

CB 519
Construction Project
Management 2

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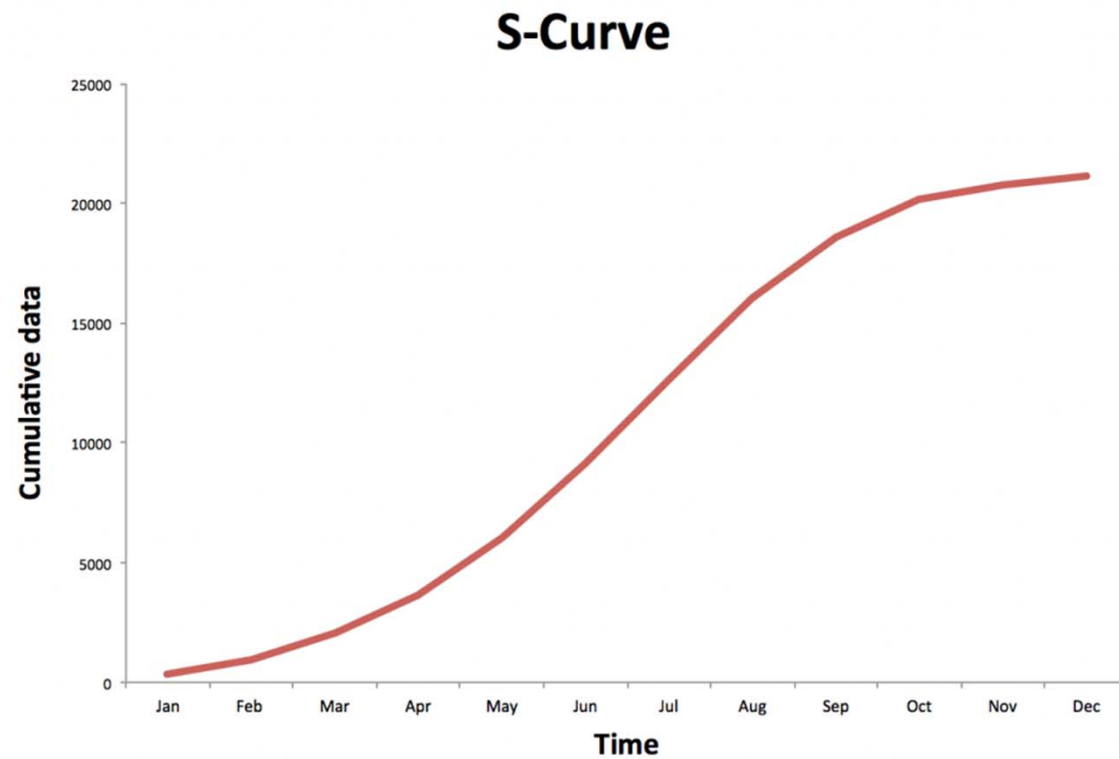
Spring - 2018

Carrying out a project

- CPM
- Project update
- Project Control

Construction S-Curve

- Planned Value
- Actual Cost and Earned Value



We need to predict the final project completion and cost given the current project status

This is called Defined under **Project Control**

What we need to measure?

- A schedule performance index: Schedule Index (SI)

- A cost performance Index: Cost Index (CI)

What can we measure so far?

- The Budget Cost of Work Scheduled (BCWS)
- The Actual Cost of Work Performed (ACWP)
- The Budget Cost of Work Performed (BCWP), also known as earned value

Budget Cost of Work Scheduled (BCWS)

- The estimated cost of the activities scheduled for a given period.
- Known as Planned Value
- We can determine that from a cost-loaded schedule

Task	Cost \$	Start Week	Finish Week	Week1	Week2	Week3	Week4	Week5	Week6	Week7	Week8
Mobilization	2,000	1	1	2,000							
Bridge excavation	5,000	2	2		5,000						
Install prefab bridge	47,000	2	3		23,500	23,500					
Backfill bridge	2,000	3	3			2,000					
Install culverts	10,000	3	4			5,000	5,000				
Rough excavation roadway	112,000	3	6			28,000	28,000	28,000	28,000		
Install saniatry sewer	57,000	6	7						28,500	28,500	
Install water lines	69,000	7	8							34,500	34,500
Total	304,000			2,000	28,500	58,500	33,000	28,000	56,500	63,000	34,500

BCWS after 3 weeks = \$89,000

Credit: Prof. Omar El-Anwar

Actual Cost of Work Performed (ACWP)

- The actual costs incurred in the site for performing a specific set of activities.
- Also known as Actual Value

Budget Cost of Work Performed (BCWP)

- The Earned Value for the contractor.
- This is the costs that the contractor can collect for performing the job under the current contract.
- For unfinished activities, we can use percentages to determine such value.

Example

- Consider an excavation job that requires 120 hour of excavation. You assigned three excavator that works 8 hours a day. Each excavator costs \$500 per day.
- After 3 days, 50% of the work was done at a cost of \$3,200
- Calculate the BCWS, ACWP, and BCWP at the end of day 3.

Solution

- Project estimated duration (day) = $120\text{hr} / (8 \times 3) = 5$ days
- Project estimated cost = $5 \text{ days} \times \$500/\text{day} \times 3 \text{ crews} = \$7,500$
- After 3 days, percentage completed = $3/5$ days
- BCWS = $3/5 \times 7,500 = \$4,500$
- ACWP = $\$3,200$
- BCWP = $\$1,500 \times (5 \times 50\%) = \$3,750$

Schedule Variance and Schedule Index

- Schedule Variance (SV)

- The difference between BCWP and the BCWS

$$SV = BCWP - BCWS$$

+ve: ahead schedule

-ve: behind schedule

- Schedule Index (SI)

- The ration of BCWP to BCWS

$$SI = BCWP / BCWS$$

>1: ahead schedule

<1: behind schedule

Cost Variance and Cost Index

- Cost Variance (CV)

- Is the difference between the BCWP and the ACWP

$$CV = BCWP - ACWP$$

+ve: under budget

-ve: over budget

- Cost Index (CI)

- Is the ratio between BCWP and the ACWP

$$CI = BCWP / ACWP$$

>1: under budget

<1: over budget

Example

- Calculate SI, SV, CI, and CV for the aforementioned example

Solution

- BCWS = \$4,500
- ACWP = \$3,200
- BCWP = \$3,750

- SI = $BCWP/BCWS = \$3,750/\$4,500 = 0.833$ (Behind schedule)

- CI = $BCWP/ACWP = \$3,750/\$3,200 = 1.17$ (Under budget)

Prediction of final cost and duration

- Assuming that the current progress (cost and performance) will continue, we can now calculate the expected cost and duration
- Expected final duration = Total Estimated Duration / SI
- Expected final cost = Total Estimated Cost / CI

For the same example

- Expected project final duration = $5/0.833 = 6$ days
- Expected project cost = $\$7500/ 1.17 = \$6,410$