (*) ~ Slides
* scope baseline

↳ Conduct Procurements
+ pre-bid conference {before tender open actual bids}

+ tender, unlike placed orders, can be called off without penalties
  └ may result in {blacklistment}

Budgeting Techniques

- Accounting Rate of Return (ARR)
- Payback Period
- Discounted Payback Period
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Modified IRR
- PI
- NPV Profile Method

• Depreciation { Technical obsolescence ; passage of time
                 due to usage }
  └ tangible assets ; except for land

± ARR Sales : 100
       - Cost : 60 → (55 + 5) ← depreciation charge
       Profit : 40 → (45)
                  → cash flow

• Amortization { Depreciation in intangible assets }
  brand name, etc.

• Depletion { declining value of resources / reserves :
  depleted resources usually end up in inventory }

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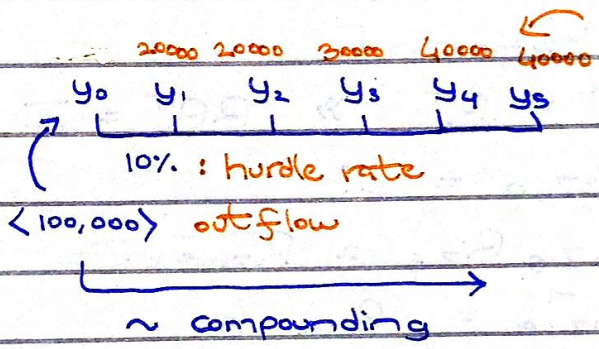
Depreciation Charge

$$= \frac{\text{Cost of asset} - \text{residual value}}{\text{Estimated life of asset}}$$

ARR { Crude method ; for non-professionals }



Net Present Value NPV

Absolute Measure

$\left[\frac{1}{1+i}\right]$

		pv factor	pv
y_0	<100,000>	1	
y_1	20000	0.90	18000
y_2	20000	0.83	16600
y_3	30000	:	→
y_4	40000	: so on	
y_5	40000		

Find sum of pv to get net value of inflow

if NPV is +ive ; $-\langle\cdots\rangle + \Sigma pv > 0$

undertake

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Profitability Index (PI)

relative measure

$$PI = \frac{\Sigma PV}{\langle \dots \rangle}$$

Payback Period

y_0	<100000>	
y_1	20000	80000
y_2	20000	60000
y_3	20000	40000
y_4	40000	0
y_5	40000	

4 years is the payback period

if say, we generated 50000 on y_4, then:

$\frac{40000}{50000} \times 100\%$

$0.8 \times 100\%$

3.8 years

Discounted Payback Period

incorporate discount factor [$1/(1+i) \dots$] into Payback Period

Refer to slides

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Engineering Project Management

Discounted Payback Period

→ discount rate, hurdle rate, WACC

y_0	10%	y_1	y_2	y_3
<70,000>		20000	35000	40000 ...
		1	1	1 x. pv factor
		18200	28900	30500

- $(1/(1+i)^n)$

⇒ Discounted payback period is always more than payback period

y_2 | 70000 − 18200 − 28900 = 22900

22900 / 30500 = 0.75

DPP ≙ 2.75 years or 2 year 9 months

NPV | Absolute Measure

<...> = 70000

Σpv = 77600

NPV = Σpv − <...> = 7600 > 0

→ choose NPV > 0 and max(NPV)

- Profitability & Liquidity:

	A	B		
Sales	100	50 / cash	50 / credit	
Cost	60	30 / ~	30 / ~	
Profit	40	20	20	Total: 40

Profitability Index | Relative Measure

$$PI = \frac{\Sigma PV}{\langle \dots \rangle} = 1.10 > 1 \quad [\text{can be undertaken}]$$

IRR (Internal Rate of Return)

- interpolation techniques
  - IRR should be higher than cost of doing business
- Interpolate between two rates that net you +ive and -ive NPVs

$$IRR = A + \left[\frac{X}{X-Y} (A(-1) + B \right]$$

- Capital / Hurdle Rate < IRR for profitable project

NPV Profile Method

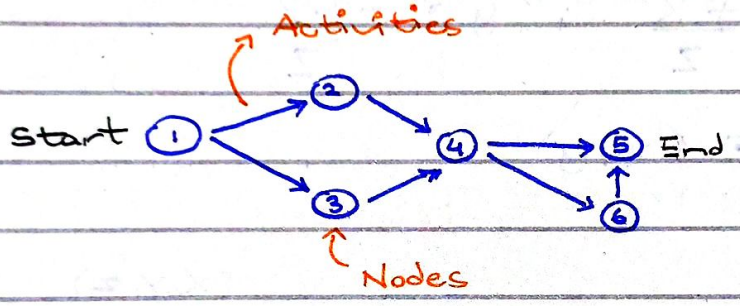
- intersection of profiles "crossover point" rate
- rest from slides ~ pretty easy

PERT CPM

- Project Evaluation Review Technique
- Critical Path Method

Arrows ≙ —▷ represent activities

Nodes ≙ O



critical path

longest -

Network Construction

~ precedence relation [from slides]

- dummy activities • do not incur/consume any resources but are essential in completing the project.

- just follow the slides
- a diagram always (left to right)

MCD
moms dance can

ily ♡ :3 ihy

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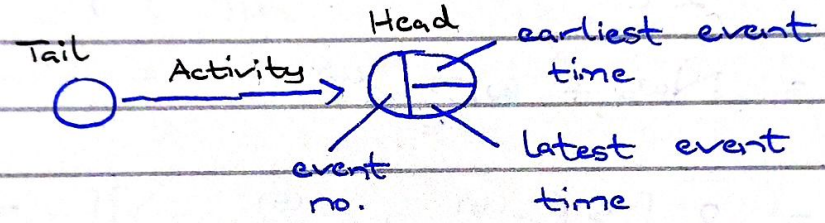
→ Project evaluation & review technique

PERT CPM ↔ very similar in nature but PERT involves probability

Net Work Diagram



└ No slack available on critical path time

buh, my mom said im spesHtul

→ For earliest time ;
└ move rightwards & take maximum values

sometimes I feel like im cool & othe times im cute (wtf ?)

→ For latest time ;
└ move leftwards & take minimum values

⇝ PERT
PDF (Discrete)
└ From slides

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Engineering Project Management

Critical Path

- Longest pathway through the network
- can revise project deadlines by modifying the critical path

Total Float

- Latest time (head) - earliest time (tail) - duration (of act.)

→ Costs & Budget

- value of work completed = total budget / act. × %age of work

- shortening of activities is called crashing

crash cost / unit time = $\frac{\text{crash cost} - \text{normal cost}}{\text{normal time} - \text{crash time}}$

- crashing increases cumulative costs

- Do PERT from slides { basic af } ez-check

4/12/23

Engineering Project Management

Gantt Chart ~ horizontal bar chart
{slides}

Project Cost Management
- Estimate Costs
- Determine budget
- Control costs

Budget
- Direct Cost
- Indirect Cost

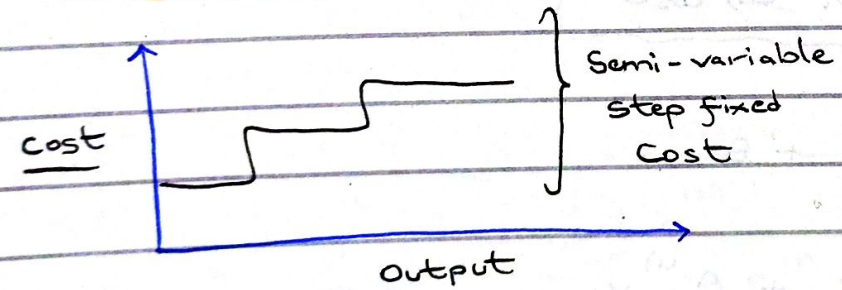
Sunk Cost | Irrelevant to the current project

Relevant Cost

Fixed Cost | in totality / per unit may vary

Variable Cost

"In the long run, all fixed costs are variable."



- Human Resources Management
- Project Quality Management

Entirely from slides; it ain't worth it