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Question 1. As presented in this chapter, quality is an integral part of project management. Because there are different levels of quality, it is important for the owner, designer, and contractor to have a mutual understanding of the quality that is expected in a project. Describe methods that can be used to ensure that quality is adequately defined, understood, and properly included in a project.

Methods to Ensure the Owner's Requirements of Quality:

o - The project manager should hold a meeting with the owner to discuss, and agree upon, the end product the project is to provide.

o - The project manager should document the owner's project objectives and expectations for quality in the project charter.

o - Although management in the owner's organization may be defining quality, it is the end user of the project in the owner's organization that should be defining the level of quality.

o - Members of the owner's staff that should be involved in defining quality should include financing, engineering, operations, and maintenance department personnel.

o - The project manager must separate "what the owner needs" from "what the owner wants", the project must be completed to ensure the owner will be able to use it as intended.

o - Maintain continuous communications with the owner throughout the project so the owner understands the total affect quality can have on the cost and schedule of a project.

o - If the owner does not have staff able to identify the desired quality, involve the designer to assist the owner in defining the level of quality needed within the constraints of budget.

Methods to Ensure the Designer's Requirements of Quality:

o - Ensure the owner's level of quality is communicated to the design team, so the proper level of quality is translated into the drawings and specifications by sharing the project charter with the designer.

o - Ensure the level of quality is clearly defined in the designer's project proposal, which requires the designer to, explain "design quality" in terms the owner can understand.

o - The designer must develop a complete, and as error free as possible, set of contract documents that ensures the level of quality that is expected from the owner.

o - Hold regular meetings to ensure that all parties are on track regarding the expected level of quality, because it is often too easy for project participants to get distracted by costs and schedules, and forget that quality is a "must" in a project.

o - Provide a thorough review of plans and specifications by experienced field construction personnel, before release to the contractor, to ensure contractability of the design.

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Answer to Question 1 continued -

o - Remain involved in the project during construction, to ensure the plans and specifications are being turned into a quality project during construction.

Methods to Ensure the Contractor's Requirement of Quality:

o - A quality control system must be developed that is workable and understood by all parties, remembering that any quality control system requires a buy-in by all parties involved in a project if it is to work effectively.

o - Concentrate quality control on those parts of a project where quality is important, and not get consumed in expending large amounts of effort inspecting things that have only a small impact on the performance of a project when it is completed and in use by the owner.

o - Carefully select contractors that have a record of quality work, rather than selecting contractors that quote the lowest cost.

o - Instill a work environment of quality and pride in workmanship among all parties in the project, show a sincere interest in the importance of quality and that quality is expected in all aspects of the project.

o - Instill an "attitude" of achieving quality work by everyone in the project; recognize and reward good quality work. Trust but verify.

o - Hold regularly scheduled meetings to address quality, just like meetings that are held to review budgets, schedules, and safety.

o - Quality should be unique, tied to each specific project, rather than a standardization. This includes clear specifications and descriptions of work.

Question 2. Give examples of problems that may arise when an owner fails to fulfill his or her responsibility of clearly defining the operational criteria of a project.

o - If the operational criteria are not clearly defined, it will have to be defined as the project progresses through design and/or into construction, which causes confusion for all parties.

o - The owner may end up paying for things in a project that are not needed, because participants in the project do not clearly understand the operational criteria of the project.

o - The owner runs the risk of receiving a project that is within approved budget and on schedule, but it may not be useable as intended or meet the desired economic performance.

o - The designer may over design the project, trying to second-guess what the owner wants, which may cause the project to be more expensive than necessary.

o - The designer may under design the project, not realizing what the owner expects in the project, which can lead to expensive additions during construction.

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Answer to Question 2 continued –

o - A considerable amount of rework will likely occur for the designer, which will increase the number of changes (and the change control level of effort) and increase the likelihood of adverse effects on the project's budget, schedule, and quality.

o - Timely responses to contractors' questions may be impaired because the owner is not sure of what they want in the project.

o - The number of change orders are likely to increase, which may result in cost overruns, schedules delays, and claims against the owner by the contractor.

o - The probability of rework is greatly increased during construction when the owner has not adequately defined the operational criteria of the project.

o - The productivity and morale of the workers during construction may be impaired because of continuous changes by the owner to adjust the project during construction so it will meet the operational needs of the owner.

Question 3. Give examples of problems that may arise when a designer fails to give adequate attention to the impact of a design selection on the cost or schedule during the construction phase.

o - Lack of attention to details in the plans may cause erection problems in the field**,** which can lead to delays in work, increased costs, and claims from the construction contractor

o - Inadequate attention to details during design can cause confusion during construction, including delays in work in the field and unnecessary rework.

o - Some design selections can cause restrictions on the methods of construction that a contractor may choose, which can adversely affect the contractor's operations.

o - Poor wording in the written specifications can cause misinterpretation of the requirements of the work to be performed, which can lead to poor quality work or costly change orders.

o - Overly restrictive wording in the specifications may place restraints on the contractor's operations and/or sequencing of construction work, which can affect costs and schedules.

o - The selection of design alternatives can impact the procurement of major equipment required in a project, which can influence the scheduling of construction work.

o - Requiring stringent inspection procedures in the plans and specifications that may interference in scheduling operations of the construction contractor.

o - Designs that are poorly assembled can impair productivity of crafts, morale of workers on the job-site, and lead to legal claims against the designer and/or owner from the contractor.

o - The quality of the design documents has a significant impact on the quality of construction and the long-term maintenance and operations of the completed facility.

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Question 4. Give examples of problems that may arise when a contractor fails to perform his or her work in accordance with the contract documents.

o - The owner may be forced to call the performance bond, which can delay the project and/or increase costs because a new contractor will have to complete the project.

o - The owner may file claims against the contractor for default of contract, which can cause expensive legal problems for the contractor and hurt the contractor's reputation.

o - The contractor may be disqualified from bidding future work of the owner, and the designer may discourage other owners from allowing the contractor to bid on the designer's work.

o - The bonding capacity of the contractor may be reduced, or completely eliminated, by the bonding company.

o - Additional costs and time are required by the owner and designer as they attempt to complete a project that is in default by the contractor.

o - The quality of the project may be impaired if another construction contractor must be brought on board to properly redo the defaulting contractor's work

o - Adverse publicity may impair the reputation of the construction contractor, which can adversely affect the success of the contractor in securing future work.

Question 5. In actuality, there are at least three project managers that are involved in a project, one each working for the owner, designer, and contractor. Since each of these individuals work for a different organization, describe methods that you would suggest to ensure good working relationships between these three individuals.

o - At the beginning of the project, all project managers should meet together to define and agree upon the authority and responsibility of each party.
o – Distribute the project charter and review it for understanding.
o – Develop a RACI chart for the respective teams

o - Agree on procedures for review and approval of documents and the distribution of documents between the parties of each organization.

o - Establish regularly scheduled joint project managers meetings with a set agenda to share information and coordinate the work in an organized manner.

o - Share information in a timely manner and make a special attempt to work together as a team to help each other.

o - Show trust, respect, and confidence in the work of others with an attitude of finding solutions and not pointing blame or finding faults, remembering it is not "what you say", but "how you say it'.

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Answer to Question 5 continued –

o - Ensure that each project manager is involved in the overall "work plan" that integrates the work of all parties.

Question 6. Interview three project managers, one working for an owner, designer, and contractor, respectively, to identify factors that each manager believes is important for the successful completion of a project.

The answer to this question will vary, depending on the background and level of experience of the project managers interviewed. Typical responses that might be expected may include:

Owner's Project Manager:

o - A competent designer that has experience in developing plans and specifications for the kind of project needed by the owner.

o - A designer that can relate the design and construction requirements in terms that can be understood by the owner.

o - An experienced construction contractor that does quality work, is reasonable in costs, and will finish the project within the time required by the owner.

o - Good working relationships among all parties in the project with good communications regarding the status and progress of work.

Designer's Project Manager:

o - An owner who can fully appreciate the work necessary to complete a set plans and specs and who is willing to compensate the designer's required effort for project administration.

o - An owner who allows adequate time for preparation of plans and specifications, and completes design approvals in a timely manner.

o - A construction contractor that has good working relationships and does quality construction work without excessive delays and/or claims.

o - A good field representative that will represent the interests of the designer during construction.

Contractor's Project Manager:

o - A thorough and complete set of plans that are free of errors and written specifications that have minimum restrictions on the contractor's operations.

o - A design firm that is familiar with construction procedures in the field and designers that perform constructability reviews before releasing plans and specifications for construction.

o - A designer that is reasonable in inspection, pay requests, and handling questions that arise during construction.

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Answer to Question 6 continued –

o - An owner who mandates a realistic completion date, approves payments in a timely manner, and is reasonable in their expectations.

Question 7. A definition of project management is given in this chapter. Review this definition and expand it to include additional items that you feel are important to the function of project management.

o - Project management also includes satisfying the customer, the end user of the project.

o - Project management should include safety as a major issue.

o - The level of quality of the project must be understood and agreed upon by all participants.

o - Project management should include the human aspects, not just procedures and techniques.

Question 8. Consult publications from one or more of the references at the end of this chapter to compare and contrast the differences between "project management" and "functional management".

The answer to this question will vary, depending on the references selected. Students should cite sources of information in their responses. Answers should be similar to Table 1-1 in the text.

Question 9. The five basic functions of management discussed in this chapter are derived from the basic principles of business management. Review two sources of publications that describe the role and functions of management, one from a journal of business management and one from a journal of engineering management. Compare the business perspective of management to the engineering perspective of management.

The answer to this question will vary, depending on the references selected. Students should cite sources of information in their responses. Responses likely will address financial vs. technical.

Question 10. Throughout the project management process, there are five questions that must be addressed. Who? Does What? When? How Much and What can go wrong? Expand this list to include other questions that may be appropriate for some situations in the management of a project.

o - Where will the work be done?

o - How will the work be done?

o - Why are we doing it this way?

o - What is the best way to do this?

o – What alternatives exist to doing the work?

o - What are the impacts if it doesn't work?

o - What are anticipated problems in doing it this way?

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Question 11. Describe the five phases of the project life cycle presented in this book.

o - Feasibility Phase: Identifies the market forces, the economic requirement (revenue generated, operating expenses, capital investment costs), strategic value for the company, and other considerations. Properly understanding why a project is needed aids in identifying alternatives.

o – Conceptual Phase: Identifies several alternatives to meet the stated objective. Each alternative will be evaluated to determine if that combination of scope, cost, and time satisfy the required elements of the objective. Evaluation techniques could include cost/benefit ratio, payback period, time to complete (time to first revenue), risk profile, or others.

o – Detailed Scope Phase: Once a preferred alternative is selected, the project can progress to the detailed scope phase. The scope, cost estimate, schedule, and risks are defined to a detailed level in preparation for sanctioning and funds authorization approval.

o – Detailed Design and Procurement Phase: If a project receives a "go" decision at the end of Detailed Scope, capital funds are authorized, and a full project team effort can begin. The project is considered sanctioned. The detailed engineering design based on the detailed project scope can begin and the procurement of long lead equipment and materials can also begin.

o – Construction and Close Out Phase: The physical creation and installation of project elements. The majority of project cost and time is expended in this phase.

Question 12. Describe some of the key concepts of project management.

1. Ensure that one person, and only one person, is responsible for the project scope, budget, and schedule
2. Don't begin work without a signed contract, regardless of the pressure to start
3. Confirm that there is an approved scope, budget, and schedule for the project as documented in the project charter.
4. Lock in the project scope at the beginning and ensure there is no scope growth without approval
5. Make certain that scope is understood by all parties, including the owner
6. Determine who developed the budget and schedule, and when they were prepared
7. Verify that the budget and schedule are linked to the scope
8. Organize the project around the work to be performed, rather than trying to keep people busy
9. Ensure there is an explicit project execution plan (work plan) to guide the entire project
10. Establish a work breakdown structure that divides the project into definable, measurable, and assignable units of work

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Answer to Question 12 continued –

11. Establish a project organizational chart that shows authority and responsibilities for all team members
12. Develop a RACI chart to define responsibility, accountability, consultation, and information requirements for all aspects of the project.
13. Build the project staff into an effective team that works together as a unit
14. Emphasize that quality is a must, because if it doesn't work, it is worthless, regardless of cost or how fast it is completed
15. Budget all tasks; any work worth doing should have compensation
16. Develop a project schedule that provides logical sequencing of the work required to complete the job
17. Establish a control system that will anticipate and report deviations on a timely basis, so corrective actions can be taken
18. Get problems out in the open with all persons involved so they can be resolved
19. Document all work, because what may seem irrelevant at one point in time may later be very significant
20. Prepare a formal agreement with appropriate parties whenever there is a change in the project
21. Keep the client informed; they pay for everything and will use the project upon completion