Construction Scheduling & Project Control

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Instructor's Manual

Chapter 1

Answers to Exercises:

1. Define planning and scheduling. Differentiate between the two terms.

   Answer: *Project planning* has been defined as "the process of choosing the one method and order of work to be adopted for a project from all the various ways and sequences in which it could be done."

   Scheduling is the determination of the timing and sequence of operations in the project and their assembly to give the overall completion time. Scheduling takes one part of the planning effort and zooms in on it.

   Project planning serves as a foundation for several related functions such as cost estimating, scheduling, project control, quality control, safety management, and other.

2. Define a "project". What makes planning and scheduling construction projects different from general planning (Hint: think of the keywords in the definition of a project)?

   Answer: A project is a temporary endeavor undertaken to produce a unique product or service.

   Two points make planning and scheduling construction projects different from general planning:

   I. Each construction project has a well-defined start point, finish point, and a scope (to be achieved within this frame of time), and

   II. There are no two identical construction projects. Each project is unique in some aspects. Differences may come from difference in location (soil type, weather conditions, labor market, building codes, unforeseen conditions, etc.), the management type and experience, or simply in different circumstances and how much Murphy's Law was involved.

3. Define a portfolio and a program in the context of project management. Give examples of each.

   Answer: Author's definition: A program is a group of related projects and/or services intended to meet a common objective and usually managed by one entity. A program could also indicate a large and complex project that is divided into several projects for more effective management.

   The PMI defines a program as ''A group of related projects managed in coordinated way to obtain benefits and control not available from managing them individually. Programs may include elements of related work outside of the scope of the discrete projects in the program.'' (PMBOK 2008)

   A program may be temporary/one-time programs or ongoing (usually periodic/annual)

   An example on a temporary program is a large development that contains several projects, e.g. infrastructure, villas, apartments, commercial, hotel, retail, etc. An example on a ongoing program is the road maintenance program in a public works department in a municipality.

   A portfolio is a group of projects, not necessarily related or dependent, usually under one project manager or department. The PMI defines it as ''A collection of projects or programs

and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives. The projects or programs of the portfolio may not necessarily be interdependent or directly related.'' (PMBOK 2008)

An example on a portfolio is when a government agency has 200 projects and it distributes them among 20 project managers (not necessarily with equal number of projects). The group of projects that one particular project manager is responsible for, makes up his/her portfolio.

4. What is project management plan? Give an example.

   Answer: PMI defines project management plan as a ''formal, approved document that defines how the project is executed, monitored and controlled. It may be summary or detailed and may be composed of one or more subsidiary management plans and other planning documents. The objective of a project management plan is to define the approach to be used by the project team to deliver the intended project management scope of the project.'' (PMBOK 2008)

   An example of the project management plan is when an owner plans to build a shopping strip. The plan (which could be brief or detailed, or somewhere in between) may include elements such as:
   - Scope of the project (size, some info on the design, possibly with several alternatives)
   - Location
   - Approximate cost
   - Approximate timeline (e.g. starting and ending points)
   - Contracting method (e.g. fix price, cost plus)
   - Delivery method (e.g. EPC, design/build)
   - Potential partners (designer, contractor, PMC, etc.)
   - Special considerations (legal, environmental, etc.)
   - Planned method of operation

5. What is project control? Why is it important?

   Answer: Project Control is the continuous process of monitoring work progress from schedule (time) and budget standpoints, comparing it to what it is supposed to be, finding any deviations, then taking corrective actions to bring the project back on schedule and within budget.

   Project control is important because things rarely –if ever- go as planned. Changes happen for various reasons and the project manager needs to keep track of progress in order to keep the project within budget and on schedule.

6. Mention a construction project you have participated in or observed. Write down the steps involved in its planning and the steps involved in its scheduling (without much specificity.)

   Many answers apply.

7. Mention the benefits of CPM (Critical Path Method) scheduling in construction projects from the contractor's perspective

   Answer:

   1) Calculate the project completion date.

2) Calculate the start or end of a specific activity.
3) Coordinate among trades and subcontractors, and expose and adjust conflicts.
4) Predict and calculate the cash flow.
5) Improve work efficiency.
6) Serve as an effective project control tool.
7) Evaluate the effect of changes
8) Prove delay claims.

8. Mention the benefits of CPM (Critical Path Method) scheduling in construction projects from the owner's perspective

   Answer:

   1) Get an idea on project's expected finish date
   2) Ensure contractor's proper planning for timely finish
   3) Predict and calculate the cash flow
   4) Serve as an effective project monitoring tool
   5) Evaluate the effect of changes
   6) Verify delay claims

9. Do all construction projects have the same need for CPM (Critical Path Method) scheduling? Why or why not?

   Answer: No. Large and complex projects have more need for CPM scheduling. A contractor or subcontractor who is doing simple and repetitive work may not have much need for CPM scheduling. One exception is when a subcontractor is doing a simple part (say installing kitchen cabinets) for a large project, the general contractor needs to implement the subcontractor's work in the overall schedule to show timing and dependencies on others' work.

10. What are the characteristics a scheduler of a building project must have? Can the same person be a scheduler for an industrial project? Why or why not?

    Answer: The scheduler must be knowledgeable in:

The CPM theory and scheduling concepts,
The scheduling computer program he/she is using, and
Some knowledge in (familiarity with) the building industry.

It is possible for the same person to be a scheduler for an industrial project; however, it would be better if the scheduler is knowledgeable in the field he/she is employed in.

11. Go to a real construction project. Meet with the project manager. Ask if they use CPM (Critical Path Method) scheduling. If they do, discuss the benefits they are getting out of scheduling. If not, ask (always politely) for the reasons they are not using CPM scheduling.

    Many answers apply.

12. Search for an article on CPM scheduling topic (ENR, Civil Engineering, and PM network magazines are good sources. Avoid scholarly journals). Summarize and discuss.

    Many answers apply.

Chapter 1: Additional questions for tests:

True or False:

1. There are no two projects in construction that are identical (from the contractor's point of view). T
2. Every construction project needs a CPM schedule. F
3. Planning and scheduling are two names for the same function. F
4. The maintenance of a large office building is considered a project. F
5. The renovation of a large office building is considered a project. T
6. Project control deals only with the money aspect of the project. F
7. Projects in a portfolio are necessarily related. F
8. Projects in a program are necessarily related. T
9. All programs have specific limited lifespan. F
10. The maintenance of city bridges can be a program. T

Multiple Choices:

1. Project control is a function that takes place:
    a. Before construction begins.
    b. While construction is going on.
    c. After construction is complete.

Answer: b.

Other Questions:

1. "Attending college" may not qualify as a project for a high school student. How can you help that student in defining that goal as a project?

Answer: Graduating from college with a certain major in a specific time can be a project. You can narrow it down more by saying "with a GPA of at least 3.0", "with $0 loans", etc.

2. If you are hiring a schedule for your company but none of the applicants has all three types of knowledge, which type you are willing to "sacrifice"? Justify your answer.

Answer: In the author's opinion, you can sacrifice either knowledge in technical field or software but not the principles.