

# THE WOODWORKER'S WEBSITE: A PROJECT MANAGEMENT CASE STUDY

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## ABSTRACT

*A case study that focuses on building a website for a woodworking business is discussed. Project management and linear programming techniques can be used to determine the time required to complete the website project discussed in the case. This case can be assigned to students in an undergraduate or graduate decision modeling or management science course. The case study, solution, and grading rubric are presented.*

## CASE

George, after a successful engineering career, has decided to pursue his lifelong dream of opening a woodworking business. George has been woodworking for a number of years and is a master craftsman. His primary products include wood carvings, furniture, jewelry boxes, wooden bowls, and other beautiful wooden objects. George has been selling his products at woodworking shows, arts and craft fairs, and at local businesses. Business has been picking up significantly and George feels that now is the time to launch a website for his business.

George wants a website that will showcase his products, allow secure online ordering, and has social media capability. In addition, George would like to provide videos on how to wood carve. The videos will be free for a two week period and then there will be a nominal monthly subscription fee. This monthly fee will allow one to watch unlimited videos and download wood carving patterns. George wants to add enough videos to get the subscription service started and then he will add additional new videos each month.

He contacts Annie, a family friend, who owns a software and website development business. They meet for lunch and George gives her all the specific requirements for the website. George would like to have a website launched in less than three weeks. He will be a vendor at a large woodworking show in six weeks and wants a website in place so potential visitors can peruse his products prior to the show.

Annie is happy to help George with the website and carefully takes notes of all his website requirements. She tells George that she needs to estimate how long the website project will take given that she and her employees are in

the midst of several projects. However, she promises that she will try her best to have the project completed within three weeks. George tells Annie that he is willing to pay extra in order to have the website completed within a three week period.

Annie goes back to her office and puts together the project activities, the time to complete each activity, and whether an activity time can be reduced (crashed) by hiring additional workers. She does not want to begin shooting videos for the subscription service (Activity J) until the videos for the wooden products are complete (Activity B). Annie can hire out additional workers at a cost of \$40.00 per hour (\$320 for an eight hour workday). Table 1 provides the activity, description, time to complete an activity, predecessors, and the maximum amount that an activity can be crashed (completion time reduced).

Annie needs your help. Her project management expert is on vacation this week. Annie would like the following items and questions addressed in a report.

- 1) Develop a project network diagram that shows all the activities and precedence relationships.
- 2) Determine the project length (without crashing).
- 3) Determine the critical path activities.
- 4) What is the shortest time that the project can be finished if crashing is allowed? What would be the crashing cost?
- 5) Determine the crashing cost if the project must be finished in 15 days, 18 days, and 21 days?

Act.	Description	Pred.	Est. Time (days)	Max. Crash Amount
A	Pictures of wooden products	----	3	1.5
B	Videos of wooden products	----	5	3
C	Design of the website main page	----	2	1
D	Design of the website product catalog	----	2	1
E	Design of the website ordering system	----	2	1
F	Completion of the website main page which includes pictures and videos	A, B, C	2	1
G	Review and changes of the website main page	F	1	0
H	Completion of the product catalog and ordering systems	A, B, D, E	2	1
I	Review and changes to the product catalog and ordering systems	H	1	0
J	Videos for the subscription system	B	15	5
K	Design of the website subscription section	J	3	1.5
L	Social media	J	2	1
M	Final website integration, review, and changes	G, I, K, L	2	0

**SOLUTION**

Table 2 shows the early start times (EST), early finish times (EFT), late start times (LST), late finish times (LFT), and slacks (LFT-EFT or LST-EST). Activities B, J, K, and M are on the critical path since their slack is zero.

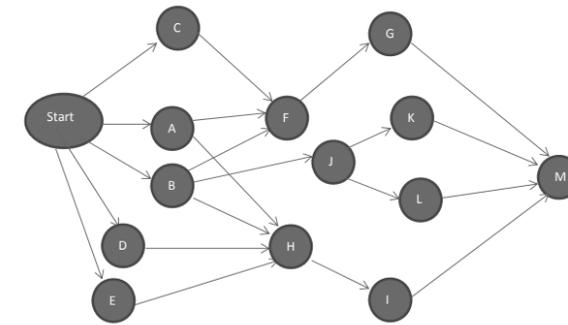
Table 3 shows the project completion time, expected crashing cost, and the activities to be crashed if crashing is permitted.

Act.	Estimated Time to Complete Activity (days)	EST	EFT	LST	LFT	Slack
A	3	0	3	17	20	17
B	5	0	5	0	5	0
C	2	0	2	18	20	18
D	2	0	2	18	20	18
E	2	0	2	18	20	18
F	2	5	7	20	22	15
G	1	7	8	22	23	15
H	2	5	7	20	22	15
I	1	7	8	22	23	15
J	15	5	20	5	20	0
K	3	20	23	20	23	0
L	2	20	22	21	23	1
M	2	23	25	23	25	0

Completion Time	Crashing Cost	Activities to be Crashed
15.5 days	\$3200	B, J, K, L
16 days	\$2880	B, J, K
17 days	\$2560	B, J
18 days	\$2240	B, J
19 days	\$1920	B, J
20 days	\$1600	B, J
21 days	\$1280	B, J
22 days	\$960	B
23 days	\$640	B
24 days	\$320	B
25 days	\$0	None

A complete Excel solution can be obtained by emailing the author. The following are the items and answers to questions listed above:

1) The project network diagram:



- The project will take 25 days without crashing any activities.
- The critical path items are activities: B, J, K, and M since their slack is zero.
- The shortest time that the project can be completed if crashing is allowed is 15.5 days. The crashing cost is \$3,200 to finish the project in 15.5 days.
- The project cannot be completed in less than 15.5 days. The cost for getting the project completed in 18 days is \$2240 and the cost is \$1280 to have the project finished within 21 days.

**GRADING RUBRIC**

The following is a sample grading rubric for this case study. Although 40 points have been allocated to the case, the point value and rubric can easily be altered.

- Project network diagram (5 points)
  - 4.00 to 5.00 points: The network diagram is correct or there is a minor mistake. The activities and precedence relationships are clearly shown.
  - 2.50 to less than 4.00 points: A decent attempt; however, there are errors. More than minor mistakes.
  - 0.00 to less than 2.50 points: Not attempted or not a decent attempt. Many errors.
- An Excel model that displays the early start times, early finish times, late start times, late finish times, and slacks (15 points)
  - 12.00 to 15.00 points: The model is correct or there are minor mistakes. The model shows the EST, EFT, LST, LFT, and slacks. It is very clear from the model what are the critical items and when the project will be completed.
  - 7.00 to less than 12.00 points: A decent attempt; however, there are errors. For example, mistakes are made in calculating the slack for several activities.
  - 0.00 to less than 7.00 points: Not attempted or not a decent attempt. Many errors.
- An Excel model that shows the activities that should be crashed, project completion time, and the crashing cost (15 points)
  - 12.00 to 15.00 points: The model is correct or there are minor mistakes. The model clearly shows the activities that should be crashed, when the project will be completed, and the crashing cost.
  - 7.00 to less than 12.00 points: A decent attempt; however, there are errors.
  - 0.00 to less than 7.00 points: Not attempted or not a decent attempt. Many errors.
- Questions (5 points)
  - 4.00 to 5.00 points: All questions have clearly and accurately been answered or there is a minor mistake. Correct grammar and spelling are used in answering the questions.
  - 2.50 to less than 4.00 points: A decent attempt; however, there are errors. More than minor mistakes. Grammar and spelling issues.
  - 0.00 to less than 2.50 points: Not attempted or not a decent attempt. Many errors.