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Earned Value Exercise

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MET AD 644: Project Risk, and Cost Management

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Case 1: Background:

You have a project that is scheduled to be completed in 10 days at a budgeted cost of $100,000. At the end of day 6 you do an analysis and you determine the job is 70% complete and you have spent $65,000.

Assumptions:

1) The following Earned Value Analysis was performed under the assumption that the baseline plan has a purely linear distribution rate of a) daily planned value, b) daily planned % complete.

2) For the EAC, this report uses the EAC formula of EAC = BAC/CPI, which is one of the EAC formulas; assuming the current trend of the cost performance will be typical of the project going forward. (Anbari, 2003)

Questions and Answers:

1. What is the project's earned value? At Day 6th, EV = $70,000.00
2. What is the project's budget at completion? BAC = $100,000.00
3. Is the project ahead, behind schedule or on time? Ahead of schedule.
4. Is the project expected to complete on budget, under or over budget? Under budget.
5. What is the project's SPI? At Day 6th, SPI = 1.17
6. What is the project's CPI? At Day 6th, CPI = 1.08

EV Calculation Details:

- See file: WuS_assign8_EVM_Calculator.xls

BAC	$ 100,000.00

Day 6th Physical % Complete	70%

Day	PV	Cum.PV	AC (/Day)	Cum. AC	EV (/Day)	Cum.EV	CV	SV	CPI	SPI	TCPI
1	$ 10,000.00	$ 10,000.00	$ -	$ -	$ -	$ -					
2	$ 10,000.00	$ 20,000.00	$ -	$ -	$ -	$ -					
3	$ 10,000.00	$ 30,000.00	$ -	$ -	$ -	$ -					
4	$ 10,000.00	$ 40,000.00	$ -	$ -	$ -	$ -					
5	$ 10,000.00	$ 50,000.00	$ -	$ -	$ -	$ -					
6	$ 10,000.00	$ 60,000.00	$ 65,000.00	$ 65,000.00	$ 70,000.00	$ 70,000.00	$ 5,000.00	$ 10,000.00	1.08	1.17	$ 0.86
7	$ 10,000.00	$ 70,000.00	$ -	$ 65,000.00	$ -						
8	$ 10,000.00	$ 80,000.00	$ -	$ 65,000.00	$ -						
9	$ 10,000.00	$ 90,000.00	$ -	$ 65,000.00	$ -						
10	$ 10,000.00	$ 100,000.00	$ -	$ 65,000.00	$ -						

EAC	**$ 92,857.14**
VAC	$ 7,142.86
ETC	$ 27,857.14
PCIC	70%
PCIB	70%

Case 2: Background:

Consider the following table of activities:

After 8 days of work, activity A has been completed on time. Activity C has 4 deliverables and 3 have been completed.

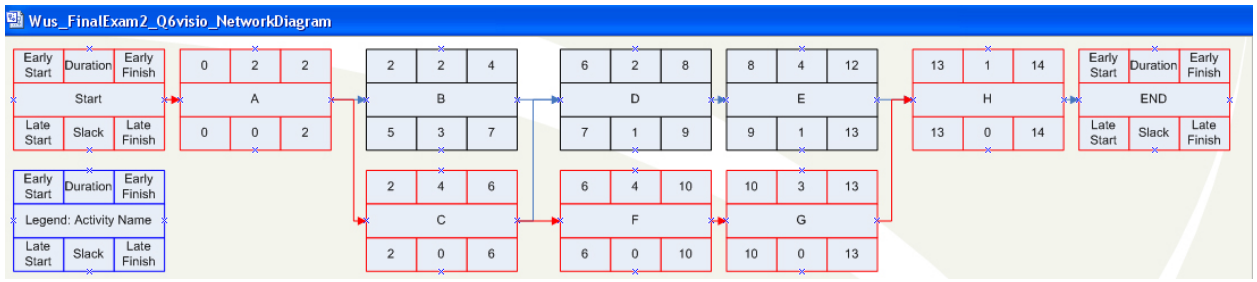
Assuming each day's work costs $100, what is the Cost Variance, the Schedule Variance, the CPI and SPI?

Activity	Predecessor	Duration (days)
Start	None	None
A	Start	2
B	A	2
C	A	4
D	B,C	2
E	D	4
F	C	4
G	F	3
H	E,G	1
End	H	None

1. Draw the network diagram
2. Complete the forward and backward passes.
3. What activities are on the Critical Path? Please Mark in Red.
4. Which activities have total slack? Which activities have free slack? (Calculate Slack Allowance.)

Answer:

1, 2, 3, 4:



Assumption: 8 days of work had passed, only activity A has been completed. Activity B, is assumed to be started right after Activity A's completion, but not 1 % is completed. Activity F could not have been started since Activity C only has 3 out of its 4 deliverables completed. Activity D could not have been started since Activity C is not completed. Table below shows what had been started and highlighted cell shows the earned or completed deliverables.

Activity Started/ Day				Earn Value
1	A			Earned
2	A			Earned

3		B	C	Earned
4		B	C	Earned
5		B	C	Earned
6		B	C	
7		B	C	
8		B	C	

Earn Value Analysis: The table below shows on day 8th, with the baseline schedule following the Network Diagram above (Appendix E), the Cost Variance is -900, Schedule Variance is -700, CPI is 0.36 and SPI is 0.42.

Day	PV	Cum.PV	AC (/Day)	Cum. AC	EV (/Day)	Cum.EV	CV	SV	CPI	SPI
1	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00				
2	$ 100.00	$ 200.00	$ 100.00	$ 200.00	$ 100.00	$ 200.00				
3	$ 200.00	$ 400.00	$ 200.00	$ 400.00	$ 100.00	$ 300.00				
4	$ 200.00	$ 600.00	$ 200.00	$ 600.00	$ 100.00	$ 400.00				
5	$ 100.00	$ 700.00	$ 200.00	$ 800.00	$ 100.00	$ 500.00				
6	$ 100.00	$ 800.00	$ 200.00	$ 1,000.00	0.00					
7	$ 200.00	$ 1,000.00	$ 200.00	$ 1,200.00	0.00					
8	$ 200.00	$ 1,200.00	$ 200.00	$ 1,400.00	0.00		-900.00	-700.00	0.36	0.42

Reference

Anbari, F. (2003). *Earned Value Project Management Method and Extensions.* Project Management Journal; Dec 2003; 34, 4; ABI/INFORM Complete P.12

Earned Value Examples:

Let's look at a simple example to see how earned value is calculated and used:

You are building a 4-sided fence. Each side is of equal length and you estimate that each side will contain the same material and labor costs as well as take the same amount of time to complete. You estimate that the project will take 4 days to complete and your budget, including a contingency reserve is $4,000.

At the end of 3 days, you are asked to prepare an Earned Value calculation in order to determine how the project is progressing. You determine that as of the end of day 3, total costs incurred are $3,500. and 70% of the project is completed.

BAC (budgeted cost at completion) = **$ 4,000.**

Your **Actual % completed** is **70%**.

Therefore your **EV** (earned value) = **BAC** X **Actual % completed**, or **EV** = **$ 4,000. X .70 = $ 2,800**.

Next, your **PV** (planned value) = **BAC** X **Planned % completed**, or **PV = $ 4,000. X 75%** (3 of 4 days) **= $ 3,000.**

Therefore, your **SPI** (schedule performance index) = **EV / PV**, or **$ 2,800. / $ 3,000. = .933**, which means you are behind schedule.

Your **SV** (schedule variance) = **EV - PV**, or **$ 2,800 - $ 3,000 = - $ 200.**

Your **CPI** (cost performance index) = **EV / AC** (actual costs), or **$ 2,800 / $ 3,500 = .8**, which means you are over budget.

Your **CV** (cost variance) = **EV - AC** or **$ 2,800 - $ 3,500 = - $ 700.**

Forecasting ahead, your **EAC** (estimated cost at completion) **= BAC / CPI**, or **$ 4,000. / .8 = $ 5,000.**

Your **VAC** (variance at completion) = **BAC - EAC** or **$ 4,000. - $ 5,000 = - $ 1,000.**

Your **ETC** (estimated cost to complete) = **EAC - AC** or **$ 5,000. - $ 3,500. = $ 1,500.**