

6.5.3 Activity Duration Estimates (Output)

David Jones

PMGT 501

Embry-Riddle Aeronautical University

2. The Global Tea and Organic Juice companies have merged. The following information has been collected for the “Consolidation Project.”

Act. ID	Description	Predecessor	a opt	m ml	b pess
1	Codify accounts	None	16	19	28
2	File articles of unification	None	30	30	30
3	Unify price and credit policy	None	60	72	90
4	Unify personnel policies	None	18	27	30
5	Unify data processing	1	17	29	47
6	Train accounting staff	1	4	7	10
7	Pilot run data processing	5	12	15	18
8	Calculate P&L and balance sheet	6, 7	6	12	24
9	Transfer real property	2	18	27	30
10	Train sales force	3	20	35	50
11	Negotiate with unions	4	40	55	100
12	Determine capital needs	8	11	20	29
13	Explain personnel policies	11	14	23	26
14	Secure line of credit	9, 12	13	16	19
15	End	10, 13, 14	0	0	0

1. Compute the expected time for each activity.

Act. ID	a opt	m ml	b pess	$t_e = ((a+4m+b))/6$
1	16	19	28	20
2	30	30	30	30
3	60	72	90	73
4	18	27	30	26
5	17	29	47	30
6	4	7	10	7
7	12	15	18	15
8	6	12	24	13
9	18	27	30	26
10	20	35	50	35
11	40	55	100	60
12	11	20	29	20
13	14	23	26	22
14	13	16	19	16
15	0	0	0	0

2. Compute the variance for each activity.

Act. ID	a opt	m ml	b press	variance=[(b-a)/6]^2
1	16	19	28	4
2	30	30	30	0
3	60	72	90	25
4	18	27	30	4
5	17	29	47	25
6	4	7	10	1
7	12	15	18	1
8	6	12	24	9
9	18	27	30	4
10	20	35	50	25
11	40	55	100	100
12	11	20	29	9
13	14	23	26	4
14	13	16	19	1
15	0	0	0	0

3. Compute the expected project duration.

Path	Duration	Total time
1-5-7-8-12-15	0-20-30-15-13-20-0	98
1-5-7-8-12-14-15	0-20-30-15-13-20-16-0	114
1-6-8-12-15	0-20-7-13-20-0	60
1-6-8-12-14-15	0-20-7-13-20-16-0	76
2-9-14-14-15	0-30-26-16-0	72
3/10/15	0-73-35-0	108
4-11-13-15	0-26-60-22-0	108

The project will take 114 time units to get completed. The critical path in this project is 1-5-7-8-12-14-15.

4. What is the probability of completing the project by day 112?

$$Z = \frac{T_s - T_e}{\sqrt{\sum \sigma^2}} = \frac{112 - 114}{\sqrt{4 + 25 + 1 + 9 + 9 + 1 + 0}} = \frac{-2}{\sqrt{49}} = -0.2857$$

Using the z values and probabilities table $p = 0.38$
38% probability of completing the project by day 112.

Within 116 days?

$$z = \frac{T_s - T_e}{\sqrt{\sum o^2}} = \frac{116 - 114}{\sqrt{4 + 25 + 1 + 9 + 9 + 1 + 0}} = \frac{2}{\sqrt{49}} = 0.2857$$

Using the z values and probabilities table $p = 0.61$
61% probability of completing the project by day 116.

5. What is the probability of completing “Negotiate with Unions” by day 90?

$$z = \frac{T_s - T_e}{\sqrt{\sum o^2}} = \frac{90 - 86}{\sqrt{4 + 100}} = \frac{4}{\sqrt{104}} = 0.3922$$

Using the z values and probabilities table $p = 0.65$
65% probability of completing the “Negotiate with Unions” by day 90.