

PROJECT MANAGEMENT BRAIN STORMING TRAINING

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https://t.me/PMP_Ethiopia

Objectives of this brain storming presentation

To Request Ourselves the following Questions?

- Are we leading projects effectively & efficiently?
- Do we have performance targets? (Time?, Quality? Cost? Client Satisfaction?)
- Do we have good project management system?
- Are we clear on individual roles and tasks?
- Do we have planned time with Planned Budget (BCWS)?
- Do we have Annual Cash flow plan for OVID Construction?
- To give some hints cost management.
- To Explain basic project cost principles, concepts, and terms.
- Do we Have **OVID** Bench marks and standards?
- Do we know good performers of the project?
- Do we Attract and retain good performers by Evaluation Mechanisms?

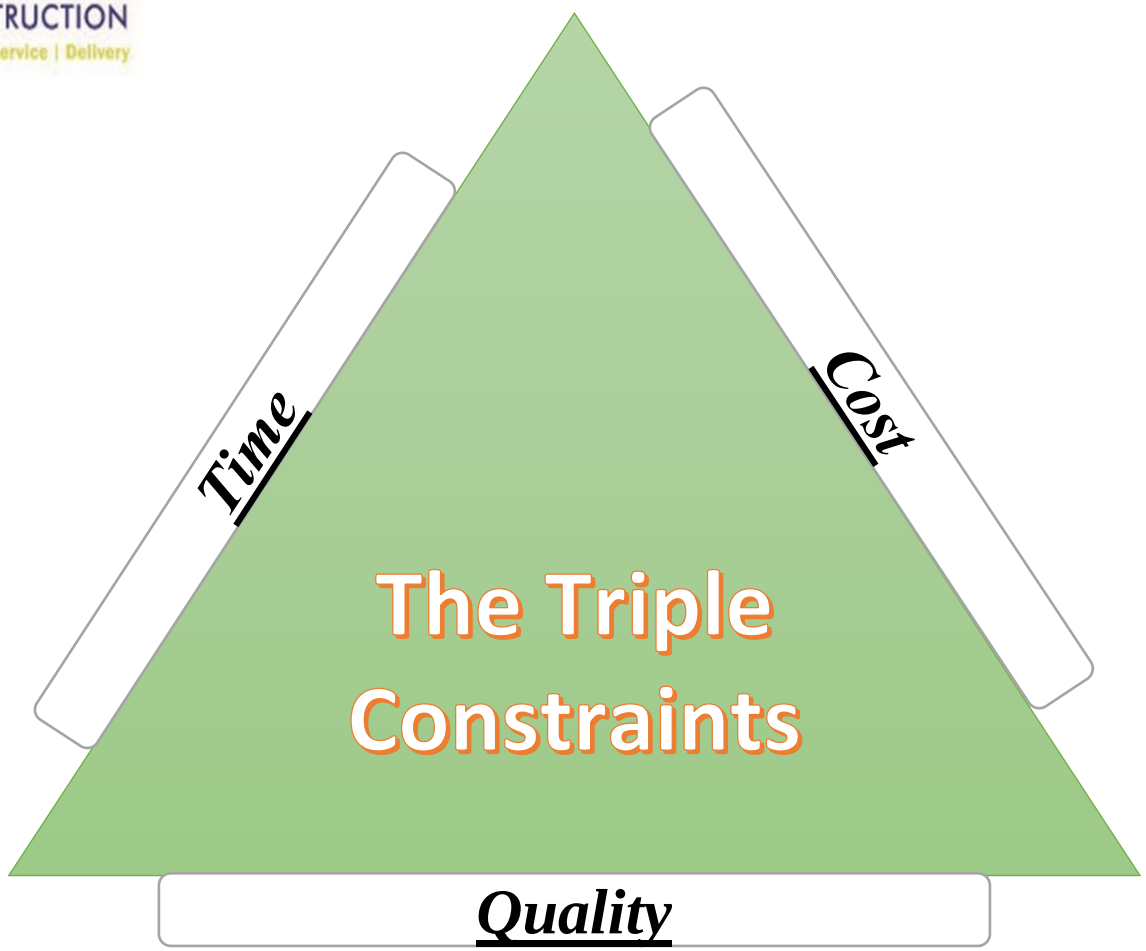
Expectations after this presentation

1. *Each project & Head office team shall trace each project's expense status in terms of EVA*
2. *Each project is expected to have the expense margin thresh hold of Material, Manpower and Equipment percentage in terms of income*
3. *Each project is expected to have its own fixed direct, indirect and over head cost*
4. *Each project is expected to control its own overhead cost*
5. *Each project is expected to have its own cash inflow and out flow plan and s- curve graph at the beginning of company fiscal year*
6. *Each project expected to register the assigned equipment available, Idle and Operational (OID) hours of the equipment.*
7. *Each project & Head office team is expected to evaluates equipment's availability, utilization, productivity and fuel consumption rate*
8. *Each project is expected to known and control the material wastage standard vs actual consumption*
9. *Each project and PME team is expected to evaluate its project with ISO format*
10. *Each project & PME team is expected to evaluate projects, project teams, PDs and pm with the KPI and PRP schemes*

Presentation Coverages

1. *Basics of Earned Value Management*
2. *Construction Cost Managements*
3. *Construction cash flow forecast*
4. *Construction Equipment Management*
5. *Performance Related Pay (PRP) Scheme*

- ***Key terms for the presentation Income, Expenses, BCWS (PV), BCWP (EV), ACWP (AV) , Cash outflow & Inflow,***
- ***Understand the <u>three Constraints</u>***
  - ***The three Constraints***
    - ***Time, Cost & Quality***
- ***Understand the <u>three resources</u>***
  - ***The three Resources***
    - ***Manpower; Material & Machinery***



Time

Time refers to any part of the project schedule, including the duration of individual tasks, milestones, and dead lines.

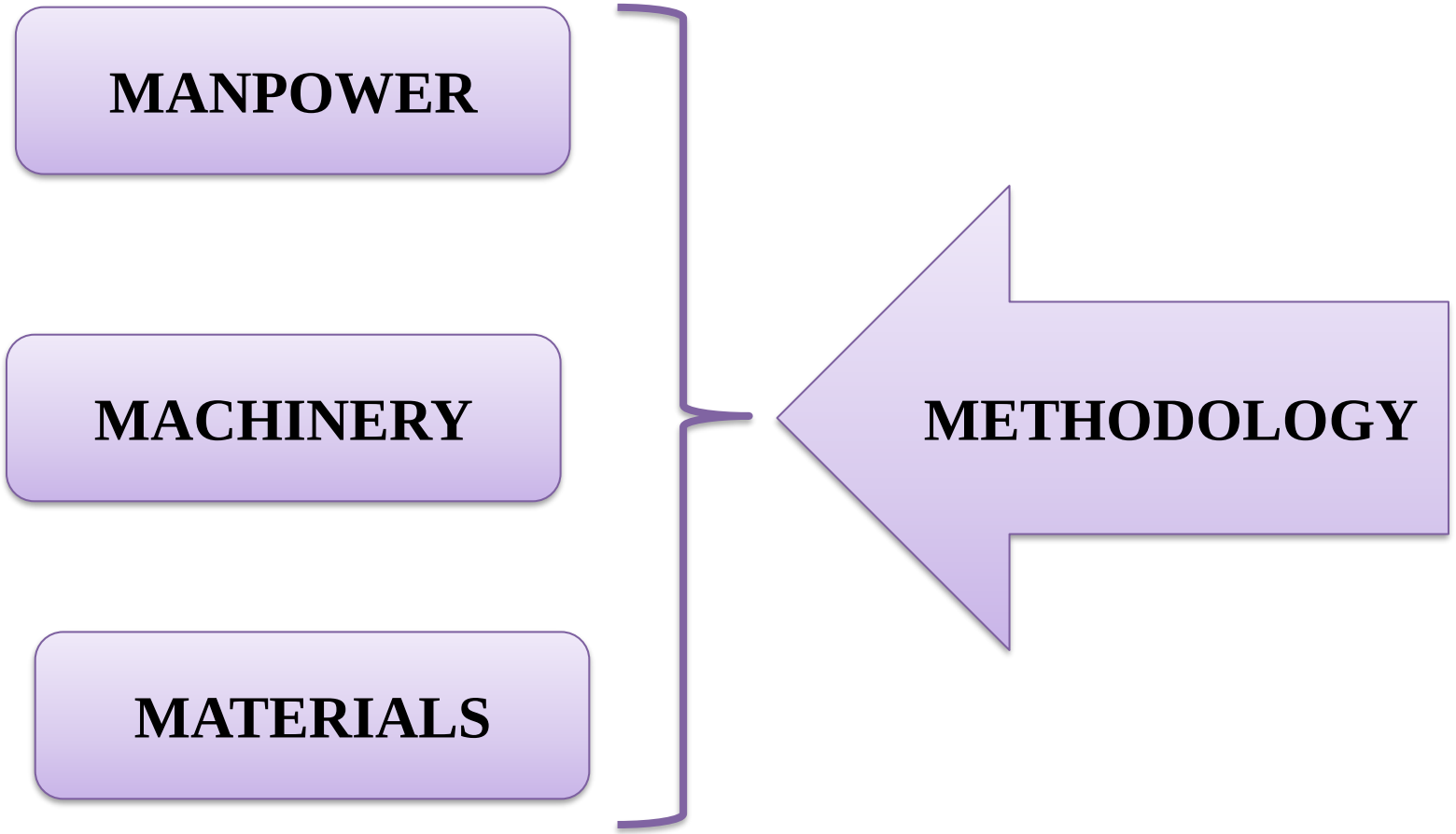
Cost

Cost or budget refers, to any or part of the project's materials, equipments, labors, Overhead costs and all external costs

Quality

Quality refers specifications, scope, standards or all the project is planned to achieve.

THE 4M'S



1. BASICS OF EARNED VALUE MANAGEMENT

Earned Value Analysis (EVA)

- ***It is a program management technique that uses "work in progress" to indicate what will happen to work in the future.***
- ***It is an enhancement over traditional accounting progress measures.***
- ***Traditional methods focus on planned accomplishment (expenditure) and actual costs.***
- ***This gives managers greater insight into potential risk areas.***
- ***With clearer picture, managers can create risk mitigation plans based on actual cost, schedule and technical progress of the work.***
- ***It is an "early warning" program/project management tool that enables managers to identify and control problems before they become impossible. It allows projects to be managed better – on time, on budget.***
- ***Earned Value Management System is not a specific system or tool set, but rather, a set of guidelines that guide a company's management control system.***

Earned Value Management (EVM)

What's Used for?

- Knowing where you are on ***schedule.***
- Knowing where you are on ***budget.***
- Knowing ***when*** can the work ***completed***.
- Knowing how much will the project ***deviate from budget and time.***
- Enable to take immediate correction measures before severe deviation from normal situation.

EVM can provide answers to the following questions:

- ***How much have we spent?***
- ***How much did we get for our money?***
- ***How much more will be have to spend to complete the tasks we wanted to accomplish?***
- ***How much longer will it take?***
- ***How efficiently is the work being done?***
- ***What has happened? (Why are we off schedule/cost?)***
- ***What is happening? (What are the impacts?)***
- ***What is going to happen? (What are we doing to fix it?)***

Five Basic Performance Data

- *BCWS* – *Budgeted Cost of Works Scheduled* – the baseline for the analysis, cumulated planned costs related to time of their incurrence; it is also called planned Value (PV)
- *BCWP* – *Budgeted Cost of Work Performed* – a measure of physical progress of works expressed by cumulated planned cost of works actually done related to time, it is also called Earned Value (EV)
- *ACWP* – *Actual Cost of Work Performed* – cumulated amount payable for works done related to time;
- *BAC* – *Budget at Completion* – total planned cost of the whole project, it equals *BCWS* at the planned finish;
- *EAC* – *Estimate at Completion* – is calculated at the date of reporting progress to serve as an estimate of the effect of deviations cumulated from the project's start on the total project cost.

Formulas

Cost Performance Index (CPI) ***measure of cost efficiency***

$$\text{CPI} = \frac{\text{Value of Work Completed}}{\text{Cost of Work Completed}} = \frac{\text{(BCWP)}}{\text{(ACWP)}}$$

Schedule Performance Index (SPI) ***measure of schedule efficiency***

$$\text{SPI} = \frac{\text{Value of Work Completed}}{\text{Value of Work Planned}} = \frac{\text{(BCWP)}}{\text{(BCWS)}}$$

- **Closer to "1" is the better**
- **Less than 1 = overrun (CPI); behind schedule (SPI)**
- **Greater than 1 = underrun (CPI); ahead of schedule (SPI)**

Variance at Completion (VAC)

B AC = BCWS

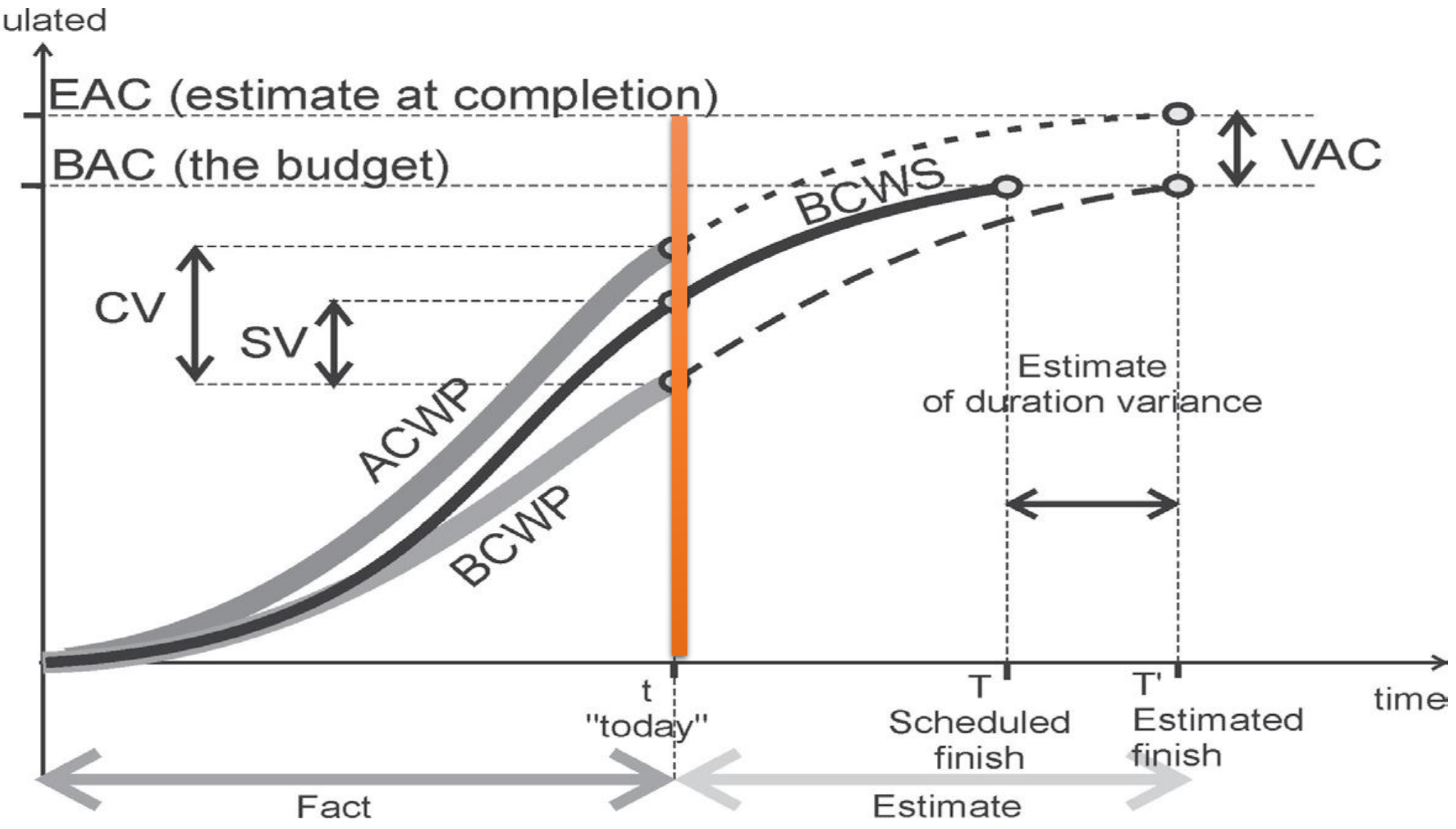
E AC = ACWP+ Budgeted Cost for remaining work

B AC **what the total job is supposed to cost**

E AC **what the total job is expected to cost**

VARIANCE AT COMPLETION is the difference between what the total job is supposed to cost and what the total job is now expected to cost.

VAC = BAC - EAC



schedule variance = BCWP - BCWS = negative number
cost variance = BCWP - ACWP = negative number

behind schedule, over cost

Earned Value Analysis (EVA) Sample Report Hossana Project

Earned value analysis by Project(Project Performance)											
Project	Budget	Actual(AC)	PV(BCWS)	EV (BCWP)	SPI (EV/PV)	CPI (EV/AC)	EAC (Budget/CPI)	Schedule Performance		Cost Performance	
Hossana Grain Sto	725,379,732	900,568,786	74,447,820	51,665,711	0.69	0.06	12,643,866,353	Behind Schedule		Over Planned Cost	
Grand Total	725,379,732	900,568,786	74,447,820	51,665,711	0.69	0.06	12,643,866,353	Behind Schedule		Over Planned Cost	
Risk and Issues (under develpoment)											

2. CONSTRUCTION COST MANAGEMENT

2. Construction Cost Managements

Types of Costs in Construction:-

Why we know them?

- *To control the cost of Overhead costs (keep in margin)*
- *To control material wastage (keep not exceed the standard)*
- *To keep the profit margin*
- *To have experience on next new project*
- *To have company standards*
- *To control uncertainties (Risks)*
- *To take remedial actions if we are going to face Risk of lost*
- *To change work methodologies*

Construction Cost Managements

Types of Costs in Construction:-

Construction Cost Components are Categorized in two two: DIRECT COSTS & INDIRECT COSTS

- ***DIRECT COSTS/Variable Costs/–*** *Direct construction costs are all costs that can be specifically booked with an activity in a project. These Includes:* ***Direct material costs; Direct labor costs ; Direct equipment costs; Subcontract costs***
- ***INDIRECT COSTS/Fixed Costs/ –*** *Indirect construction costs are all costs, which cannot be directly booked under a specific activity. Also called* ***overhead costs****, include* ***head office and site overhead costs.***

Construction Cost Managements

What are the project Cost Components?

Project Cost Components			
	Project Cost Components	**Direct Cost**	**Indirect Costs**
1	**Manpower Costs** 15% - 20% OVID = 18.0%	All cost of Labors directly involved in activities of work (Cost of Sales) Example:- All Payments made for the following staffs are all Direct Labour Costs (Cost of Sales) 1 Mason with Dl 2 Carpentors with Dl 3 barbenders with Dl 4 piece rate (sub Contractors)expenses 5 Equipment operators 6 Dump Truck drivers, 7 Heavy duty equipment operators,	All Cost of labors which is not directly involved in Activities (Expenses). Example:- All Payments made for the following staffs are all Idirect Labour Costs (expenses) 1 Human Resources Administration Employees 2 Procurments & supply employees 3 Finance employees 4 General servicees employees 5 Office engineering teams 6 time keepeersand gange chiefs (Kabo) 7 Project managers staffs 8 Service vehicle drivers 9 equipments admin & Garage Workers

Construction Cost Managements

What are the project Cost Components?

Project Cost Components			
	Project Cost Components	**Direct Cost**	**Indirect Costs**
2	**Equipment Costs**	All expenses of equipment directly involved in activities of work (Cost of Sales)	All expenses of equipment which is not directly involved in Activities (Expenses).
	5% - 10% OVID = 7.5%	Example:- All Payments made for the following equipments are Direct equipment costs (Cost of Sales) which are working directly at payable item of works 1 Heavy duty equipment like Dozer, excavator, grader, loader, roller etc 2 cranes, concrete pumps etc 3 Mixer trucks, water trucks, concrete vibrators etc 4	Example:- All Payments made for the following equipments are Indirect equipment costs (expenses) which are not deployed directly at payable item of works 1 Any equipments assigned to non payable activities 2 Service buses, vehicles, fuel trucks 3 All logistics transports 4 equipment used for access road construction

Construction Cost Managements

What are the project Cost Components?

Project Cost Components			
	Project Cost Components	Direct Cost	Indirect Costs
3	Material Costs	All material expenses which are directly changed to activities for paying back (Cost of Sales) Example:- All Payments made for the following equipments are Direct equipment costs (Cost of Sales) which are working directly at payable item of works	All material expenses which are not directly changed to activities for paying back (Cost of Sales) Example:- All Payments made for the following equipments are Indirect equipment costs (expenses) which are not deployed directly at payable item of works
	45% - 60%	1 Cement, rebar, plywood, purlin, ecualypptose etc 2 Scaffolding, nails, tying wires etc 3 water proofing materials, concrete pipes etc 4 Sanitory & electrical materials & fixtures 5 Finishing materials, 6 Aggregate, sand, admixtures, etc 7 sub base, base course, Bitumene tc	1 stationery materials 2 Cleaning & sanitation materials 3 Camp facilities materials 4 materials for access road construction 5 materials for site camp construction 6 materials for site office construction 7
	OVID = 47.0%		

Construction Cost Managements

What are the project Cost Components?

Project Cost Components			
	Project Cost Components	Direct Cost	Indirect Costs
4	Mislaneous Expense < 2%		All others expenses which are not mentioned above 1 Mobilization and demobilization costs; 2 Tender Expenses; 3 Expertise service costs; 4 phone communications expenses 5 Office running expenses

Total Indirect Cost = 10% - 15%

OVID = 8.5%

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Direct Cost and Indirect Cost

CLASSIFICATION OF COSTS

DIRECT COSTS	INDIRECT COSTS
EXPENSES THAT DIRECTLY RELATED WITH PRODUCTION	GENERAL EXPENSES, BUSINESS EXPENSES, RUNNING COSTS
ALSO CALLED AS VARIABLE COSTS	ALSO CALLED AS FIXED COSTS
DIRECT MATERIAL DIRECT LABOR DIRECT WAGES	RENT OFFICE EXPENSES INDIRECT WAGES

Brain storming Questions

You are managing a three years project. Your CPI=0.91 and SPI=1.15. That means you are earning 0.91 birr for every 1.0 ETB spent. While your are ahead of schedule by 15%. As a result you are held a meeting with the project team to resolve the budget over run. Who of the following would best address the budget over run issue?

A. ***Construction Engineer*** *recommends that fast tracking option; thus lowering the cost*
B. ***Office Engineer*** *Recommends that since most of the complex technical work has been completed, he suggested that the most experienced resources could be swapped out for less experienced resources, thus lowering costs*
C. ***Deputy Project manager*** *recommends that negotiate with the stake holders to reduce scope, thus lowering the costs.*
D. ***HR office*** *recommends that firing out of some daily laborers, thus lowering the costs.*

B – Swapping out expensive resources for less expensive resources would most directly impact your budget and is the simplest thing to do, especially if there is no technical impact on the project. Fast tracking may not reduce your costs, but they reduce schedule.

3. CONSTRUCTION CASH FLOW FORECAST

PREPARED & PRESENTED BY – ASMARE WALLE (Eng.)- PPECM/1563

3. CONSTRUCTION CASH FLOW

- *"Cash flow" refers to a contractor's income and outgo of cash.*
- *Cash flow forecasting is required to determine whether or not the funds to execute the plan are available. And to* ***know the Contractors*** *sources of Financing*
- *Cash flow forecasting is the forecasting of both cash in and cash out of the project.*
- *The cash shortage on the project must be made up form the contractor's working capital, or money must be borrowed to provide the necessary operating funds.*
- ***The difference between Expenses and revenue makes it necessary for the contractor to obtain temporary financing***
- ***Usually a bank extends a line of credit against which the contractor can buy materials, make payments and pay other expenses while waiting for reimbursement from owner***

3. CONSTRUCTION CASH FLOW

PURPOSE OF A CASH FLOW FORECAST

- ***Enables Executives to make key decisions in relation to setting business targets eg strategic planning***
- ***Shows management when the money is needed and how much managers can make decisions to ensure availability of funds***
- ***Preparation of cash flow forecast should support lending decisions when applying for a loan***

3. CONSTRUCTION CASH FLOW

CASH FLOW FORECAST - BENEFITS

- *Lease instead of outright purchase of non-current assets eg buildings, equipment*
- *Delaying the purchase of non-current assets eg Buildings, equipment, vehicles*
- *Shortening the average trade receivables collection period*
- *Reduce Inventory Levels thus reduce cash tied up in this type of asset*
- *Negotiation with suppliers to extend trade payables*
- *To arrange other financial sources, Sale of assets, other sources of income stated*

3. CONSTRUCTION CASH FLOW

CASH FLOW FORECAST - BENEFITS

- *Facilitates improved planning and control of business activities – eg payment dates for expenses are known*
- *Enables managers to forecast future cash flows more accurately – eg deficits can be avoided by postponing certain payments*
- *Allows managers to anticipate 'peaks' and 'troughs' in the cash cycle and take corrective action – surpluses can be re-invested to generate additional income*
- *Assists co-ordination between Partners – eg agreement of an investment/project start date*

3. CONSTRUCTION CASH FLOW

CASH FLOW FORECAST - LIMITATIONS

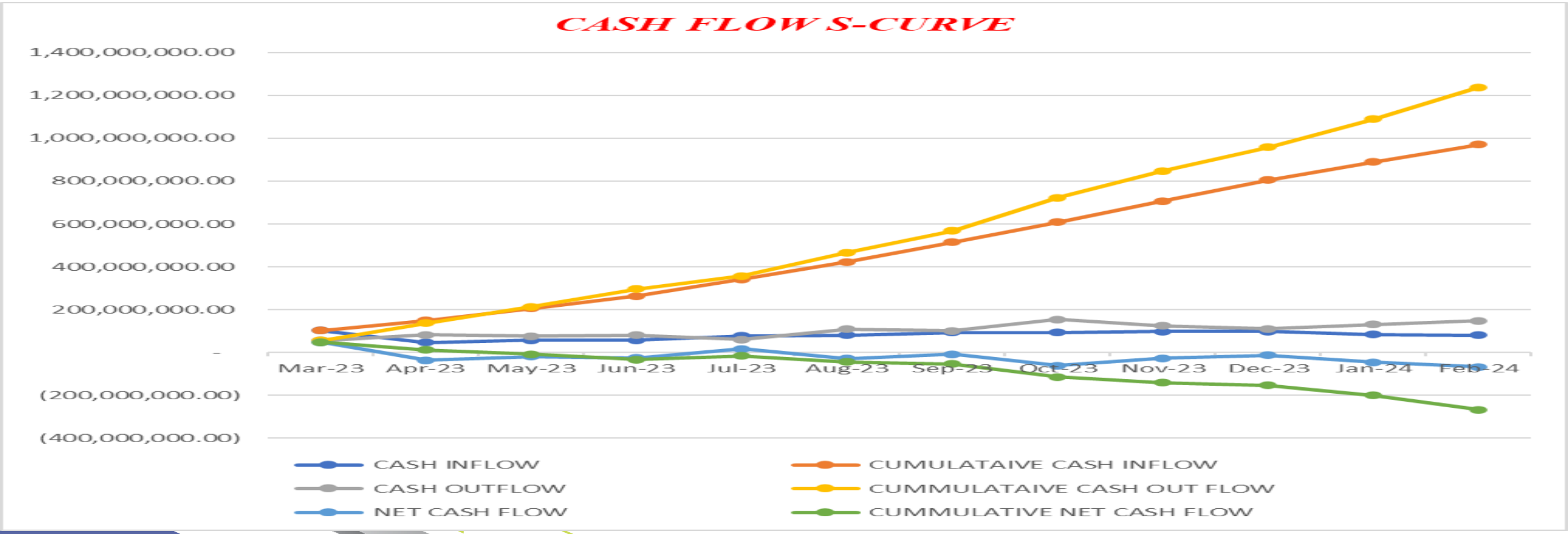
- *Cash flow estimates and may not be entirely accurate – a cash deficit may occur if costs are underestimated*
- *Cash Flow Forecasts are subject to inaccuracies as the data may change due to a number of external factors which are beyond the control of business managers, including: changes in economic conditions, changes in interest rates, seasonal fluctuations and global events*
- *Forecasts only consider cash payments and receipts only – ignores non-cash expenses which reduces profits*

CASH FLOW (INFLOW & OUTFLOW)

	OVID Construction PLC					Document No:								
	EFY 2014: Profit/Loss of New Proffessional Theater Project					Issue No:								
						Issue date:								
		2023										2,024.00		
S. No	Items	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Total
1	**Revenue:**													
1.1	Construction Revenue/Income	23,193,140.40	34,542,155.17	40,271,949.04	36,718,474.69	60,030,637.39	50,631,753.93	67,609,816.93	59,351,937.29	68,437,763.98	64,085,302.39	52,778,768.26	54,513,501.70	612,165,201.18
1.2	Price Escalation	79,538,558.72	11,596,570.20	17,271,077.59	20,135,974.52	18,359,237.35	30,015,318.70	25,315,876.97	33,804,908.47	29,675,968.65	34,218,881.99	32,042,651.20	26,389,384.13	358,364,408.46
1.3	Other Income													-
	Total Revenue/Income	**102,731,699.12**	**46,138,725.37**	**57,543,026.63**	**56,854,449.21**	**78,389,874.74**	**80,647,072.63**	**92,925,693.90**	**93,156,845.76**	**98,113,732.63**	**98,304,184.38**	**84,821,419.46**	**80,902,885.83**	970,529,609.64
2	**Direct Project Cost**													-
2.1	**Construction Materials**	33,254,752.66	60,931,495.29	53,821,564.15	52,339,310.13	45,552,933.34	96,661,768.84	45,815,908.61	64,677,837.96	25,729,417.13	16,869,319.34	3,693,189.53	2,867,329.99	502,214,826.98
	Subtotal: Construction Materials	**33,254,752.66**	**60,931,495.29**	**53,821,564.15**	**52,339,310.13**	**45,552,933.34**	**96,661,768.84**	**45,815,908.61**	**64,677,837.96**	**25,729,417.13**	**16,869,319.34**	**3,693,189.53**	**2,867,329.99**	502,214,826.98
2.2	**Direct Labour**													-
2.2.1		**578,933.33**	**578,933.33**	**578,933.33**	**578,933.33**	**611,433.33**	**552,933.33**	**491,833.33**	**491,833.33**	**491,833.33**	**394,333.33**	**394,333.33**	**394,333.33**	6,138,600.00
2.2.2														-
	Subtotal: Direct Labour	**578,933.33**	**578,933.33**	**578,933.33**	**578,933.33**	**611,433.33**	**552,933.33**	**491,833.33**	**491,833.33**	**491,833.33**	**394,333.33**	**394,333.33**	**394,333.33**	6,138,600.00
2.3	**Subcontractor**													-
2.3.1	Supply & Fix	5,205,825.00	6,371,082.32	4,793,306.97	5,858,976.02	6,889,523.27	3,643,213.93	50,145,331.78	84,497,503.51	93,817,444.14	86,079,377.18	122,338,714.14	139,529,514.73	609,169,812.98
2.3.2	Labour Only	6,281,124.87	8,827,616.94	6,659,728.07	6,568,154.48	3,256,579.42	4,006,519.95	100,048.33	77,072.94	29,596.27	-		234,231.78	36,040,673.03
	Subtotal: Subcontractor	**11,486,949.87**	**15,198,699.26**	**11,453,035.04**	**12,427,130.49**	**10,146,102.69**	**7,649,733.88**	**50,245,380.11**	**84,574,576.45**	**93,847,040.41**	**86,079,377.18**	**122,338,714.14**	**139,763,746.51**	645,210,486.01
2.4	**Construction Equipment and Machinary**													-
2.4.1		2,497,872.00	2,652,416.00	2,652,416.00	2,506,816.00	1,990,976.00	1,990,976.00	1,990,976.00	1,637,376.00	1,637,376.00	1,637,376.00	1,533,376.00	1,533,376.00	24,261,328.00
2.4.2														-
	Subtotal: Construction Equipment and Machinary	**2,497,872.00**	**2,652,416.00**	**2,652,416.00**	**2,506,816.00**	**1,990,976.00**	**1,990,976.00**	**1,990,976.00**	**1,637,376.00**	**1,637,376.00**	**1,637,376.00**	**1,533,376.00**	**1,533,376.00**	24,261,328.00
2.5	Transportation cost													-
2.6	Fuel, Oil, Lubricants & sparepart	499,574.40	530,483.20	530,483.20	501,363.20	398,195.20	398,195.20	398,195.20	327,475.20	327,475.20	327,475.20	306,675.20	306,675.20	4,852,265.60
	Total: Direct Cost	**48,318,082.26**	**79,892,027.08**	**69,036,431.72**	**68,353,553.16**	**58,699,640.56**	**107,253,607.25**	**98,942,293.25**	**151,709,098.94**	**122,033,142.07**	**105,307,881.06**	**128,266,288.20**	**144,865,461.03**	1,182,677,506.59
3	**Indirect Project Cost**													-
3.1	Indirect Materials - Mobilization Budget													-
3.2	Indirect machineries													-
3.3	Project overhead	6,950,275.84	2,187,524.80	7,695,159.66	13,210,287.02	2,367,344.80	2,434,777.30	2,569,642.30	2,637,074.80	2,637,074.80	5,861,193.44	2,637,074.80	3,110,600.80	54,298,030.37
	Total: Indirect Project Cost	**6,950,275.84**	**2,187,524.80**	**7,695,159.66**	**13,210,287.02**	**2,367,344.80**	**2,434,777.30**	**2,569,642.30**	**2,637,074.80**	**2,637,074.80**	**5,861,193.44**	**2,637,074.80**	**3,110,600.80**	54,298,030.37
	Total: Project Cost	**55,268,358.10**	**82,079,551.88**	**76,731,591.38**	**81,563,840.18**	**61,066,985.36**	**109,688,384.55**	**101,511,935.55**	**154,346,173.74**	**124,670,216.87**	**111,169,074.50**	**130,903,363.00**	**147,976,061.83**	1,236,975,536.96
	Gross Profit	**47,463,341.02**	**(35,940,826.51)**	**(19,188,564.75)**	**(24,709,390.97)**	**17,322,889.38**	**(29,041,311.92)**	**(8,586,241.66)**	**(61,189,327.99)**	**(26,556,484.25)**	**(12,864,890.12)**	**(46,081,943.55)**	**(67,073,176.00)**	**(266,445,927.32)**
	Direct Project Cost/Total Revenue	***47.03%***	***173.16%***	***119.97%***	***120.23%***	***74.88%***	***132.99%***	***106.47%***	***162.85%***	***124.38%***	***107.12%***	***151.22%***	***179.06%***	***121.86%***
	Indirect Project Cost/Total Revenue	***6.77%***	***4.74%***	***13.37%***	***23.24%***	***3.02%***	***3.02%***	***2.77%***	***2.83%***	***2.69%***	***5.96%***	***3.11%***	***3.84%***	***5.59%***
	Total Project Cost/Total Revenue	***0.54***	***1.78***	***1.33***	***1.43***	***0.78***	***1.36***	***1.09***	***1.66***	***1.27***	***1.13***	***1.54***	***1.83***	***1.27***
	Gross Profit/Total Revenue	***0.46***	***(0.78)***	***(0.33)***	***(0.43)***	***0.22***	***(0.36)***	***(0.09)***	***(0.66)***	***(0.27)***	***(0.13)***	***(0.54)***	***(0.83)***	***(0.27)***

3. CONSTRUCTION CASH FLOW

	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24
CASH INFLOW	102,731,699.12	46,138,725.37	57,543,026.63	56,854,449.21	78,389,874.74	80,647,072.63	92,925,693.90	93,156,845.76	98,113,732.63	98,304,184.38	84,821,419.46	80,902,885.83
CUMULATAIVE CASH INFLOW	102,731,699.12	148,870,424.49	206,413,451.11	263,267,900.33	341,657,775.07	422,304,847.70	515,230,541.59	608,387,387.35	706,501,119.97	804,805,304.35	889,626,723.81	970,529,609.64
CASH OUTFLOW	55,268,358.10	82,079,551.88	76,731,591.38	81,563,840.18	61,066,985.36	109,688,384.55	101,511,935.55	154,346,173.74	124,670,216.87	111,169,074.50	130,903,363.00	147,976,061.83
CUMMULATAIVE CASH OUT FLOW	55,268,358.10	137,347,909.98	214,079,501.36	295,643,341.54	356,710,326.91	466,398,711.45	567,910,647.00	722,256,820.74	846,927,037.62	958,096,112.12	1,088,999,475.12	1,236,975,536.96
NET CASH FLOW	47,463,341.02	(35,940,826.51)	(19,188,564.75)	(24,709,390.97)	17,322,889.38	(29,041,311.92)	(8,586,241.66)	(61,189,327.99)	(26,556,484.25)	(12,864,890.12)	(46,081,943.55)	(67,073,176.00)
CUMMULATIVE NET CASH FLOW	47,463,341.02	11,522,514.51	(7,666,050.25)	(32,375,441.21)	(15,052,551.84)	(44,093,863.76)	(52,680,105.41)	(113,869,433.40)	(140,425,917.65)	(153,290,807.77)	(199,372,751.32)	(266,445,927.32)



4. CONSTRUCTION EQUIPMENT MANAGEMENT

PREPARED & PRESENTED BY – ASMARE WALLE (Eng.)- PPECM/1563

Equipment Management

In any construction Projects equipment management is very sensitive and needs high attention. The followings are main areas to be controlled.

1. ***Hours registration***
2. ***Fuel Consumption***
3. ***Efficiency controlling***
4. ***Output controlling***
5. ***Data collection***

Equipment Management

1. Working hour registration controlling

There are 3 types of equipment hour recording mechanisms.

a. ***Engine Hours (EH)-*** **started to be recorded when the machine's engine just turned on and ends when the engine turns off.**

this is used for:

- ***To control the working hours of the machine***
- ***To know the machine's fuel consumption***

b. ***Working Hours (WH) –*** **started to be recorded when the machine just started to execute the work and ends when the working time is completed. Which is recorded by hand watch.**

this is used for:

- ✓ ***To know the machine's normal working hours (available Hours)***
- ✓ ***To control the working hours of the machine***
- ✓ ***To prepare payment if the machine***
- ✓ ***To know the normal productivity of the machine***

c. **Contact Hours (CH)– started to be recorded when the machine is just started to execute the work and ends when the work is stopped to be executed.**

this is used for:

- ✓ ***To measure maximum productivity***
- ✓ ***To control the time sheet***

In General :- CH < WH < EH

Equipment Management

2. Fuel Controlling

Fuel is a liquid cash for any construction company. Therefore OVID has a serious concern on fuel consumption rate of any equipment. Therefore each project should have a daily fuel recording mechanisms.

Gross consumption Control

Total Previously consumed Qty	This period total consumed Qty	To date total consumed Qty (2)
	To date Balance	= (1)-(2)

Heavy duty trucks and Light vehicles Fuel Consumption Record

S.No.	Date	Km Reading (km)	Fuel Taken (liter)	Fuel Consumption rate (liter/km)	Remark
1					
2					
.					
.					
.					
30					
31					

Equipment Management

EQUIPMENT MONTHLY FUEL CONSUMPTION SUMMARY FORM - OC-EOM-F-037

It. No	Equipment Provider, Lessor	Equipment			Hours/ Km Worked during the Month A	Unit	Actual Production Achieved B	Fuel Consumed In month Lit C	Oil Consumed Lit D	Fuel Consumed Rate C/A
		Make	Model	Plate/ Serial No						
SUM										

Equipment Management

2. Fuel Controlling

Fuel consumption of Machines, trucks and vehicles should be controlled by:

- ✓ **Time sheet hours vs fuel taken (machine)**
- ✓ **Km traveled vs fuel Taken (trucks & vehicles)**
- ✓ **Fuel consumption vs standard**
- ✓ **Output produced by working hours vs fuel consumption**
- ✓ **Efficiencies (availability & utilization)**

Equipment Management

2. Fuel Consumption

The standard fuel consumption rate of any equipment at any working condition is limited to the following range.

S. No.	Type of Equipment	Fuel Consumption standard	
1	Dozer	= 35 - 40	liter/hour
2	Excavator with Breaker	= 20 - 25	liter/hour
3	Excavator with Bucket	= 25 - 30	liter/hour
4	Grader	= 15 - 20	liter/hour
5	Loader	= 10 - 15	liter/hour
6	Roller	= 8 - 10	liter/hour
7	Dump Truck	= 1.5 - 2.0	km/liter
8	Water Truck	= 1.5 - 2.1	km/liter
9	Light Vehicle (New)	= 8 - 10	km/liter
10	Light Vehicle (Old)	= 6 - 8	km/liter

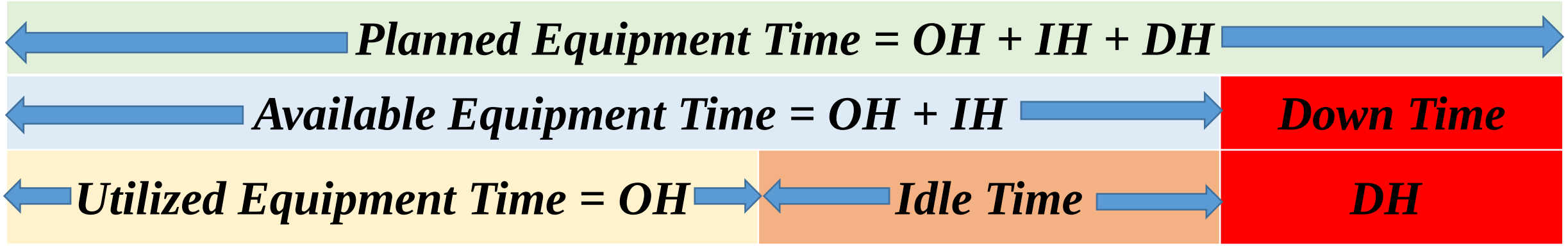
Equipment Efficiencies

Construction equipment has three types of ***equipment hours***.

Planned hours (PH): - which is usually 8 hours per day but can be extended as it is needed

Available hours (AH): - which is less than 8 hours due to equipment down ness (which used to evaluate equipment maintenance crew)

Utilized hours (UH): - hours utilized directly for the work. (Which is working hours recorded by hand watch and used to evaluate the equipment utilization efficiency). Which is used to evaluate the technical crew (Engineers and Foremen)



EAE = Available Equipment Time divided by Planned Equipment time Or

EUE = Actual Utilized equipment Time divided by Planned Available Equipment Time

EOE = Actual Utilized Equipment time divided by Planned Equipment Time or EOE = EA * EU

EAE = Equipment Availability efficiency

EUE = Equipment Utilization Efficiency

EOE = Equipment Overall Efficiency

OH- Operational Hours

IH = Idle Hours

DH = Down Hours

Equipment Management

MONTHLY EQUIPMENT UTILIZATION REPORT FORM OC-EOM-F-011

It. No	Equipment Provider, Lessor	Equipment			Work Description	Available (time) Hours A	Utilized Hours B	Equipment Utilization % B/A	Remark
		Make	Model	Plate/ Serial No					
SUM									

Equipment Management

Example

Availability, Utilization and Overall efficiency Calculation Format (Sample)

S.No.	Plate Number	Equipment Type	Hours			Efficiency			
			Planned Hours =(OH+IH+DH) (A)	Available Hours =(OH+IH) (B)	Utilized Hours =(OH) (C)	Availability Efficiency =(OH+ID)/(OH+IH+DH) (D) = B/A	Utilization Efficiency =OH/(OH+IH) (E) =C/B	Overall Efficiency (F) = C/A	Overall Efficiency (F) = D*E
1	0156	Dozer	300	280	260	93%	93%	87%	87%
2	5676	Grader	300	200	195	67%	98%	65%	65%
3	7688	Loader	300	198	190	66%	96%	63%	63%
4	7515	Roller	300	150	140	50%	93%	47%	47%
5	5555	Excavator	300	234	230	78%	98%	77%	77%
6	3-33333	Water Truck	300	150	140	50%	93%	47%	47%
7	3-44444	dump Truck	300	300	250	100%	83%	83%	83%
8	-	Crusher	300	301	250	100%	83%	83%	83%
9	-	Batching Plant	300	160	150	53%	94%	50%	50%
10	-	Asphalt Plant	300	150	145	50%	97%	48%	48%
Total			**3000**	**2143**	**1970**	71%	92%	66%	66%

Equipment Management

4. Output Recording vs cost

Each equipment's performance should be recorded daily.

- Recorded Available hours
- Quantity of work performed
- Hourly equipment rental cost

These three should also synchronized with the fuel taken by the equipment

- Performance calculation = Quantity of work performed divided by Available hour
- Cost of performed work = (fuel cost + rental cost + operator cost)/quantity of work performed

Equipment type	Previous performance	This Period Performance	Average performance

Equipment Management

Example -

EQUIPMENT MONTHLY RENTAL PROFITABILITY REPORT FORM OC-EOM-F-039

It. No	*Description*	*Unit*	*Budget for the Month*	*Actual For the Month*	*Variance*	*Reason for Variance*
	Rental Revenue					
	Cost Recognized					
	Gross profit					
	Direct Expense					
	Profit					

Equipment Management

5. Data collection System

- **All the above data should be recorded by qualified and professionals workers.**
  - ✓ **civil engineers,**
  - ✓ **construction management graduate,**
  - ✓ **TVET graduate in the field of construction etc.**

What is the use of proper Data collection system

Type of equipment	Qty	Rental Rate	Wasted time per day (Hour)	working day per month	losing money per month	10x	
Dozer	1	3000	1	30	90,000.00		
Excavator	1	1600	1	30	48,000.00		
Loader	1	800	1	30	24,000.00		
Roller	1	750	1	30	22,500.00		
Total					**184,500.00**	**1,845,500.00**	

If we have five machines in each type we will lose ETB 184,500.00 per month at one project

- **this is a monthly salary of 10 civil engineers (18,450.00 Birr per month)**
- **if those machines at 10 projects we will lose ETB 1,845,500.00 per month**
- **if those machines stay for 4 months we will lose ETB 7,380,000.00 per month**

5. PERFORMANCE RELATED PAY (PRP) SCHEME

1. What is PRP?

Performance Related Pay (PRP) - is a ***monetary payment (award)*** based on the performance of the *targeted work in* ***addition to basic salary***, ***and as a function of targeted performance***, ***expected expense, monthly project evaluation, and equipment efficiencies***.

PRP = Function of (salary, expense, performance target, equipment's' efficiencies)

Considerations ;- ***Projects should be evaluated not only based on monthly income vs plan, but also should be evaluated by how much cost such monthly income is performed vs Expected/planned cost (PV).***

Objective ;-

1. ***Increase project performance targets;***
2. ***To identify and benefit good performers of the project.***
3. ***To complete the project on time with Planned Budget (PV)***
4. ***To develop Good project management system.***
5. ***Attract and retain good performers;***
6. ***Clarify individual roles and tasks;***
7. ***To set standard performance target (Bench Mark)***

1. Introduction

Project Evaluation Criteria

1. Monthly performance ---------- Engineering aspect
2. Cost (EVM)---------- Financial aspect
3. Equipment Efficiency----------Equipment aspect
4. Quality of work ---------- Approved payment
5. The minimum performance for award is considered to be 80%

2. Performance target Preparation and Steps in creating performance related pay systems

2.1. PRP For Project managers & Project Directors

The Annual performance related payment shall be implemented by the following formula:

for project managers

$$PA_{pm} = PM_r * CPI * P_{vs}R * SPI * (OC_t - T_{sp})/OC_t * AME/100 * EUE * OC_m$$

- **PA_{pm} –** ***Annual performance Award (Birr) for project managers***
- **PM_r -is** ***Reference Award for Project managers (200,000 ETB)***
- ***CPI, SPI - are cost terms in Annual base.***
- ***$P_{vs}R$ – is the ratio of total Annual payment vs total annual performance Report***
- ***OC_t – Original Contract time in days***
- ***T_{sp} – Slippage time from Original Contract in days***
- ***AME Average Monthly Evaluation Marks (= Monthly Summation)/12***
- ***EUE – Total Annual Equipment utilization ratio of the project***
- **OC_m - Original Contract Time in Months (12 if more than one Year)**

2. Performance target Preparation and Steps in creating performance related pay systems

2.1. PRP For Project managers & Project Directors

The Annual performance related payment shall be implemented by the following formula:

for project Directors *(Average of projects Under Project Directors)*

$$PA_{pd} = PDr * CPI * P_{vs}R * SPI * (OC_t - T_{sp})/OCt * AME/100 * EUE * OC_m$$

- **PA_{pm} –** ***Annual performance Award (Birr) for project managers***
- **PD_r -is** ***Reference Award for Project directors (300,000 ETB)***
- ***CPI, SPI - are cost terms in Annual base. PvsR – is the ratio of total Annual payment vs total annual performance Report***
- ***Oc_t – Original Contract time in days***
- ***T_{sp} – Slippage time from Original Contract in days***
- ***AME Average Monthly Evaluation Marks (= Monthly Summation)/12***
- ***EUE – Total Annual Equipment utilization ratio of the project***
- **OC_m - Original Contract Time in Months (12 if more than one Year)**

2. Performance target Preparation and Steps in creating performance related pay systems

2.1. PRP For Project managers & Project Directors

Criteria and Formula for Annual Performance Related Pay (PRP) Award For Project Managers & Project Directors

S.No.	Evaluation Criteria	Abrevations	Figures for Example	Remarks
1	Contract Amount before VAT	CA	500,000,000.00	
2	Annual Plan	AP	500,000,000.00	
3	Annual Execution	AE	450,000,000.00	
4	Annual Budgeted Cost of Work Scheduled	BCWS	425,000,000.00	Target Profit =75,000,000 ETB
5	Annual Budgeted Cost of work Performed	BCWP	382,500,000.00	
6	Annual Actual Cost of Work Performaed	ACWP	390,000,000.00	
7	Schedule Performance Index	SPI	0.90	= BCWP/BCWS
8	Cost Performance Index	CPI	0.98	= BCWP/ACWP
9	Todate Payment approved Vs Todate Executed Report	$P_{vs}R$	0.95	$P_{vs}R \geq 0.95$
10	Original Contract Time	OC_t	365.00	
11	Elapsed Time	T_e	300.00	
12	Slipage Time from Original Contract	T_{sp}	65.00	= Oct-T_{sp}
13	Equipment Annual Cummulative Efficiency	EUE	0.90	= Utilized Time/ Planned Operational Time (OT/(OT+IT)
15	Average Monthly Evaluation Marks (= Mothly Summation)/12	AME	0.90	= Summation of Monthly Evaluation/12
16	Original Contract Time in Months (12 if more than one Year)	OC_m	12.00	= Contract Time/30 (But should be less than $\leq$12)
17	Reference Award for Project managers	PM_r	200,000.00	
18	Reference Award for Project Directors	PD_r	300,000.00	
19	**Performance Award For Project Managers**	**PA_{pm}**		**= PMr * CPI *$P_{vs}R$ * SPI * (OC_t-T_{sp})/Oct * AME/100 * EUE * OC_m**
20	**Performance Award For Project Directors (Evaluation Criteria For Project Directors will be Average of Projects Under them)**	**PA_{pd}**		**= PDr * CPI * $P_{vs}R$ * SPI * (OC_t-T_{sp})/Oct * AME/100 * EUE * OC_m**

2. Performance target Preparation and Steps in creating performance related pay systems

2.1. PRP For Project managers & Project Directors

Annual Award Examples									
Performance Award For Project Managers		PMr	CPI	$P_{vs}R$	SPI	$(OC_t-T_{sp})/OC_t$	AME/100	EUE	OC_m
		200,000.00	0.98	0.95	0.90	0.82	0.90	0.90	12.00
	PA_{pm}	**1,339,854.37**							
Performance Award For Project Directors (Evaluation Criteria For Project Directors will be Average of Projects Under them)		PDr	CPI	$P_{vs}R$	SPI	$(OC_t-T_{sp})/OC_t$	AME/100	EUE	OC_m
		300,000.00	0.95	0.90	0.80	0.80	0.85	0.85	12.00
	PA_{pd}	**1,423,267.20**							

Annual Award Examples									
Performance Award For Project Managers		PMr	CPI	PvsR	SPI	(OCt-Tsp)/OCt	AME/100	EUE	OCm
		200,000.00	1.00	1.00	1.00	1.00	1.00	0.85	12.00
	PA_{pm}	**2,040,000.00**							
Performance Award For Project Directors (Evaluation Criteria For Project Directors will be Average of Projects Under them)		PDr	CPI	PvsR	SPI	(OCt-Tsp)/OCt	AME/100	EUE	PApm
		300,000.00	0.95	0.95	0.95	0.95	0.95	0.85	12.00
	PA_{pd}	**2,367,769.67**							

2. Performance target Preparation and Steps in creating performance related pay systems

2.1. PRP For Project managers & Project Directors

Main Construction Material Utilization; Evaluation Standard Vs Actual Utilization (Wastage Controlling)

S,No.	Materials to be Evaluated		If Not, the the Award will Reduced as	
1	Concrete Casted Volume Vs Supplied Volume Ratio - C_{ratio}	$C_{ratio} \geq 98\%$	$PA_{pm} * C_{ratio}/0.98$	$PA_{pd} * C_{ratio}/0.98$
2	Reinforcement Bar Placed Qty Vs Supplied Qty Ratio - R_{ratio}	$RB_{ratio} \geq 95\%$	$PA_{pm} * RB_{ratio}/0.95$	$PA_{pd} * RB_{ratio}/0.95$
	Built Up Area in m^2 Vs Hollow Concrete Block Supplied Ratio- HCB_{ratio}	$HCB_{ratio} \geq 0.077$	$PA_{pm} * HCB_{ratio}/0.077$	$PA_{pd} * HCB_{ratio}/0.077$
3	Selected Material Compacted Volume for specified Item of works Vs Supplied Volume - SM_{ratio}	$SM_{ratio} \geq 60\%$	$PA_{pm} * SM_{ratio}/0.60$	$PA_{pd} * SM_{ratio}/0.60$
4	Electric Cables Installed Qty Vs Supplied Qty Ratio - EC_{ratio}	$EC_{ratio} \geq 99\%$	$PA_{pm} * EC_{ratio}/0.99$	$PA_{pd} * EC_{ratio}/0.99$
5	Electrical Fixtures Fixed Vs Supplied Ratio -EL_{ratio}	$EL_{ratio} \geq 99\%$	$PA_{pm} * El_{ratio}/0.99$	$PA_{pd} * El_{ratio}/0.99$
6	Sanitory Fixtures Fixed Vs Supplied Ratio -EF_{ratio}	$SN_{ratio} \geq 99\%$	$PA_{pm} * SN_{ratio}/0.99$	$PA_{pd} * SN_{ratio}/0.99$
7	Electric wires Installed Qty Vs Supplied Qty Ratio - EW_{ratio}	$EW_{ratio} \geq 97\%$	$PA_{pm} * EW_{ratio}/0.97$	$PA_{pd} * EW_{ratio}/0.97$
8	Wall & Floor Ceramic placed Qty Vs Supplied Qty Ratio - WFC_{ratio}	$WCF_{ratio} \geq 97\%$	$PA_{pm} * WFC_{ratio}/0.97$	$PA_{pd} * WFC_{ratio}/0.97$
9	UPVC & PVC Material Installed Qty Vs Supplied Qty - PVC_{ratio}	$PVC_{ratio} \geq 97\%$	$PA_{pm} * PVC_{ratio}/0.97$	$PA_{pd} * PVC_{ratio}/0.97$
10	PPR Material Installed Qty Vs Supplied Qty -PPR_{ratio}	$PPR_{ratio} \geq 97\%$	$PA_{pm} * PPR_{ratio}/0.97$	$PA_{pd} * PPR_{ratio}/0.97$
11	Total Fuel to be utilized as per standard Vs Total Actual Fuel Consumed - Fl_{ratio} ---------- *(NB:-If it is less than 0.95, it is improper fuel utilization & if it is greater than 1.0, the equipment is not utilized properly, meaning it was idle)*	$0.95 \leq Fl_{ratio} \leq 1.0$	$PA_{pm} * Fl_{ratio}$	$PA_{pd} * Fl_{ratio}$

2. Performance target Preparation and Steps in creating performance related pay systems

2.1. PRP For Project managers & Project Directors

MATERIAL UTILIZATION FORM OC-BC-F-013

Project Name:_____

Reporting Period:_____

Item No	Work type	Unit	Quantity of Work	Standard Consumption	Actual Consumption	Utilization Efficiency	Remark

Prepared

Signature:_____

Checked

Signature:_____

Approved

Signature:_____

WHY PROJECT FAIL?

- *Overallocated Resources*
- *Poor Communications*
- *Bad Stakeholder Management*
- *Unreliable Estimates & planning*
- *Inadequate Risk Management*
- *Lack of Team building and lack of willingness*
- *Lenient Monitoring and Controlling*
- *Project managers who lack experience and training*
- *No measures for evaluating the success of the project*
- *Placement of improper officials*
- *Conflict*
- *Poorly defined project scope*
- *Failure to identify key assumptions*
- *Ineffective leadership*
- *Failure to track requirements*
- *Failure to track progress*

END