

## **Practical 5: Project Management Tools and Techniques**

Project management is the discipline of planning, organizing, securing, and managing resources to achieve specific goals within a defined time frame and budget constraints. It involves overseeing a project from its initiation through planning, execution, and closure. Project management encompasses various processes, methods, and tools to ensure that a project is completed successfully.

**Knowledge area** refers to a specific area of expertise or focus that is essential for successfully managing a project. Project management knowledge areas are the key components or domains of knowledge that project managers and their teams need to understand, apply, and integrate to effectively plan, execute, and control a project. These knowledge areas serve as a framework for organizing and categorizing project management processes and best practices.

The Project Management Institute (PMI) defines ten knowledge areas in its Project Management Body of Knowledge (PMBOK), which is a widely recognized standard in the field of project management. These ten knowledge areas are:

**1. Project Integration Management:** This knowledge area encompasses the processes required to ensure that various elements of a project are properly coordinated, including project initiation, planning, execution, monitoring and controlling, and project closure.

**2. Project Scope Management:** Focuses on defining, managing, and controlling the project scope, including the work that needs to be done and the work that should not be done.

**3. Project Schedule Management:** Involves activities to develop, maintain, and control the project schedule, ensuring that it is completed within the specified timeframe.

**4. Project Cost Management:** Focuses on budgeting, estimating, and controlling project costs to ensure that the project remains within budget.

**5. Project Quality Management:** Involves activities to ensure that the project meets the specified quality standards and requirements.

**6. Project Resource Management:** Encompasses the acquisition, allocation, and management of human resources, equipment, materials, and other resources needed for the project.

**7. Project Communications Management:** Addresses how project information is communicated to stakeholders, including reporting, distribution, and performance reporting.

**8. Project Risk Management:** Focuses on identifying, assessing, and managing risks and uncertainties that could impact the project's objectives.

**9. Project Procurement Management:** Deals with the procurement and management of goods and services from external vendors, including contracting and supplier selection.

**10. Project Stakeholder Management:** Encompasses identifying and managing stakeholders, understanding their interests, needs, and expectations, and ensuring their engagement throughout the project lifecycle.

### **Project Integration Management:**

Project integration management is an organized approach that ensures all processes within a project are synchronized and executed efficiently, and resources remain on track to achieve the project goals. It helps project managers to balance stakeholder expectations and customer needs while optimizing tasks and resources, steering the project toward success.

A project manager is required to oversee many components of the project, such as scope, schedules, costs, and resources. He or she must avert risk and facilitate smooth communication. Quality must be ensured, and clients and stakeholders must be appeased!

The seven important steps in project integration management are:

#### **1. Creating a Project Charter**

Every project starts with creating a project charter or a project document. This document will mention all the key stakeholders involved and the necessary points of contact. This is an official document that covers the project goals, timelines, budget, deliverables, and processes. This is a backbone to lead the project from the beginning till the end.

#### **2. Establishing a Project Management Plan**

Create a master plan, determining the deliverables of the project, significant benchmarks, timelines, and other necessary information for evaluating success. Project managers and team leaders divide the project into smaller milestones or steps, giving it a work-breakdown structure.

#### **3. Managing Project Execution**

In the process of project execution, the team executes the project plan by following the functions and performing tasks to achieve results on time and on budget. Managers participate in task management, implementation of stakeholder meetings,

communication and coordination, analysis of updates and reports, and resource management. The goal of project execution is that every resource in the project plan and service description is efficient and productive.

#### **4. Managing Project Knowledge**

In this process, managers utilize the existing information and acquire new or additional information to achieve the set business goals. This process in the integration ensures that every member of the team knows what they need to know and when they need to know it. It increases the value of knowledge exchange and stimulates innovation within the organization.

#### **5. Monitoring and Controlling Project Work**

Project integration management tries to make sure there is harmony in all the areas of the project such as communication, time, scope, budget, quality, personnel, risk, procurement, and stakeholders. The project work must be carefully monitored and directed to ensure compliance with the project management plan. Managers regularly perform earned value analysis to determine the budget and schedule of the project.

#### **6. Integrated Change Control**

Managers must ensure that any change request in terms of budget, term, resources, and so on are curbed to the extent possible. The changes control board must evaluate the changes to determine alternatives and solutions. This is fundamental for positive delivery to customers.

#### **7. Closure of the Project**

Once the project work is completed and the results are finally accepted by the client, it is time to conclude the project. The team leaders and managers first conduct a formal review of the entire project. This will define project successes, problems and lessons learned to improve future opportunities.

#### **Project Scope Management:**

Project Scope Management is a process that helps in determining and documenting the list of all the project goals, tasks, deliverables, deadlines, and budgets as a part of the planning process.

For a project manager, managing the expectations of the stakeholders and clients is one of the most challenging tasks. With a definite project scope, managers can easily stay on track and ensure that all the deadlines are being followed throughout the project life cycle.

The six processes involved in accurately identifying the project scope management:

##### **1. Planning scope management**

Create a scope plan document that you can refer to in the later stages.

The document mainly helps in defining, managing, validating, and controlling the project's scope. It includes:

- Detailed project scope statement
- Breakdown of all the project requirements
- Expected project deliverables
- Project change control process

## **2. Collecting requirements**

You will be required to document all the project requirements, expectations, budgets, and deliverables through interviews, surveys, and focus groups.

You should gather the following in this phase:

- Functional as well as non-functional requirements
- Stakeholder requirements
- Business requirements
- Support and training requirements
- Project requirements

## **3. Defining the scope**

At this step, you need to turn requirements into a well-detailed description of the service or product that you are trying to deliver through the project. Any kind of inclusions to the scope would then have to go through the entire change control process to ensure the team is only working on things that they are supposed to work on. With a defined scope, you get a reference point for your project team and anyone else involved. In case there is something that is not involved in the scope, it doesn't need to be completed by the team.

## **4. Making a project breakdown structure**

A project breakdown structure is a document that breaks down all the work which needs to be done in the project and then assigns all the tasks to the team members. It lists the deliverables that need to be completed and their respective deadlines as well. You can use project management software for this step of the process to assign and prioritize project tasks which will make it easier to track the entire progress of the project and avoid any unnecessary bottlenecks.

## **5. Validating scope**

In this step, the scope and deliverables that you have recorded need to be sent to project executives and stakeholders to get the necessary approvals. Scope validation needs to be done before starting the project to ensure that if something goes wrong then it is easy to find where it went wrong.

## **6. Controlling scope**

Project managers need to ensure that as the project begins, it always stays within the defined scope. In case there are some things that need to change, then the proper change control process should be followed.

### **Project Schedule Management:**

Project schedule management is defining, creating, and maintaining a project schedule to ensure the project is completed on time and within budget. A project schedule is a document that outlines the tasks and activities that need to be completed to achieve the project's goals.

Steps in Creating Project Schedule:

#### **Step 1: Define the project scope and objectives**

Define the scope and objectives of the project. This involves determining what the project is trying to achieve and what it is not trying to achieve.

#### **Step 2: Break the project down into tasks**

Break the project down into individual tasks. Start by brainstorming a list of all the activities needed to achieve the project's goals. Then, organize these tasks into logical sequences and group related tasks together.

#### **Step 3: Estimate the duration and resources for each task**

Estimate how long each task will take to complete personnel, equipment, materials needed. This helps to understand project's timeline, resource requirements.

#### **Step 4: Create a project timeline**

Create a project timeline. Start by mapping out the sequence of tasks, showing which tasks must be completed before or after other tasks. Then add milestones to mark critical points or events in the project timeline. Finally, add an estimated timeline to the project schedule so that you can track progress and identify any potential delays or roadblocks.

#### **Step 5: Assess risks and assumptions**

It's essential to assess any risks or assumptions that could affect the project and develop strategies to address them. This will help ensure the project runs smoothly and is completed on time and within budget.

#### **Step 6: Communicate and report**

To ensure everyone involved in the project is on the same page, it's essential to have a plan for how the project team will communicate and report progress and status to stakeholders. This could include regular project updates, status meetings, or a dedicated dashboard to track progress and deadlines.

### **Project Cost Management:**

Project cost management is the process of estimating, budgeting and controlling costs throughout the project life cycle, with the objective of keeping expenditures within the approved budget.

Without a predefined budget, not only is it difficult to answer these questions, but it becomes impossible to assess whether you are progressing in the right direction once the project is underway.

#### **1. Project Resource Planning**

Resource planning is the process of identifying the resources required to execute a project and take it to completion. Examples of resources are people (such as employees and contractors) and equipment (such as infrastructure, large construction vehicles and other specialized equipment in limited supply).

Resource planning is done at the beginning of a project, before any actual work begins.

To get started, project managers first need to have the work-breakdown structure (WBS) ready. They need to look at each subtask in the WBS and ask how many people, with what kind of skills are needed to finish this task, and what sort of equipment or material is required to finish this task?

#### **2. Cost Estimation**

Cost estimation is the process of quantifying the costs associated with all the resources required to execute the project. To perform cost calculations, we need the following information:

- Resource requirements (output from the previous step)
- Price of each resource (e.g., staffing cost per hour, vendor hiring costs, server procurement costs, material rates per unit, etc.)
- Duration that each resource is required
- List of assumptions
- Potential risks
- Past project costs and industry benchmarks, if any
- Insight into the company's financial health and reporting structures

#### **3. Cost Budgeting**

Cost budgeting can be viewed as part of estimation or as its own separate process.

Budgeting is the process of allocating costs to a certain chunk of the project, such as individual tasks or modules, for a specific time period. Budgets include contingency reserves allocated to manage unexpected costs.

Budgeting creates a cost baseline against which we can continue to measure and evaluate the project cost performance. If not for the budget, the total estimated cost would remain an abstract figure, and it would be difficult to measure midway.

Evaluation of project performance gives an opportunity to assess how much budget needs to be released for future phases of the project.

#### **4. Cost Control**

Cost control is the process of measuring cost variances from the baseline and taking appropriate action, such as increasing the budget allocated or reducing the scope of work, to correct that gap. Cost control is a continuous process done throughout the project lifecycle. The emphasis here is as much on timely and clear reporting as measuring.

Earned value management (EVM) is one of the most popular approaches to measuring cost performance. Example.

At the end of a week, you measure the progress of task X and find that it's 25% complete. Now, how do you assess if you are on track to meet the task budget? First, a project manager calculates the planned value for this task (at the planning stage). Let's say, Task X has a budget of Rs4000 and is expected to be 50% complete by the week.

Planned value (PV) of task X by the week =  $\text{Rs}4000 * .5 = \text{Rs}2000$

Earned value (EV) of task X by the week =  $\text{Rs}4000 * .25 = \text{Rs}1000$

Now, you also determine the actual cost (AC) of the work, which involves other variables such as equipment and material costs (say, Rs800).

Schedule variance =  $\text{EV} - \text{PV} = \text{Rs}1000 - \text{Rs}2000 = -\text{Rs}1000$ .

Cost variance =  $\text{EV} - \text{AC} = \text{Rs}1000 - \text{Rs}800 = \text{Rs}200$ .

The negative schedule variance indicates that the task is falling behind, but the positive cost variance indicates that it's under budget.

#### **Project Quality Management:**

Project quality management is defined the process of continually measuring the quality of all activities and taking corrective action until the desired quality is achieved.

#### **Elements of Project Quality Management**

There are three primary areas of project quality management: quality planning, quality assurance, and quality control. Each of these fills a slightly different role in the quality management process.

##### **1. Quality Planning**

The quality planning area of project quality management clearly defines how a process or plan of action will be performed. It might involve drawing up a charter for a company project, forming a clear objective or end goal of the project, or painting a clear picture of what the finished product might look like if the project is carried out successfully. Quality planning will usually entail assessing possible risk, setting appropriate standards, and documenting all necessary project materials.

##### **2. Quality Assurance**

Of the three branches of project quality management, quality assurance is probably the biggest. Companies have had designated quality assurance managers for decades to ensure that all systems, processes, and production are safe, efficient, and effective. Quality assurance teams are responsible for ensuring and proving that

all processes are being performed as optimally as possible, usually to meet company expectations and be compliant with local regulations. Audits and checklists are two examples of how quality assurance might measure safety and effectiveness.

### **3. Quality Control**

Quality control often involves taking steps to identify problems and perform the necessary corrective action(s). Where quality assurance seeks to be proactive and prevent problems from occurring, quality control is reactive, and is implemented after a problem has already occurred. Ultimately, quality control boils down to maintaining business standards. A few areas that this segment of project quality management might target include: improving unsafe production processes, correcting faulty manufacturing (e.g. lopsided caps or uneven bottles in manufacturing), and repairing malfunctioning or ineffective equipment.

### **Project Resource Management:**

Resource management is an aspect of the project management process that plans, organizes, manages, and measures people's work. Its purpose is to plan, allocate and schedule the company's resources as efficiently as possible. This is done by maximizing each resource's utilization.

### **Types of Resources in Project Management**

**Finances** – How much can be invested in new equipment or employee training?

**Staffing** – designers, construction crews, drivers, auditors

**Space and rooms** – meeting rooms, office studios, warehouses

**Equipment** – cranes, vehicles, pipes, cameras

**Technology** – software, tools, and digital systems

### **Resource Management Processes**

**Utilization** – shows the percentage (%) of the resource in use for the selected time slot. It can be people's time or skills, machinery usage, or time spent in meeting rooms. Maximum utilization is always 100%. One of the goals of resource management is to maximize resource utilization as effectively as possible.

**Resource plan** – is the step before resource scheduling. This helps you understand all the different resources needed to finish the project. You should make the resource plan as detailed as possible.

**Starting date and ending date** – the actual dates when the project or task is set to start and when it is expected to finish.

**Duration** – shows the project or task length in days/hours.



### **Project Resource Management Techniques**

**Resource allocation** – helps you identify the types and amounts of resources needed to fulfill your projects. The allocation process assigns specific resources to specific project tasks.

**Resource aggregation** – shows the consumed amount of resources on a daily, weekly or monthly basis. It's basically the sum of resources used for one task or project in a given timeframe.

**Resource scheduling** – if you know the resource allocation and have a decent overview of their consumption, it is much easier to schedule them to actual resource and project plans. Resource plans show the exact time a resource is needed. Resource scheduling helps to ensure:

- the efficient use and utilization of the resources;
- a realistic schedule with start and end dates for tasks;
- see possible problems and conflicts due to lack of project resources;
- better future planning.

### **Project Communication Management:**

Project communication management is a collection of processes that help make sure the right messages are sent, received, and understood by the right people.

#### **How to create a project communication management plan**

When creating a plan, project managers should follow these five steps:

**Decide your objectives:** What will be the purpose of your communication? You may use some communication tools for awareness, such as a status report. Others may require action, such as requiring a sponsor to authorize spending or a customer to approve project testing.

**Determine your audience:** Who are the stakeholders in this project? You should make an extensive list of everyone involved. Consider anyone impacted by the project or who influences its success. This list should include team members, sponsors, customers, and other interested parties.

**Write your message:** What will the message be for each type of communication? This is the actual content that will be shared. Key components to be communicated include scope, schedule, budget, objectives, risks, and deliverables.

**Choose your channel:** How will the message be delivered? Will it be a formal report emailed out to all stakeholders? Or will it be an informal verbal debrief during a team meeting?

**Set a timeline:** When will you deliver your message? Do your stakeholders require weekly or monthly reports? Is there a deadline to meet? Consider varying time zones and employee schedules here.

### **Project Risk Management:**

Project risk management is the process that project managers use to manage potential risks that may affect a project in any way, both positively and negatively. The goal is to minimise the impact of these risks.

A risk is any unexpected event that can affect people, technology, resources, or processes (including projects). Unlike a regular problem that may arise, risks are incidents that may occur suddenly, sometimes entirely unexpected.

### **5 steps to manage project risks**

#### **1. Identify potential risks**

The first step is identifying all potential risks that could affect your project's timeline or goals. It includes closely analyzing the overall project plan and determining any potential issues that could arise. Schedule brainstorming sessions with your project team and stakeholders.

#### **2. Analyze the identified risks**

Start analyzing them to understand how and to what extent they can impact your project. Focus on quantitative and qualitative risk analysis. When assessing risks, consider three key factors: risk probability (likelihood of a risk event occurring), risk impact (consequences of a risk event occurring), and risk vulnerability (extent to which a risk event can be controlled).

#### **3. Create a response plan**

The response plan should include how you'll address each of the identified high-priority risks. The plan should also be achievable, practical, and tailored to fit your project's specific needs.

#### **4. Implement the response plan**

After developing a response plan, it's time to implement it. This will require close coordination between team members and stakeholders. Make sure everyone involved in the project is aware of the risks and knows what they need to do to mitigate them. To execute the plan effectively, designate someone to be in charge of each step so there is continuity and no confusion. As the project progresses, keep a close eye on the risks and make changes to the response plan as needed.

#### **5. Monitor and evaluate risks**

Risk management is not a one-time activity; it's an ongoing process that should be revisited regularly. And that's why you should never stop monitoring and evaluating project risks.

Continuous monitoring will allow you to track the progress of mitigation measures, ensure they are effective, and make necessary adjustments when required.

### **Project Procurement Management:**

Procurement management refers to all the actions and strategies related to the cycle of identifying, evaluating and selecting suppliers of production inputs. This involves creating a procurement management plan, testing quality, managing procurement contracts, executing purchases and any other activity that's needed to control how purchases are made in your organization.

### **Procurement Management Process**

#### **1. Plan Procurement Management**

Procurements are first identified during the planning phase of the project. For every external contractor, there needs to be a statement of work (SOW) to serve as a document outlining the work being contracted.

#### **2. Conduct Procurements**

The conduct procurement phase is when you study the bids that come back and determine which one to accept. Before deciding, however, there should be a criterion in place to decide which bid is best for the project and fits your logistics management. The agreements are then signed and the project management plan is updated.

#### **3. Control Procurements**

Once the contracts are signed, the management of those contractors must be folded into the overall management responsibilities. Contractors can have a negative impact on budgets and schedules, which can lead to a project going off-track or worse. Therefore, regular status updates are necessary to review contractor agreements, get progress updates and review work performance to make sure that the contractors are meeting the requirements outlined in their contracts. Though you hire contractors because they're experts in what they do, you still need to monitor and track their work to make sure it's proceeding as planned.

#### **4. Close Procurements**

Just as there's a process to start the procurement, there needs one in place to finalize it. What constitutes completed work should be detailed in the initial agreement with the contractor so there's no confusion on either's part as to when the work is done.

### **Project Stakeholder Management:**

A stakeholder is an individual, group or organization that is impacted by the outcome of a business venture or project. Project stakeholders, as the name implies, have an interest in the success of a project, and can be internal or external to the organization that is sponsoring the project.

Stakeholder management is a project management process that consists in managing the expectations and requirements of all the internal and external stakeholders that are involved with a project.

### **Stakeholder Management Process**

#### **1. Stakeholder Analysis**

Stakeholder analysis is a series of steps, stakeholder identification, stakeholder mapping and stakeholder prioritization. In simple terms, stakeholder analysis could be defined as the process of understanding who your project stakeholders are, what's their level of influence and involvement, and their importance for your project or business.

#### **2. Stakeholder Identification**

This process consists in identifying all your internal and external stakeholders. Later these stakeholders will be analyzed, prioritized and engaged. For this, review project planning documents such as your project charter to help you find stakeholder information and look for any government regulations that might apply to your project. If so, those government agencies become project stakeholders and identify all the people and organizations involved with your supply chain.

#### **3. Stakeholder Mapping**

Now that you've identified all your internal and external stakeholders, it's time to determine their level of interest and the power or influence they have over the project. Create a power interest grid or power interest matrix

#### **4. Stakeholder Prioritization**

Once you have a thorough list, you can begin prioritizing your project stakeholders by their importance to the project. Decide who among them have the most influence on the project and are affected by it. Once you've determined who your key stakeholders are, it will be easier to keep an eye on them and determine which are the best stakeholder management strategies to keep them satisfied.

#### **5. Stakeholder Engagement**

Finally, with the information created in your stakeholder map, you figure out how to engage your stakeholders. This is the process by which you decide how you'll communicate and interact with your project stakeholders.

This leads to a stakeholder communication plan that outlines the channels and frequency of communications between you and each project stakeholder. You can use our communication plan template to get started.