

"This is where you come in, Wesley. The project to expand the Latin American facility involves four major phases: (1) concept development, (2) definition of the plan, (3) design and construction, and (4) start-up and turnover. During the concept development phase, a project owner, that will be you, is chosen to oversee all four phases of the project and given a budget to develop a plan. The outcome of the concept development phase consists of just a rough plan, feasibility estimates for the project, and a rough schedule. Also, a justification for the project and a budget for the next phase will be needed."

"In the plan definition phase, the project owner selects and works with a project manager to oversee the activities associated with this phase. Plan definition consists of four major activities that are completed more or less concurrently: (1) defining the project scope, (2) developing a broad schedule of activities, (3) developing detailed cost estimates, and (4) developing a plan for staffing. The outputs of this phase are combined into a detailed plan and proposal for management specifying how much the project will cost, how long it will take, and what the deliverables are."

"If the project gets management's approval and provides the appropriations, the project progresses to the third phase, design and construction. This phase consists of four major activities: (1) detailed engineering, (2) mobilization of the construction employees, (3) procurement of production equipment, and (4) construction of the facility. Typically, the detailed engineering and the mobilization of the construction employees are done concurrently. Once these activities are completed, construction of the facility and procurement of the production equipment are done concurrently. The outcome of this phase is the physical construction of the facility."

"The final phase, start-up and turnover, consists of four major activities: pre-start-up inspection of the facility, recruiting and training the workforce, solving start-up problems, and determining optimal operating parameters (called *centerlining*). Once the pre-start-up inspection is completed, the workforce is recruited and trained at the same time that start-up problems are solved. Centerlining is initiated upon the completion of these activities. The desired outcome of this phase is a facility operating at design requirements."

"The cost to complete an activity depends on both the amount of time required to complete the task and the cost rate of performing the activity. I have compiled two tables here for you. Table A provides optimistic, most likely, and pessimistic time estimates for the major activities. Table B provides similar estimates for the cost rates to complete the activities. Like time estimates, the cost rate to complete the facility expansion project can vary for a number of reasons such as using more or less expensive resources, price changes in labor and materials, the need to outsource work that was expected to be performed in-house, and so on. According to the data in Tables A and B, Concept Development is expected to cost \$24,000, 12 months at \$2,000/month."

**TABLE A** Three Time Estimates for NutriStar Production Facility Expansion Project

Activity	Optimistic Time (months)	Most Likely Time (months)	Pessimistic Time (months)
<b>A: Concept Development</b>	3	12	24
<b>Plan Definition</b>			
B: Define project scope	1	2	12
C: Develop broad schedule	0.25	0.5	1
D: Detailed cost estimates	0.2	0.3	0.5
E: Develop staffing plan	0.2	0.3	0.6
<b>Design and Construction</b>			
F: Detailed engineering	2	3	6
G: Facility construction	8	12	24
H: Mobilization of employees	0.5	2	4
I: Procurement of equipment	1	3	12
<b>Start-up and Turnover</b>			
J: Pre-start-up inspection	0.25	0.5	1
K: Recruiting and training	0.25	0.5	1
L: Solving start-up problems	0	1	2
M: Centerlining	0	1	4