Case Study: International Capital, Inc.

Benjamin Srock

Embry-Riddle Aeronautical University Worldwide Campus

Assessing and Managing Project Risk

PMGT-613

Archie Addo, Ph.D.

April 22, 2017

Case Study: International Capital, Inc.

International Capital, Inc. (IC) specializes in securing funds for small-medium sized firms (Larson & Gray, 2014, p. 244). Utilizing a standardized format for each project, newly assigned project manager, Beth Brown is assigned to collect network information and activity times and create a plan for presentation to the review committee. The plan includes an outline of the project network, calculations to support project comparison with an average project, and the average needed to ensure 95 percent completion reliability in 70 workdays (Larson & Gray, 2014, p. 245).

Activity	Description	Immediate Predecessor
A	Start story draft using template	
B	Research client firm	
C	Create "due diligence" rough draft	A,B
D	Coordinate needs proposal with client	C
E	Estimate future demand and cash flows	C
F	Draft future plans for client company	E
G	Create and approve legal documents	C
H	Integrate all drafts into first-draft proposal	D,F,G
I	Line up potential sources of capital	G,F
J	Check, approve, and print final legal proposal	H
K	Sign contract and transfer funds	I,J

Table 1: Network Information (Larson & Gray, 2014, p. 244)

	Time in Workdays		
Activity	Optimistic	Most Likely	Pessimistic
A	4	7	10
B	2	4	8
C	2	5	8
D	16	19	28
E	6	9	24
F	1	7	13
G	4	10	28
H	2	5	14
I	5	8	17
J	2	5	8
K	17	29	45
	61	108	203

Table 2: Activity Times (Larson & Gray, 2014, p. 245)

Figures 1 and 2 represent the data gathered and provided by Beth Brown. From this information, we first determine the estimated time for each activity. Estimated time is expressed as $t_e = \frac{a+4m+b}{6}$, where $a =$ optimistic, $b =$ pessimistic, and $m =$ most likely .

Step 1: Determine Expected Time

Activity "A" example: $t_e = \frac{a+4m+b}{6} = \frac{4+4(7)+10}{6} = \frac{42}{6} = \mathbf{7}$

Time in Workdays				
Activity	**Optimistic (a)**	**Most Likely (m)**	**Pessimistic (b)**	**Expected Time**
A	4	7	10	7.0
B	2	4	8	4.3
C	2	5	8	5.0
D	16	19	28	20.0
E	6	9	24	11.0
F	1	7	13	7.0
G	4	10	28	12.0
H	2	5	14	6.0
I	5	8	17	9.0
J	2	5	8	5.0
K	17	29	45	29.7
	61	108	203	

Table 3: Expected Time Table

Step 2: Determine Activity Variance

Activity variance is expressed as $\sigma_{t_e} = \left(\frac{b-a}{6}\right)$.

Activity "A" Example: $\sigma_{t_e}{}^2 = \left(\frac{b-a}{6}\right)^2 = \left(\frac{10-4}{6}\right)^2 = \left(\frac{6}{6}\right)^2 = 1^2 = \mathbf{1}$

Time in Workdays					
Activity	**Optimistic (a)**	**Most Likely (m)**	**Pessimistic (b)**	**Expected Time**	**Variance**
A	4	7	10	7.0	1.0
B	2	4	8	4.3	1.0
C	2	5	8	5.0	1.0
D	16	19	28	20.0	4.0
E	6	9	24	11.0	9.0
F	1	7	13	7.0	4.0
G	4	10	28	12.0	16.0
H	2	5	14	6.0	4.0
I	5	8	17	9.0	4.0
J	2	5	8	5.0	1.0
K	17	29	45	29.7	21.8
	61	108	203		

Table 4: Activity Variance Table

Step 3: Determine the Critical Path

Utilizing QM for Windows, the activity expected times in *Table 3* and the network information contained in *Table 1*, The project can expect a completion time of 72.7, or 73 days to complete, with a critical path identified as A-C-D-H-J-K. *Table 5* represents the AON network times for early start, early finish, late start, late finish, and slack. *Figure 1* provides a pictorial view of the project from a precedence point of view.

Results					
Task	Early Start	Early Finish	Late Start	Late Finish	Slack
A	0	7	0	7	0
B	0	4.3	2.7	7	2.7
C	7	12	7	12	0
D	12	32	12	32	0
E	12	23	14	25	2
F	23	30	25	32	2
G	12	24	20	32	8
H	32	38	32	38	0
I	30	39	34	43	4
J	38	43	38	43	0
K	43	72.7	43	72.7	0
	Project	**72.7**			

Table 5: AON Network Table

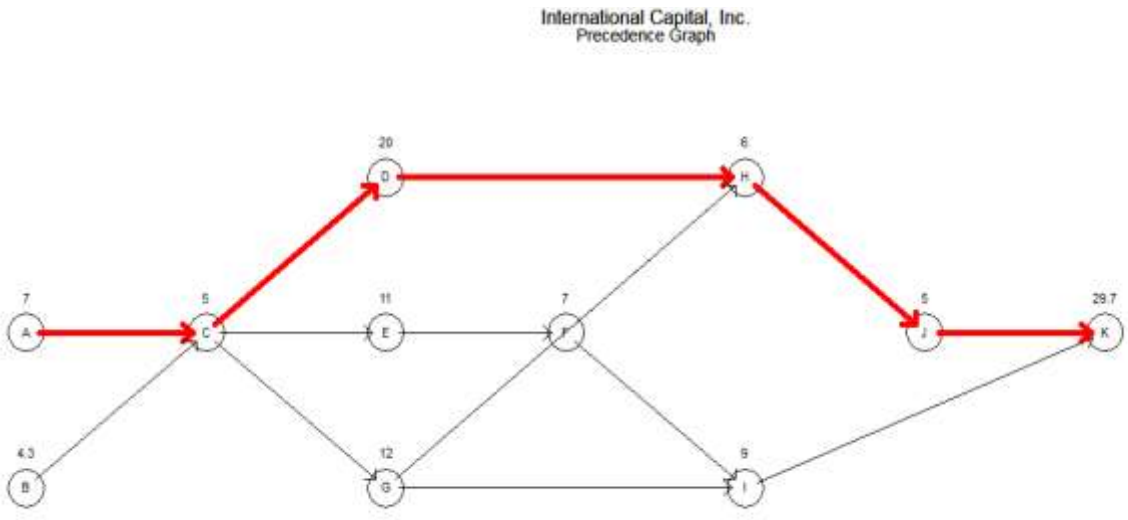

Figure 1. International Capital, Inc. Precedence Graph

Step 4: Determine the Variance of the Average Project

Average project variance is calculate utilizing the average completion times of items along the critical path. Average project variance is expressed as $\sigma_{T_E} = \sqrt{\sum {\sigma_{t_e}}^2}$, *where* $T_E = critical\ path\ duration, t_e = weighted\ average\ activity\ time.$

$$\sigma_{T_E} = \sqrt{\sum {\sigma_{t_e}}^2} = \sqrt{(1+1+4+4+1+21.8)^2} = \sqrt{32.8^2} = 32.8$$

Step 5: Determine the Z value

The "Z" value represents the number of standard deviations from the mean, which in turn represents the probability of achieving project completion within the desired timeline (Larson & Gray, 2014, p. 240). Probability or the "Z" value is expressed as $Z = \frac{T_S - T_E}{\sqrt{\sum {\sigma_{t_e}}^2}}$ *where* T_S *is the scheduled project duration, and* T_E *is the critical path duration.*

Given: $T_S = 70\ days$

$T_E = 72.7\ days$

$\sqrt{\sum {\sigma_{t_e}}^2} = \sqrt{32.8}$

$$Z = \frac{T_S - T_E}{\sqrt{\sum {\sigma_{t_e}}^2}} = \frac{70-72.7}{\sqrt{32.8}} = \frac{-2.7}{\sqrt{32.8}} = -0.47144 = -0.4714$$

Using, Larson & Gray (2014) "Z" values and probability chart on page 242, $P = 0.3192$ or 31.92% probable that the project can be completed in the target of 70 days. This stacks up to the average project.

Step 6: Determine average days to ensure 95% probability

Using, Larson & Gray (2014), a probability of 95 percent equates to a "Z" value of 1.65. Using this value and the given values of $T_S = 70\ days$, and $\sqrt{\sum {\sigma_{t_e}}^2} = \sqrt{32.8}$, the value of T_E can be obtained by simply plugging in the values and algebraically solving for the unknown.

$$\left(1.65 = \frac{T_S - T_E}{\sqrt{\sum {\sigma_{t_e}}^2}}\right) = \left(1.65 = \frac{70 - T_E}{\sqrt{32.8}}\right) = \left(1.65\ x\ \sqrt{32.8} = 70 - T_E\right) = (9.449 = 70 - T_E)$$

$$= (9.449 - 70 = -T_E) = (-60.55 = -T_E)$$

$$T_E = 60.55\ days$$

To achieve a 95 percent chance of completing the project in 70 working days, the average should be 60.55 days.

References

Larson, E. W., & Gray, C. F. (2014). *Project Management: The Managerial Process* (6th ed.). New York, NY: McGraw-Hill.