Project management

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What is a project:

A project is a series of tasks with a specific objective (or deliverable) to be completed within a set timeline and upon completion, a product or service is created. Project are unique because they end, unlike other businesses functions that repeat or continue regularly.

*** A project is an activity that.**

Is temporary having a start and end date.
Is unique.
Brings about change.
Has unknown elements, which is therefore create risk.

*** A project is:**

A job that has a beginning and an end (Time).
A specified outcome (Scope).
At a stated level of performance (Quality).
At a budget (Cost).

What is The Triple Constraint:

The triple constraint, also known as the project management triangle, refers to the boundaries of time, scope and cost that apply to every project. This concept is a cornerstone of project management, and therefore managers must pay special attention to the schedule, budget and work breakdown structure during the planning phase.

* Let's look at how time, scope and cost are managed with the help of project management processes.

1- Time: Project managers must estimate the time required to complete a project. To do so, they use tools such as PERT charts or the critical path method. This must be done during the initiation and planning phases of the project life cycle to develop a schedule covering the duration of all the activities. Once the execution phase begins, the status of the project must be monitored to make changes to the schedule baseline. The project management process responsible for this constraint is schedule management.

2- Scope: The scope refers to all the work necessary to complete a project. It must be identified during the planning stage by using a work breakdown structure. If the scope is not properly defined early in the project, it can expand during the execution phase due to unplanned activities. This is known as scope creep and might cause projects to fail. The scope management process helps keep this constraint in check.

3- Cost: There are many costs associated with a project. Project managers are responsible for estimating, budgeting and controlling costs so the project can be completed within the approved budget. All this falls under the process known as cost management.

***The Importance of the Triple Constraint:**

Clearly, the triple constraint is crucial to any project. And it's critical to remember that the three points of this triangle are always influencing one another. If there is a setback in time, then there will have to be an adjustment in either scope or cost. The same being true for the other points. It's the duty of the project manager to always keep these constraints in check.

What is management:

Management is the technique of understanding the problem, needs and controlling the use of resources, cost, time, scope and quality.

*The process of dealing with / through or controlling things / people

What is project management:

Is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

*** Common project management terms:**

1- Delivrables : Tangible 'things 'that the project produces.

2- Milestones: Dates by which major activities are performed.

3- Tasks: Also called actions. Activities undertaken during the project.

4- Risks: Potential problems that may arise.

5-Issues: Risks that have happened.

6- Gantt chart: A specific type of chart showing time and tasks Usually created by a project management program like MS project.

7- Stakeholder: Any person or group of people who may be affected by your project - project manager, project sponsor, team members, customers, etc.

8- Resources: Anything you need to complete the project, such as personnel, supplies, materials, tools, people and more.

9- Budget: Estimate of total cost related to completing a project.

10- Tracking & Monitoring: Collecting project data and making sure it reflects the results you planned for.

Project management methodologies:

1- PMI PMBOK
2- Agile
3- Waterfall
4- Scrum
5- Kanban

The project managment life cycle:

1- Initiation process
2- Planning process
3- Execution process
4- Monitor & control process
5- Closing process

1-Initiation processes: Those processes performed to define a new project or a new phase of an existing project by obtaining to start the project or phase.

*Key tasks:

a-**Make a Project Charter**: What is the vision, objective, and goals of this project.

b-**Identify the High-level Scope and Deliverables**: What is the product or service that needs to be provided.

c-**Conduct a Feasibility Study**: What is the primary problem and its possible solutions.

d-**Ballpark the high-level Cost and create a Business Case**: What are the costs and benefits of the solution.

e-**Identify Stakeholders**: Who are the people this project affects, how, and what are their needs.

2-Planning processes: Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve. The purpose of a project plan is to guide the execution and control project phases.

*Key tasks:

a- **Create a Project Plan:** Identify the phases, activities, constraints and schedule and create a project timeline with a Work Breakdown Schedule and Gantt chart.

b- **Create a Financial Plan**: Create a project budget and cost estimate and a plan to meet your maximum cost, complete with allocations across resources and departments.

c- **Create a Resource Plan**: Build a great team, recruit and schedule the resources and materials needed to deliver the project.

d- **Create a Quality Plan**: Set your quality targets and measures.

e- **Create a Risk Plan**: Identify the possible risks, assumptions, issues and dependencies, assign an owner, and develop a mitigation plan for how you will avoid/overcome them.

f- **Create an Acceptance Plan**: Assign criteria for what constitutes 'done 'and 'delivered.'

g- **Create a Communication Plan**: List your stakeholders and plan the communication cadence.

h- **Create a Procurement Plan**: Find any 3rd party suppliers required and agree terms.

3-Executing processes: Those processes performed to complete the work defined in the project management plan to satisfy the project specifications.

***Key tasks:**

a- **Creating tasks and organizing workflows:** Assign granular aspects of the projects to the appropriate team members, making sure team members are not overworked.

b- **Briefing team members on tasks:** Explain tasks to team members, providing necessary guidance on how they should be completed, and organizing process-related training if necessary.

c- **Communicating with team members, clients, and upper management:** Provide updates to project stakeholders at all levels.

d- **Monitoring quality of work:** Ensure that team members are meeting their time and quality goals for tasks.

e- **Managing budget:** Monitor spending and keeping the project on track in terms of assets and resources.

4-Monitor & control processes: Those processes required to track, review, and regulate the progress and performance of the project, identify any areas in which changes to the plan are required and initiate the corresponding changes.

*** Key tasks:**

a- **Cost & Time Management**: Review timesheets and expenses to record, control and track against the project's budget, timeline and tasks.

b- **Quality Management:** Reviewing deliverables and ensuring they meet the defined acceptance criteria.

c- **Risk Management**: Monitor, control, manage and mitigate potential risks and issues.

d- **Acceptance Management:** Conduct user acceptance testing and create a reviewing system, ensuring that all deliverables meet the needs of the client.

e- **Change Management** : When the project doesn't go to plan, managing the process of acceptable changes with the client to ensure they're happy with necessary changes.

5- **Closing processes:** Those processes performed to finalize all activities across all processes groups to formally close the project or phase.

***Key tasks:**

a- **Analyzing project performance:** Determine whether the project's goals were met (tasks completed, on time and on budget) and the initial problem solved using a prepared checklist.

b- **Analyzing team performance:** Evaluate how team members performed, including whether they met their goals along with timeliness and quality of work.

c- **Documenting project closure:** Make sure that all aspects of the project are completed with no loose ends remaining and providing reports to key stakeholders.

d- **Conducting post-implementation reviews:** Conduct a final analysis of the project, considering lessons learned for similar projects in the future.

e- **Accounting for used and unused budget:** Allocate remaining resources for future projects.

Project management knowledge areas:

1- **Project Integration Management**: This knowledge area contains the tasks that hold the overall project together and integrate it into a unified whole.

a- **Develop Project Charter:** One of only two processes during the Initiation phase, the development of a project charter initiates the project and authorizes the project manager.

b- **Develop Project Management Plan:** This is the primary guiding document for the project manager and result of the planning phase. It is used to ensure a successful outcome to the project. The project management plan is distributed and approved by relevant stakeholders, particularly the project sponsor, and changes are tracked through the change log.

c- **Direct and Manage Project Work:** This process encompasses the production of the project's deliverables.

d- **Manage Project Knowledge:** Most projects require the acquisition of additional knowledge. This requires active management to ensure the project finishes on time and budget.

e- **Monitor and Control Project Work:** This process contains the work necessary to monitor the project, perform earned value analysis and project status reports, and identify potential project changes.

d- **Perform Integrated Change Control:** In this process the change control is carried out. Whether your project requires change request forms, project sponsor approvals, and other administration or if it's a basic change log, this process manages project changes.

e- **Close Project or Phase:** This process contains the tasks necessary to close the project, or the project phases.

2-**Project Scope Management:** This knowledge area involves the project scope, that is, the work that is included within the project. Since scope changes are one of the top causes of project changes and grief in general, it is very important that the boundaries of the project be well defined from the outset and monitored rigorously.

a- Plan Scope Management: The Scope Management Plan is part of the project management plan and can be a section within it rather than a stand-alone document.

b- Collect Requirements: At this stage the detailed requirements of the final product or service are assembled and itemized.

c- Define Scope: A scope statement is created which can be in sentence form or bulleted.

d- Create WBS: A Work Breakdown Structure (WBS) contains either a graphical or table-style breakdown of the project work.

e- Validate Scope: During the project the deliverables are "validated" meaning they are approved by the recipient.

f- Control Scope: The scope statement must be revisited regularly considering the project work that has been completed and current project status.

3-**Project Schedule Management:** This is usually the most time consuming of the knowledge areas. During planning, the project manager must divide the project into tasks and create both a schedule (start and finish dates for each task) and budget for each task.

a- **Plan Schedule Management:** The Schedule Management Plan contains information such as how the schedule will be created, who will be responsible for it, how aggressive it will be, and under what circumstances it will be changed.

b- **Define Activities:** The project is divided into tasks, note that according to the PMBOK this process is different from Create WBS within the Scope Management knowledge area, but in practice they are generally the same.

c- **Sequence Activities:** The tasks are "sequenced" that is, they are ordered and the relationships between them are established. These relationships take the form of Finish-to-Start (FS), Finish-to-Finish (FF), Start-to-Start (SS) and Start-to-Finish (SF). For small projects with simple schedules this is not necessary.

d- **Estimate Activity Durations:** Using its resource list, a duration is estimated for each task.

e- **Develop Schedule:** Firstly, a network diagram is produced which determines the critical path as well as floats for each task. Secondly, a graphical bar chart schedule is created with each activity plotted on their early start dates.

f- **Control Schedule:** Earned value analysis is performed on regular project status intervals to determine whether the project is ahead or behind schedule, and by how much, at that status point.

4- **Project Cost Management**: The project budget is usually one of the most sensitive parts of a project. Wouldn't it be nice to have project budgets that are comfortable and contain plenty of cushion, but very few projects have this luxury. The budget must be established through rigorous estimating techniques and monitored to ensure there are no unnecessary changes that make stakeholders unhappy.

a- **Plan Cost Management:** The Cost Management Plan establishes things like the methodologies with which the project budget will be established, the criteria for changes, and control procedures.

b- **Estimate Costs:** The cost of each task is estimated, considering the resources, labor, materials, equipment, and any other item of cost necessary to complete the task.

c- **Determine Budget:** The task budgets are rolled up into an overall project budget.

d- **Control Costs:** Earned value analysis is performed on regular project status intervals to determine the project status at that status point.

5-Project Quality Management: Quality is one of the triple constraints of Time, Cost, and Quality. As such, when you need better quality, you need to put in more time or cost. Because of this integral nature of the quality of the project's deliverables, the quality level should be established during project planning and specified within the project management plan. Then when issues arise regarding product specifications, there is a plan to deal with it.

a- **Plan Quality Management:** The Quality Management Plan can be a section of the project management plan or a stand-alone document, and it contains the quality specifications for the product or service. There should be no doubt whether the product being produced is a Mercedes-Benz or a Pinto.

b- **Manage Quality**: The processes that ensure the quality of the deliverables must be inspected regularly to ensure they are working.

c- **Control Quality:** The deliverables themselves are inspected to ensure they conform to the quality standards.

6-Project Procurement Management: Almost all projects have some form of outside procurement. Hiring subcontractors can get the job done quicker or with better expertise but sacrifices the ability to control the quality, schedule, or other factors. Also, the fine print often results in budget and schedule overruns that were not envisioned.

a- **Plan Procurement Management:** The Procurement Management Plan identifies the outside procurement needs of the project and parameters under which the contractors will be procured.

b- **Conduct Procurements:** The contractors are hired. This process involves producing the statements of work, terms of reference, request for proposals, and such, as well as soliciting the responses and choosing a vendor.

c- **Control Procurements:** During project execution the contractors must be managed, and the contracts monitored to provide early warning of project changes.

7-Project resources Management: The project team is usually one of the most important factors in the success of a project. If you have a good team, you will have a successful project. This knowledge area is concerned with acquiring the right team, ensuring their satisfaction, and tracking their performance.

a-**Plan Resource Management:** The Human Resource Management Plan identifies the roles/positions required by the project, the minimum requirements for those roles, and how they fit into the overall project structure.

b- **Estimate Activity Resources:** To ensure the necessary resources are available, the quantity of each resource needs to be estimated.

c- **Acquire Resources:** Once the required number of resources has been estimated, the resources can be acquired.

d- **Develop Team**: The project team often requires training to develop the necessary competencies to complete the project, but the development of the team environment and interaction between team members is also actively managed.

e- **Manage Team:** The project team is actively managed to ensure their production is maximized and they are satisfied.

f- **Control Resources:** The resources are monitored, and their performance evaluated to ensure maximum productivity.

8-Project Communications Management: Communication with stakeholders is often the key factor that allows stakeholders to be satisfied even when unexpected changes happen. It is essential to develop a communications plan to keep all stakeholders "in the loop" throughout the project and communicate early and often when unexpected issues occur.

a- **Plan Communications Management:** The Communications Management Plan identifies the regular communication requirements of each stakeholder, such as investor circulars, progress updates, and so forth. It also identifies any specific communications procedures for unexpected issues or project changes.

b- **Manage Communications:** During project execution the communications plan is put into practice and communications are actively managed.

c- **Monitor Communications:** During regular status points the project communications are reviewed and revisions to the communications plan are initiated.

9-Project Risk management: Managing project risk is one of the most underrated aspects of project management. Major risks are very seldom identified up front and analyzed within the project management plan, but when they are project stakeholders tend to forgive the unexpected issues much quicker. Not to mention they hold the project manager in high regard for strong safeguarding of their investments.

a- **Plan Risk Management:** The Risk Management Plan identifies how the risks will be itemized, categorized, and prioritized.

b- **Identify Risks:** The major risks to the project are identified and placed into a risk register (list of risks). Most projects have one or two risk that take significant precedence over all others, and these should often get special attention.

c- **Perform Qualitative Risk Analysis:** Once the biggest risks are identified, they are classified into categories of likelihood and impact, and then ranked according to priority.

d- **Perform Quantitative Risk Analysis:** Once the risks are ranked according to priority, the biggest priority risks are numerically analyzed according to their impact to the project budget, schedule, or any other part of the project.

e- **Plan Risk Responses:** For the most important risks, response plans are drafted such that all parties are aware of how to respond to the occurrence of the risk.

f- **Implement Risk Responses:** The risk responses identified in the previous step are carried out.

g- **Monitor Risks:** At regular status points the risk register is inspected and risks that have expired are crossed off.

10- Project Stakeholder Management: There is nothing more important than the project's stakeholders. You could, in theory, declare a project a success if the stakeholders are satisfied but the project was a disaster (although I wouldn't recommend this line of thinking). The stakeholders should be actively managed and addressed within the project management plan.

a- **Identify Stakeholders:** During the project initiation phase the major stakeholders are identified and their concerns established.

b- **Plan Stakeholder Engagement:** The Stakeholder Management Plan lists each stakeholder and prioritizes their concerns and potential impacts on the project.

c- **Manage Stakeholder Engagement:** During project execution the stakeholders must have their needs addressed and communication lines must remain open.

d- **Monitor Stakeholder Engagement:** During status intervals each stakeholder must be considered to determine if their needs are being addressed and if changes need to be made to ensure that they are.

What Is a Project Manager:

A project manager is the individual tasked with planning and executing the project: this is the person responsible for leading the team and organizing the work.

* However, most project managers share common roles and responsibilities. Some of the more traditional duties of a project manager include the following.

a- **Scope Management**: Defining the work needed to complete the project activities.

b- **Task Management**: Planning tasks and defining their deliverables.

c- **Resource Management**: Using people, capital, materials and all other resources efficiently.

d- **Team Management**: Assembling and leading a team.

e- **Schedule Management**: Analyzing the duration of activities to create a project schedule. Once the execution phase begins, the project status must be monitored to update the schedule baseline.

f- **Quality Management**: Establishing a quality policy for the project's deliverables and implementing quality assurance and quality control procedures.

g- **Cost Management**: Estimating costs and creating a budget.

h- **Stakeholder Management**: Satisfying stakeholders' expectations and communicating with them throughout the project life cycle.

i- **Risk management**: Identifying, monitoring and minimizing project risk.

j- **Status Reporting**: Monitoring and tracking progress and performance by generating reports and other documentation.

Construction management :

Planning, scheduling is an important part of construction management. Planning and scheduling of construction activities helps engineers to complete the project in time and within the budget. The term 'Construction 'does not only denote physical activities involving men, materials and machinery but also covers the entire gamut of activities from conception to realization of a construction project. Thus, management of resources such as men, materials, machinery requires effective planning and scheduling of each activity.

What is Construction Management?

Management is the science and art of planning, organizing, leading and controlling the work of organization members and of using all available organization resources to reach stated organizational goals. Construction management deals with economical consumption of the resources available in the least possible time for successful completion of construction projects. 'Men' , 'materials', 'machinery 'and 'money 'are termed as resources in construction Management.

Objectives of Construction Management:

The main objectives of construction management are, Completing the work within estimated budget and specified time. Maintaining a reputation for high quality workmanship Taking sound decisions and delegation of authority Developing an organization that works as a team.

The functions of construction Management are:

1- Planning
2- Scheduling
3- Organizing
4- Staffing
5- Directing
6- Controlling
7- Coordinating

1- **Planning in Construction Management**: It is the process of selecting a particular method and the order of work to be adopted for a project from all the possible ways and sequences in which it could be done. It essentially covers the aspects of 'What to do 'and 'How to do it'.

Importance of construction project planning:

Planning helps to minimize the cost by optimum utilization of available resources. Planning reduces irrational approaches, duplication of works and inter departmental conflicts. Planning encourages innovation and creativity among the construction managers. Planning imparts competitive strength to the enterprise.

2- **Scheduling in Construction Management**: Scheduling is the fitting of the final work plan to a time scale. It shows the duration and order of various construction activities. It deals with the aspect of 'when to do it'.

Importance of construction project scheduling:

Scheduling of the programming, planning and construction process is a vital tool in both the daily management and reporting of the project progress.

3- **Organizing:** Organizing is concerned with the decision of the total construction work into manageable departments/sections and systematically managing various operations by delegating specific tasks to individuals.

4- **Staffing:** Staffing is the provision of the right people to each section / department created for successful completion of a construction project.

5- **Directing:** It is concerned with training subordinates to carry out assigned tasks, supervising their work and guiding their efforts. It also involves motivating staff to achieve desired results.

6- **Controlling**: It involves a constant review of the work plan to check on actual achievements and to discover and rectify deviation through appropriate corrective measures.

7- **Coordinating**: It involves bringing together and coordinating the work of various departments and sections so as to have good communication. It is necessary for each section to be aware of its role and the assistance to be expected from others.

Importance of Construction Management:

Construction management practices invariably lead to "maximum production at least cost". A good construction management, results in completion of a construction project within the stipulated budget. Construction management provides importance for optimum utilization of resources. In other words, it results in completion of a construction project with judicious use of available resources.

Construction management provides necessary leadership, motivates employees to complete the difficult tasks well in time and extracts potential talents of its employees. Construction management is beneficial to society as the effective and efficient management of construction projects will avoid, escalation of costs, time overrun, wastage of resources, unlawful exploitation of labor and pollution of environment.

What is Construction Project Management?

In brief, construction project management is the process of managing construction projects. But when you're talking about managing a construction project in comparison to other types of projects, the distinction is mostly that construction is mission-based. That means that the project's organization ends with the end of the project build.

While generally project management is defined as managing resources over the life cycle of a project through various tools and methodologies to control scope, cost, time, quality, etc—when working in the construction industry your outlook must be broader. It usually includes a wider variety of constraints to consider that are specific to the design and build of construction projects. Construction project management can interact with a variety of different disciplines in the lifetime of a project as well, from architecture to engineering to public works to city planning.

Types of Construction Projects:

There are a variety of different types of construction projects, depending on the different construction sectors. There are two sectors in construction: residential and commercial. Depending on the sector, there can be up to four different types of projects:

1- **Residential home building and renovation**
2- **Heavy industrial construction**
3- **Commercial and institutional construction**
4- **Engineering construction**

That means there are a wide variety of types of construction projects that require construction management to be successful. Construction management might be required for a simple home to a large bridge, from engineering a dam build to an airport seismic retrofit project. Construction project managers, then, manage the beginning and end of a project build, often managing on-site to ensure the safe, successful construction.

The Construction Project Manager:

Construction project management is run by a construction project manager. This person is tasked with the planning, coordination, budgeting and supervision of the construction project.

*Construction project manager responsible for the following tasks:

1-Estimate and negotiate project costs.
2-Formulate budget.
3-Create schedule and work timetables.
4-Manage work orders.
5-Determine which methods and strategies are appropriate for the project.
6-Communicate with clients and stakeholders, re. budget, progress, etc.
7-Lead or interface with workers, teams and other construction professions on technical and contract details.
8-Work with building, construction and regulatory specialists.

*Key Principles of Construction Project Management

Construction project management requires a broad variety of skills, along with the ability to interface with a diverse range of agencies and people in order to lead the project from concept to build. It's important that construction project managers follow the principles of project management during every phase of the project.

*Conceiving and Initiating the Project:

You can't start a project unless you know you'll be able to finish it. First comes the due diligence to determine if the project is even feasible. How do you figure this out? You want to go through a feasibility study or what is often called a business case, in which you look at the goals, cost and timeline to see if you have resources to reach a successful project end within those constraints. You also want to define the reasoning behind the project and make sure it's sound. If so, then you create your project charter to help initiate the project. You'll also identify potential issues and risks in this phase.

Stages of Construction Project Management:

When you're managing a construction job there are certain objectives you should consider. You reach them in stages. Just like in any project, you accomplish it by breaking it down. The following are four steps you can take to organize a successful construction project management project.

1-Design
2-Preconstruction
3-Procurement
4-Construction

1-**Design:**
There are four parts to designing a construction project. It's the responsibility of the project manager to make sure your design meets with building codes and other regulations.
The concept. What are the needs, goals and objectives of the project? You'll be making decisions based on the size of the project, the site allocated for the build and the actual design of what you're building. This consists of a list for each room or space under consideration, including all critical data.
The schematic design. This is a sketch that identifies all the various parts, materials, sizes, colors, textures, etc. It includes the floorplan, elevations, etc., even a site plan.
Develop the design. This requires research. What are the materials to use? What equipment will be needed? How much are the materials? You'll be refining the original drawings from the previous stage now to reflect these decisions. Knowing local building codes and adhering to them will be important at this stage.
Get the contract documents together. These are the final drawing and construction specs. These will be used by outside contractors to bid on the job.

2-**Preconstruction :**
Once the bids are accepted, but before ground is broken, you'll have these three steps to work on:
a- Assign a project manager. Do this if it has't already been determined. Sometimes a project manager is on board early and participates in the first stages of a project, while other times they aren't hired until the design is complete.
b- Determine the rest of the personnel. Find a contract administrator: this is the person who help the project manager. A superintendent is needed now, as well, who keeps everything on schedule in terms of the materials, deliveries and equipment. They're also on site to deal with construction activities. Finally, you want to have a field engineer, which is more an entry-level position to deal with paperwork.
c- Investigate the site. Check to see if anything is needed. The site must be ready for the construction, which might mean dealing with environmental issues, such as the suitability of the soil for construction.

3-**Procurement:** You have people and you've planned for the construction and materials necessary to complete it. Now you must purchase those materials and equipment. This might be the responsibility of the general contractor or subcontractors, depending on the organization of the business doing the construction.

4-**Construction :**
Finally, you're ready for the build! But first you have a preconstruction meeting to deal with work hours, the storage of materials, quality control and site access. Then get everyone on site and set up.

You'll need to create a schedule of payment and a process to deliver them. This information needs to be transparent, not only to meet financial obligations, but to maintain a happy and productive workforce and environment. Make sure your work orders are detailed enough to avoid misunderstandings between you and your contractors.

Reference :

1- thedigitalprojectmanger.com
2-Udemy.com
3-nexttrainning.com
4-pmi.org
5-projectmanger.com
6-techtarget.com