

EXAMINATION NOTES

B.COM 4th SEMESTER

SUBJECT : PROJECT MANAGEMENT

PROGRAM CODE : DSC

COURSE CODE : 26COMI404DS04OD

EXTERNAL MARKS : 70 INTERNALC MARKS : 30

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UNIT -1

* PROJECT MANAGEMENT

Project Management is the process of **planning, organizing, executing, and closing** a project to achieve specific goals **within time, cost, and scope constraints**.

Core Elements

Scope – What work will be done (and what won't)

Time – Schedule, deadlines, milestones

Cost – Budget and resources

Quality – Standards and deliverables

Risk – Identifying and managing uncertainties

Communication – Keeping stakeholders aligned

Project Life Cycle

1. **Initiation** – Define goals, feasibility, stakeholders
2. **Planning** – Create schedule, budget, risk & resource plans
3. **Execution** – Do the work, manage the team
4. **Monitoring & Controlling** – Track progress, fix issues
5. **Closure** – Deliver final output, evaluate performance

Common Methodologies

Waterfall – Linear, step-by-step

Agile – Flexible, iterative (Scrum, Kanban)

Hybrid – Mix of both

PRINCE2 – Process-driven (common in UK/EU)

Role of a Project Manager

- Define objectives
- Manage team & resources
- Control risks and changes
- Communicate with stakeholders
- Deliver the project successfully

- Notes for **exam / assignment**
- **Real-life examples**
- **Diagrams** (life cycle, triangle, etc.)
- **Case study**
- **Short definition** (2–5 marks)
- **Full project plan** sample

Project Manager

A **Project Manager** is the person responsible for **planning, executing, monitoring, and closing** a project while ensuring it meets its objectives **on time, within budget, and according to scope and quality standards**.

***Responsibilities of a Project Manager**

1. Project Planning

- Define project goals and scope
- Develop project plans, schedules, and timelines
- Estimate costs and prepare the budget

2. Team Management

- Select and organize the project team
- Assign tasks and responsibilities
- Motivate and guide team members

3. Time Management

- Set deadlines and milestones
- Track progress against the schedule
- Ensure timely completion of tasks

4. Cost Management

- Monitor project expenses
- Control costs and avoid budget overruns
- Approve expenditures

5. Quality Management

- Ensure project deliverables meet required standards
- Conduct reviews and quality checks

6. Risk Management

- Identify potential project risks
- Develop risk mitigation plans
- Handle issues and uncertainties

7. Communication Management

- Communicate project status to stakeholders
- Conduct meetings and prepare reports
- Act as a link between team and stakeholders

8. Stakeholder Management

- Identify stakeholders and understand their expectations
- Manage conflicts and obtain approvals

9. Monitoring and Controlling

- Track project performance
- Manage changes in scope or schedule
- Take corrective actions when needed

10. Project Closure

- Ensure all deliverables are completed
- Hand over the project to the client
- Document lessons learned

Project Management as a Profession

Project Management has emerged as a **recognized and respected profession** due to the increasing complexity of projects in industries such as IT, construction, healthcare, manufacturing, and business services.

A project manager applies **specialized knowledge, skills, tools, and techniques** to plan, execute, monitor, and complete projects successfully while meeting organizational objectives.

***Project Management is a Profession**

1. Specialized Knowledge and Skills

Project managers require expertise in:

- Planning and scheduling
- Cost and risk management
- Quality control
- Leadership and communication

2. Formal Education and Training

- Professional degrees and diplomas in project management
- Continuous learning through workshops and certifications

3. Professional Certifications

- **PMP (Project Management Professional)** – PMI
- **PRINCE2**
- **CAPM, Agile Scrum Master**
These certifications set professional standards and ethics.

4. Defined Roles and Responsibilities

- Clear authority and accountability
- Standardized job descriptions across industries

5. Use of Standard Methodologies

- Agile, Waterfall, Hybrid, PRINCE2
- Globally accepted frameworks and best practices

6. Ethical Standards

- Professional bodies define codes of conduct
- Emphasis on integrity, responsibility, and fairness

7. Career Growth and Opportunities

- High demand across sectors
- Opportunities for advancement to program or portfolio management

Importance of Project Management as a Profession

- Improves project success rate
- Ensures efficient use of resources
- Enhances customer satisfaction
- Supports organizational strategy

Conclusion

Project Management is a professional discipline that combines **technical expertise, leadership, and ethical practices**, making it essential for modern organizations

***SELECTION OF A PROJECT MANAGER**

The **selection of a project manager** is a critical decision that directly affects the success of a project. An effective project manager must possess the right combination of **technical knowledge, leadership ability, and managerial skills**.

Factors to Consider in Selecting a Project Manager

1. Technical Competence

- Understanding of the project's technical requirements
- Knowledge of tools, technologies, and methodologies

2. Leadership Skills

- Ability to lead, motivate, and guide the team
- Strong decision-making capabilities

3. Experience

- Prior experience in managing similar projects
- Ability to handle complex and uncertain situations

4. Communication Skills

- Clear and effective communication with team members and stakeholders
- Strong negotiation and conflict-resolution skills

5. Planning and Organizational Skills

- Ability to plan schedules, budgets, and resources
- Strong time-management skills

6. Problem-Solving Ability

- Capability to identify issues early and take corrective action
- Analytical and critical-thinking skills

7. Authority and Responsibility

- Should be given adequate authority to make decisions
- Clear definition of responsibilities

8. Adaptability and Flexibility

- Ability to handle change and uncertainty
- Comfortable with new technologies and processes

9. Ethical Standards

- Integrity, accountability, and professionalism

Methods of Selection

- Internal promotion based on performance
- External recruitment for specialized projects
- Selection through interviews, assessments, and past performance review

*FITTING A PROJECT INTO THE PARENT ORGANISATION

(Project Management Team)

Fitting a project into the **parent organisation** means aligning the project and its **project management team** with the organisation's **structure, culture, policies, and strategic goals** so the project can be executed efficiently without conflict.

Key Aspects of Fitting the Project into the Parent Organisation

1. Organisational Structure

The project must fit within the organisation's structure:

- **Functional structure** – Project manager has limited authority
- **Matrix structure** – Authority shared between functional and project managers
- **Projectized structure** – Project manager has full authority

The project management team is formed accordingly.

2. Alignment with Organisational Strategy

- Project objectives should support the organisation's long-term goals
- Priorities, timelines, and deliverables must match business strategy

3. Authority of the Project Manager

- Clear definition of authority and responsibility
- Level of control over budget, resources, and decisions must be established

4. Integration with Functional Departments

- Project team members may come from different departments
- Proper coordination with HR, finance, procurement, and operations is essential

5. Communication and Reporting Relationships

- Clear reporting lines between project team and senior management
- Standard reporting formats and review meetings

6. Organisational Policies and Procedures

- Project must follow existing rules, standards, and procedures
- Use of organisation-approved tools and documentation

7. Organisational Culture

- Project management style should match organisational culture
- Team behaviour, leadership style, and decision-making should align

8. Resource Sharing and Conflict Management

- Shared resources may cause conflicts
- Strong coordination and management support are needed

Role of Top Management

- Provides support and authority to the project manager
- Resolves conflicts between project and functional managers

Conclusion

Fitting a project into the parent organisation ensures **smooth coordination, efficient resource utilization, and alignment with strategic goals**, leading to successful project outcomes

*PROJECT MODEL

A **project model** is a structured framework that shows **how a project is planned, executed, monitored, and completed**. It defines the **phases, activities, roles, and decision points** of a project from start to finish.

Common Project Models

1. Waterfall Model

A **linear and sequential** model where each phase must be completed before the next begins.

Phases:

- Initiation
- Planning
- Design
- Implementation

- Testing
- Deployment
- Closure

Advantages:

- Simple and easy to manage
- Clear documentation

Disadvantages:

- Rigid and difficult to change

2. Agile Model

An **iterative and flexible** model where work is done in small increments (sprints).

Features:

- Continuous customer feedback
- Adaptive to change
- Frequent delivery of working products

Examples: Scrum, Kanban

3. Spiral Model

Combines **planning, development, and risk analysis** in repeated cycles.

Key Focus: Risk management

Suitable for: Large and complex projects

4. V-Model

An extension of the Waterfall model where **testing is planned alongside development**.

Left side: Development phases

Right side: Testing phases

5. Incremental Model

Project is developed in **small functional parts**, each adding value.

Generic Project Life Cycle Model

1. **Concept / Initiation**
2. **Planning**
3. **Execution**
4. **Monitoring & Controlling**
5. **Closure**

Importance of a Project Model

- Provides clear structure and direction
- Improves planning and control
- Reduces risks
- Enhances communication

Conclusion

A project model helps organizations **manage complexity, control progress, and achieve project objectives efficiently**

phases of project management

Here you go ☐ — a **clear, standard answer** on the **Phases of Project Management**, perfect for exams, notes, or quick revision.

Phases of Project Management

Project management is carried out through a series of **systematic phases** known as the **Project Life Cycle**. Each phase has specific objectives and deliverables.

1. Initiation Phase

- Identify the project purpose and objectives
- Conduct feasibility study
- Identify stakeholders
- Prepare project charter

Output: Project approval

2. Planning Phase

- Define project scope
- Develop schedule and milestones
- Estimate cost and prepare budget
- Plan resources, risks, quality, and communication

Output: Project management plan

3. Execution Phase

- Perform the actual project work
- Manage project team and resources
- Communicate with stakeholders
- Ensure quality standards

Output: Project deliverables

4. Monitoring and Controlling Phase

- Track project progress
- Compare actual performance with plan
- Control scope, cost, time, and quality
- Manage risks and changes

Output: Performance reports and corrective actions

5. Closure Phase

- Complete and hand over deliverables
- Obtain customer acceptance
- Release project resources
- Document lessons learned

Output: Project closure report

Diagram Tip (for exams)

Initiation → Planning → Execution → Monitoring & Controlling → Closure

Conclusion

The phases of project management ensure **structured execution, effective control, and successful completion** of a project.

***Project Environment**

The **project environment** refers to all **internal and external factors** that influence the planning, execution, and success of a project. These factors affect how the project is managed and how decisions are made.

Types of Project Environment

1. Internal Project Environment

Factors **within the organization** that affect the project.

Includes:

- Organizational structure (functional, matrix, projectized)
- Organizational culture and leadership style
- Availability of resources
- Policies, procedures, and standards
- Skills and experience of the project team

2. External Project Environment

Factors **outside the organization** that influence the project.

Includes:

- Economic conditions
- Government laws and regulations
- Market competition
- Technological changes
- Social and cultural factors
- Environmental conditions

Key Elements of the Project Environment

1. Stakeholders

- Customers, sponsors, suppliers, users
- Their expectations and influence on the project

2. Organizational Culture

- Affects communication, decision-making, and risk-taking

3. Political Environment

- Power relationships and authority within and outside the organization

4. Physical Environment

- Location, climate, infrastructure

Impact of Project Environment

- Influences project planning and execution
- Affects risk management and decision-making
- Determines communication and leadership style

Role of Project Manager

- Understand and analyze the project environment
- Adapt management approach accordingly
- Minimize negative impacts and leverage positive factors

Conclusion

The project environment plays a crucial role in project success, and effective management requires **continuous awareness and adaptation** to environmental factors

***The 7S of Project Management (McKinsey 7S Model)**

The **7S model** is used to analyze and align the key elements of a project or organization to ensure **effective project execution and success**. It shows that successful project management depends on **both hard and soft factors**.

The Seven S's

1. Strategy

- The plan designed to achieve project objectives
- Aligns the project with organizational goals

2. Structure

- Organizational and project reporting relationships
- Defines authority, responsibility, and communication flow

3 Systems

- Procedures, processes, and tools used to manage the project
- Includes planning, budgeting, monitoring, and control systems

4. Staff

- People involved in the project
- Skills, experience, and availability of team members

5. Skills

- Technical and managerial competencies of the project team

- Problem-solving, leadership, and communication skills

6. Style

- Leadership and management style of the project manager
- Affects motivation, decision-making, and team culture

7. Shared Values

- Core beliefs, culture, and values of the organization
- Guide behavior and decision-making in the project

Classification

- **Hard S's:** Strategy, Structure, Systems
- **Soft S's:** Staff, Skills, Style, Shared Values

Importance of 7S Model in Project Management

- Ensures alignment between project and organization
- Helps identify gaps and weaknesses
- Improves project performance and coordination

Conclusion

The 7S model emphasizes that **all seven elements must work together** for effective project management and successful project outcomes

*Project Analysis and Selection

Project analysis and selection is the process of **evaluating, comparing, and choosing the most suitable project** from several alternatives based on organizational objectives, feasibility, and available resources.

Project Analysis

Project analysis involves a detailed study to determine whether a project is **viable and worthwhile**.

Types of Project Analysis

1. Technical Analysis

- Evaluates technical feasibility
- Availability of technology, skills, and equipment

2. Economic / Financial Analysis

- Cost–benefit analysis
- Return on Investment (ROI), Payback Period, NPV, IRR

3. Market Analysis

- Demand for the product or service
- Market size, competition, customer needs

4. Operational Analysis

- Ability of the organization to operate and maintain the project
- Availability of manpower and processes

5. Legal and Environmental Analysis

- Compliance with laws, regulations, and environmental standards

Project Selection

Project selection is the process of **choosing the best project** among alternatives based on analysis results.

Methods of Project Selection

1. Non-Financial Methods

- Strategic alignment
- Management judgment
- Scoring models
- Checklists

2. Financial Methods

- Payback Period
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Benefit–Cost Ratio

Factors Influencing Project Selection

- Organizational strategy
- Risk level
- Resource availability
- Time constraints

- Social and environmental impact

Conclusion

Project analysis and selection ensure that **resources are invested in projects that are feasible, profitable, and aligned with organizational goals**

UNIT -2

***Project Planning**

Project Planning is **the process of defining objectives, scope, resources, and schedules to guide the execution and control of a project. It ensures that the project is organized, feasible, and achievable within time, cost, and quality constraints.**

Objectives of Project Planning

- Define clear project goals and deliverables
- Estimate time, cost, and resources required
- Identify risks and plan mitigation
- Ensure efficient use of resources
- Provide a roadmap for project execution

Key Steps in Project Planning

1. Defining Project Scope

- Clearly state the work to be done and deliverables
- Identify boundaries: what is included and excluded

2. Setting Objectives

- Specific, Measurable, Achievable, Relevant, Time-bound (**SMART**) goals

3. Work Breakdown Structure (WBS)

- Break the project into smaller, manageable tasks
- Assign responsibilities and timelines

4. Scheduling

- Develop a timeline with milestones
- Use tools like **Gantt charts** or **PERT/CPM networks**

5. Resource Planning

- Identify human, financial, and material resources
- Allocate resources efficiently

6. Budgeting / Cost Estimation

- Estimate costs for all tasks
- Prepare a detailed project budget

7. Risk Management

- Identify potential risks and uncertainties
- Develop mitigation or contingency plans

8. Quality Planning

- Define quality standards
- Plan for quality control and assurance

9. Communication Planning

- Define reporting structure
- Schedule meetings, reports, and stakeholder updates

Importance of Project Planning

- Reduces uncertainty and risk
- Provides a clear roadmap for execution
- Enhances coordination among team members
- Helps in monitoring and controlling project progress
- Improves chances of project success

Diagram Tip (for exams)

Project Planning Process:

Scope → Objectives → WBS → Schedule → Resources → Budget → Risk → Quality → Communication

Conclusion

Project planning is the **foundation of successful project management**, providing a structured approach to achieve project goals efficiently and effectively

WORK BREAK DOWN STRUCTURE

A **Work Breakdown Structure (WBS)** is a way to break a project into **smaller, manageable pieces** so it's easier to plan, assign, estimate, and control. In simple terms It's a **hierarchical tree** that shows **all the work** needed to complete a project—nothing more, nothing less.

Key ideas of a WBS

- **Deliverable-focused** (not activities at first)
- Break work down until tasks are **clear, measurable, and assignable**
- Follows the **100% rule**: it includes 100% of the project scope
- Usually 3–5 levels deep

Basic structure

1. **Level 1** – Entire project
2. **Level 2** – Major deliverables or phases
3. **Level 3+** – Sub-deliverables → work packages

Example: Website Development Project (WBS)

1. Website Development Project

1.1 Project Management

- 1.1.1 Project planning
- 1.1.2 Progress tracking

1.2 Design

- 1.2.1 UI design
- 1.2.2 UX design

1.3 Development

- 1.3.1 Frontend development
- 1.3.2 Backend development

1.4 Testing

- 1.4.1 Functional testing
- 1.4.2 User acceptance testing

1.5 Deployment & Maintenance

- 1.5.1 Deployment
- 1.5.2 Maintenance

- Clear project scope
- Better cost & time estimation
- Easier task assignment
- Reduces missed work

* PROCESS MAPPING

Process Mapping is a way to **visually show how work gets done**, step by step—from start to finish. It helps you see **what happens, who does it, and where things slow down or break**.

It's a **flowchart of a process** that shows:

- Inputs → activities → decisions → outputs
- Who is responsible at each step
- Handoffs and delays

Why process mapping matters

- Finds bottlenecks and waste
- Improves efficiency and quality
- Standardizes how work is done
- Clarifies roles and responsibilities

Common types of process maps

1. **Basic Flowchart** – simple step-by-step view
2. **Swimlane Diagram** – shows responsibilities by role/team
3. **Value Stream Map** – focuses on time, value, and waste
4. **SIPOC Diagram** – high-level overview (Suppliers, Inputs, Process, Outputs, Customers)

Basic symbols you'll see

- **Oval** – Start / End
- **Rectangle** – Activity
- **Diamond** – Decision
- **Arrow** – Flow direction

Example: Process Map (Online Order)

Start



Customer places order



Payment processed?

Yes → Confirm order

No → Cancel order



Prepare shipment



Ship product

↓ □
End

Steps to create a process map

1. Define the **start and end**
2. List all **process steps**
3. Identify **decision points**
4. Assign **roles/owners**
5. Draw the flow
6. Review and improve

WBS vs Process Mapping (quick contrast)

- **WBS** = *What work needs to be done*
- **Process Map** = *How the work is done*

*PROJECT BUDGETING

Project Budgeting is the process of **estimating, allocating, and controlling costs** so a project can be completed **within approved funds**.

In simple terms It answers one big question:How much will this project cost—and where will the money go?

Key components of a project budget

1. **Cost Estimates**
 - Labor (salaries, wages, overtime)
 - Materials & equipment
 - Software, licenses, tools
 - Vendor/consultant costs
2. **Direct Costs**
 - Clearly tied to the project (labor, materials)
3. **Indirect Costs**
 - Overhead (utilities, admin, office space)
4. **Contingency Reserve**
 - For known risks (typically 5–15%)
5. **Management Reserve**
 - For unknown risks (often not in the baseline)

Common budgeting methods

- **Bottom-up budgeting** – estimate each task (most accurate)
- **Top-down budgeting** – budget set by management
- **Analogous estimating** – based on past projects

- **Parametric estimating** – cost per unit (e.g., cost per square meter)
- **Three-point estimating** – optimistic, most likely, pessimistic

Simple example: Project Budget Table

Cost Category	Estimated Cost
Labor	\$25,000
Materials	\$10,000
Software	\$3,000
Testing	\$2,000
Contingency (10%)	\$4,000
Total Budget	\$44,000

Budget baseline

Once approved, the budget becomes the **cost baseline**, used to:

- Track actual vs planned costs
- Control spending
- Measure performance

Budget control tools

- **Earned Value Management (EVM)**
 - PV (Planned Value)
 - EV (Earned Value)
 - AC (Actual Cost)
- Cost variance (CV) & cost performance index (CPI)

Why project budgeting is critical

- Prevents cost overruns
- Supports decision-making
- Improves accountability
- Increases project success rate

* FINANCIAL PROJECTIONS

Financial Projections are forward-looking estimates of a project's or business's **future financial performance**, based on assumptions and data. They're used to plan, budget, secure funding, and make decisions.

In simple terms

They answer: How much money will we make or spend in the future—and when?

Core components of financial projections

1. **Revenue Projections**
 - Sales volume × price
 - Growth rates
 - Timing of cash inflows
2. **Cost Projections**
 - Fixed costs (rent, salaries)
 - Variable costs (materials, commissions)
 - One-time costs (setup, equipment)
3. **Profit & Loss (Income Statement)**
 - Revenue – Expenses = Net Profit
4. **Cash Flow Projection** (very important)
 - When cash actually comes in and goes out
5. **Balance Sheet Projection** (for businesses)
 - Assets, liabilities, equity over time

Typical projection periods

- Monthly (Year 1)
- Quarterly (Years 2–3)
- Annually (3–5 years)

Common methods used

- **Bottom-up forecasting** (most realistic)
- **Top-down forecasting**
- **Trend analysis**
- **Scenario modeling** (best / base / worst case)

Simple example: 1-Year Financial Projection

Revenue

- 1,000 units × \$50 = \$50,000

Expenses

- Production costs: \$20,000
- Operating expenses: \$15,000

Net Profit

- $\$50,000 - \$35,000 = \$15,000$

Cash flow example (monthly snapshot)

Month	Cash In	Cash Out	Net Cash
Jan	\$8,000	\$6,500	\$1,500
Feb	\$9,000	\$7,000	\$2,000

Why financial projections matter

- Attract investors & lenders
- Support strategic planning
- Identify cash shortfalls early
- Set realistic financial goals

Projections vs Budget (quick clarity)

- **Budget** = detailed plan for spending
- **Financial projections** = forecast of financial outcomes

*TIME VALUE OF MONEY (TVM)

Time Value of Money means: **Money today is worth more than the same amount in the future**, because today's money can be invested and earn returns.

Why TVM exists

- **Earning potential** (interest, investment returns)
- **Inflation** reduces purchasing power
- **Risk & uncertainty** in the future
- **Opportunity cost**

Core TVM concepts

1. **Present Value (PV)**
Value of future money **today**

2. **Future Value (FV)**
Value of today's money **in the future**
3. **Interest Rate (r)**
Rate of return or discount rate
4. **Time (n)**
Number of periods (years, months)

Key formulas (basic)

Future Value (FV)

$$FV = PV \times (1 + r)^n$$

Present Value (PV)

$$PV = FV \div (1 + r)^n$$

Simple example

If you invest **\$1,000 today** at **10% per year** for **3 years**:

$$FV = 1,000 \times (1.10)^3$$

$$FV = \mathbf{\$1,331}$$

So \$1,000 today > \$1,000 in 3 years.

TVM in decision-making

- Capital budgeting
- Loan & mortgage calculations
- Investment appraisal
- Project evaluation (NPV, IRR)

TVM techniques

- **Discounting** → bringing future cash flows to present value
- **Compounding** → growing present money into the future

Example: Present Value

Receive **\$5,000 after 2 years**, discount rate **8%**:

$$PV = 5,000 \div (1.08)^2$$

$$PV \approx \mathbf{\$4,287}$$

Where TVM is used

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Payback Period (discounted)
- Annuities & perpetuities

* COST OF CAPITAL

Cost of Capital is the **minimum return** a company or project must earn to **satisfy investors and lenders**. It's basically the **hurdle rate** for investment decisions.

Main components of cost of capital

1. Cost of Debt (Kd)

The effective interest rate paid on borrowed funds.

After-tax cost of debt

$$K_d = \text{Interest rate} \times (1 - \text{Tax rate})$$

Interest is tax-deductible, so debt is cheaper after tax.

2. Cost of Equity (Ke)

Return required by shareholders (higher than debt because of risk).

Common method: CAPM

$$K_e = R_f + \beta (R_m - R_f)$$

Where:

- R_f = Risk-free rate
- β = Beta (risk of the company)
- R_m = Market return

3. Cost of Preference Shares (if any)

$$K_p = \text{Dividend} \div \text{Net issue price}$$

Weighted Average Cost of Capital (WACC)

Most commonly used **cost of capital**.

Formula

$$\text{WACC} = (E/V \times K_e) + (D/V \times K_d \times (1 - T))$$

Where:

- E = Market value of equity
- D = Market value of debt
- V = E + D
- T = Corporate tax rate

Simple WACC example

- Equity = 60%, $K_e = 12\%$
- Debt = 40%, $K_d = 8\%$
- Tax rate = 30%

$$\text{WACC} = (0.6 \times 12\%) + (0.4 \times 8\% \times 0.7)$$

$$\text{WACC} = 7.2\% + 2.24\%$$

$$\text{WACC} = \mathbf{9.44\%}$$

Why cost of capital matters

- Used as **discount rate** in NPV
- Helps choose between projects
- Measures financial risk
- Maximizes firm value

Key points to remember

- Lower cost of capital = higher firm value
- Debt is cheaper than equity (tax shield)
- Optimal capital structure minimizes WACC

*APPRAISAL CRITERIA

Appraisal Criteria are the **standards or measures used to evaluate** a project, investment, employee, or performance to decide whether it is **acceptable, profitable, or successful**.

Because this term is used in different areas, I'll give you the **most common one first** (project/investment appraisal), then briefly show others.

Project / Investment Appraisal Criteria (most common)

These are used to decide **whether a project should be accepted or rejected**.

1. Net Present Value (NPV)

- **Accept** if $NPV > 0$
- Measures value added to the firm
- Considers time value of money

Best appraisal method

2. Internal Rate of Return (IRR)

- **Accept** if $IRR > \text{Cost of Capital}$
- Rate at which $NPV = 0$
- Easy to understand as a percentage

Can be misleading with multiple cash flows

3. Payback Period

- Time taken to recover initial investment
- **Accept** if $\text{payback} \leq \text{target period}$

Ignores time value of money & profits after payback

4. Discounted Payback Period

- Payback using **discounted cash flows**
- Better than simple payback, but still partial

5. Profitability Index (PI)

- $PI = \text{PV of future cash flows} \div \text{Initial investment}$
- **Accept** if $PI > 1$
- Useful when capital is limited

6. Accounting Rate of Return (ARR)

- Based on accounting profit
- **Accept** if $ARR \geq \text{required return}$

Ignores cash flow & TVM

Other meanings of appraisal criteria

Performance appraisal (HR)

- Quality of work
- Productivity
- Teamwork
- Communication
- Reliability

Property appraisal

- Location
- Market value
- Size & condition
- Comparable sales

Quick exam tip

NPV is superior because it:

- Considers time value of money
- Uses cost of capital
- Maximizes shareholders' wealth

***RISK ANALYSIS IN CAPITAL INVESTMENT DECISION**

Risk Analysis in Capital Investment Decision is the process of identifying, measuring, and managing uncertainty in a project's future cash flows before committing large funds.

Why risk analysis is important

- Future cash flows are uncertain
- Long-term investments involve high capital & irreversibility
- Helps avoid over- or under-investment
- Improves quality of capital budgeting decisions

Types of risk in capital investment

1. Business risk – demand, price, operating costs
2. Financial risk – leverage, interest rates
3. Project-specific risk – delays, cost overruns
4. Market risk – economic conditions, competition
5. Political & regulatory risk – laws, taxes, policies

Methods of risk analysis

1. Sensitivity Analysis

- Changes one variable at a time (sales, cost, price)
- Shows which variable affects NPV the most

Simple but ignores probability

2. Scenario Analysis

- Evaluates best, worst, and most likely scenarios
- Considers multiple variables changing together

More realistic than sensitivity analysis

3. Risk-Adjusted Discount Rate (RADR)

- Higher risk → higher discount rate
- Adjusts cost of capital to reflect risk

Easy to apply but subjective

4. Certainty Equivalent Method

- Adjusts cash flows downward for risk
- Discounts using risk-free rate

Theoretically superior but complex

5. Probability Analysis (Expected Value)

- Assigns probabilities to cash flows
- Calculates expected NPV

Requires reliable probability estimates

6. Decision Tree Analysis

- Useful when decisions are made in stages
- Incorporates probabilities and outcomes

Ideal for R&D and expansion projects

7. Simulation (Monte Carlo)

- Uses computer models to simulate thousands of outcomes
- Gives distribution of NPV

Highly advanced and realistic

Example (Sensitivity Analysis – simple)

If NPV becomes negative when:

- Sales drop by 5%
- Costs increase by 3%

➡ Project is highly sensitive and risky.

Risk vs Uncertainty

- Risk → probabilities known
- Uncertainty → probabilities unknown

Key exam points

- Higher risk → higher required return
- NPV with risk adjustment is the best criterion
- No single method is perfect → use combination of methods

UNIT-3

* ENVIRONMENT AND POLLUTION

Meaning of Environment

The **environment** includes **everything that surrounds and affects living organisms.**

It consists of:

- **Natural components** – air, water, land, plants, animals
- **Man-made components** – buildings, roads, industries
- **Social & cultural components** – human activities, institutions, relationships

In short: *Environment is the total of natural, biological, and human-made surroundings in which life exists.*

*POLLUTION

Pollution is the **introduction of harmful substances or energy into the environment** that causes **undesirable changes** and harms living beings.

These harmful substances are called **pollutants**.

In short: Pollution is environmental degradation caused by human activities.

Relationship between Environment and Pollution

- The **environment supports life**
- **Pollution damages the environment**
- Excessive pollution leads to **health problems, climate change, and ecosystem imbalance**

Examples

- Smoke from vehicles → **Air pollution**
- Sewage in rivers → **Water pollution**
- Plastic waste → **Land pollution**
- Loudspeakers → **Noise pollution**

One-line exam definitions

- **Environment:** *The sum total of all living and non-living surroundings that influence life.*
- **Pollution:** *The contamination of the environment by harmful substances resulting in adverse effects.*

Industrial Pollution

Industrial pollution refers to the **contamination of the environment caused by industrial activities**, such as manufacturing, mining, power generation, and chemical processing.

Types of industrial pollution

1. Air Pollution

Caused by emission of:

- Smoke, dust, and particulate matter
- Sulphur dioxide (SO₂), nitrogen oxides (NO_x)
- Carbon monoxide (CO)

Sources: factories, thermal power plants, refineries

Effects: respiratory diseases, acid rain, global warming

2. Water Pollution

Caused by discharge of:

- Untreated industrial effluents
- Chemicals, heavy metals (lead, mercury)
- Oils and toxic wastes

Effects: water-borne diseases, death of aquatic life, water contamination

3. Soil / Land Pollution

Caused by:

- Dumping of solid industrial waste
- Toxic chemicals and heavy metals

Effects: loss of soil fertility, food contamination

4. Noise Pollution

Caused by:

- Heavy machinery
- Industrial operations

Effects: hearing loss, stress, sleep disturbance

5. Thermal Pollution

Caused by:

- Discharge of hot water from power plants into rivers

Effects: reduced oxygen in water, harm to aquatic organisms

Causes of industrial pollution

- Rapid industrialization
- Poor waste management
- Use of outdated technology
- Weak enforcement of environmental laws

Effects of industrial pollution

- Human health problems
- Damage to ecosystems
- Loss of aquatic life
- Climate change & global warming

Control measures for industrial pollution

At industry level

- Treatment of effluents before discharge
- Use of pollution control devices (scrubbers, filters)
- Adoption of cleaner production technologies

At government level

- Strict environmental laws
- Regular monitoring and penalties
- Promotion of renewable energy

Conclusion

Industrial pollution is a **serious environmental issue** that threatens human health and natural ecosystems. **Sustainable industrial practices** are essential to reduce its impact.

***POLLUTION CONTROL STANDARDS**

Pollution Control Standards are **regulations, guidelines, or limits set by authorities** to **prevent, reduce, or control pollution** from industries, vehicles, and other sources. They define **acceptable levels of pollutants** in air, water, soil, and noise.

Key Objectives

- Protect human health
- Preserve natural resources and ecosystems
- Ensure sustainable development
- Control industrial emissions and effluents

Types of Pollution Control Standards

1. Air Quality Standards

- Limit **emission of pollutants** like SO₂, NO_x, CO, particulate matter
- Examples:

- **Ambient air standards:** Maximum concentration of pollutants in air
- **Emission standards:** Maximum pollutant level from industries, vehicles

2. Water Quality Standards

- Define **permissible limits of pollutants** in surface water, groundwater, and drinking water
- Examples of regulated pollutants:
 - BOD (Biochemical Oxygen Demand)
 - COD (Chemical Oxygen Demand)
 - Heavy metals: lead, mercury, cadmium

3. Soil / Land Standards

- Regulate **disposal of industrial waste and chemicals**
- Prevent contamination by heavy metals, pesticides, and hazardous waste

4. Noise Standards

- Define **permissible noise levels** in industrial, residential, and commercial areas
- Measured in decibels (dB) for day and night periods

5. Emission Standards for Vehicles

- Limit **exhaust gases** from petrol/diesel engines
- Reduce CO, NO_x, particulate matter
- Examples: Bharat Stage (BS) standards in India

Methods to Meet Pollution Control Standards

- Install **effluent treatment plants (ETPs)**
- Use **air pollution control devices:** scrubbers, cyclones, electrostatic precipitators
- Regular **monitoring and reporting** of emissions
- Shift to **cleaner fuels and renewable energy**

*ENVIRONMENTAL REGULATION IN INDIA

Environmental regulations in India are laws, rules, and standards enacted by the government to protect and improve the environment and control pollution. These are enforced mainly by the **Ministry of Environment, Forest and Climate Change (MoEFCC)** and the **Central Pollution Control Board (CPCB)**.

Objectives of Environmental Regulation

- Protect **air, water, soil, and biodiversity**

- Control **industrial pollution**
- Ensure **sustainable development**
- Promote **renewable energy and eco-friendly practices**

Key Environmental Laws in India

1. The Environment (Protection) Act, 1986

- Provides **overall framework** for environmental protection
- Empowers the government to set **standards for pollution**
- Regulates **handling of hazardous substances**

2. Water (Prevention and Control of Pollution) Act, 1974

- Establishes **State and Central Pollution Control Boards (SPCB & CPCB)**
- Controls **water pollution from industries and sewage**
- Sets standards for **wastewater discharge**

3. Air (Prevention and Control of Pollution) Act, 1981

- Regulates **air pollution from industries and vehicles**
- Establishes **emission standards** for industries
- Empowers authorities to monitor **ambient air quality**

4. The Wildlife Protection Act, 1972

- Protects **wildlife species and their habitats**
- Prohibits hunting of endangered species

5. The Forest Conservation Act, 1980

- Regulates **deforestation and forest land use**
- Requires **government approval** for non-forest use of forest land

6. The Hazardous Waste (Management & Handling) Rules, 1989

- Governs **handling, storage, transport, and disposal of hazardous waste**

7. The Bio-Medical Waste Management Rules, 2016

- Regulates **disposal of medical waste** to prevent contamination

8. Plastic Waste Management Rules, 2016

- Ban or control **single-use plastics**

- Promote **recycling and safe disposal**

9. National Green Tribunal (NGT) Act, 2010

- Special **environmental court** to handle cases
- Provides **fast-track justice for environmental issues**

Other Measures

- **Emission standards for vehicles** (Bharat Stage norms)
- **Environment Impact Assessment (EIA)** for new projects
- **Renewable energy promotion**
- **Awareness campaigns**

Exam-ready definition

Environmental regulations in India are laws and rules enacted to protect the environment, prevent pollution, and ensure sustainable use of natural resources, enforced by government agencies like MoEFCC and CPCB.

*ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Environmental Impact Assessment (EIA) is a **systematic process to evaluate the potential environmental effects of a proposed project** before it is carried out. It helps decision-makers understand the **environmental consequences** and adopt measures to minimize negative impacts.

Key Definition

EIA: *A formal process used to predict, evaluate, and mitigate the environmental effects of development projects before they are implemented.*

Objectives of EIA

1. Identify **adverse environmental impacts** of projects
2. Promote **sustainable development**
3. Integrate **environmental considerations into decision-making**
4. Suggest **mitigation measures** to reduce negative impacts
5. Ensure compliance with **environmental regulations and standards**

Stages of EIA Process

1. **Screening** – Decide whether a project requires EIA
2. **Scoping** – Identify key environmental issues to focus on
3. **Baseline Data Collection** – Study existing environmental conditions
4. **Impact Prediction & Assessment** – Forecast potential effects (air, water, land, biodiversity)

5. **Mitigation Measures** – Propose actions to reduce or avoid negative impacts
6. **Report Preparation** – Prepare an **Environmental Impact Statement (EIS)**
7. **Public Consultation** – Obtain feedback from stakeholders
8. **Decision Making** – Approve, reject, or modify the project
9. **Monitoring & Compliance** – Ensure implementation of mitigation measures

Importance of EIA

- Prevents **environmental degradation**
- Reduces **health risks** to humans
- Helps in **legal compliance**
- Improves **project sustainability and social acceptance**

EIA in India

- Governed by **Environment (Protection) Act, 1986**
- **EIA Notification 2006** by MoEFCC outlines procedures
- Mandatory for **major infrastructure, industrial, and mining projects**
- Public hearings are part of the process

Example

For a **new power plant**, EIA assesses:

- Air pollution (SO₂, NO_x, particulate matter)
- Water usage and wastewater discharge
- Impact on nearby forests and wildlife
- Noise and soil contamination
- Socio-economic effects on local communities

*SOCIAL COST-BENEFIT ANALYSIS (SCBA)

Social Cost-Benefit Analysis (SCBA) is a method used to **evaluate the overall impact of a project or policy on society**, taking into account **both costs and benefits to all stakeholders**, not just financial profits.

Key Definition

SCBA: *A systematic process of comparing the social benefits and social costs of a project or policy to determine whether it contributes to overall societal welfare.*

Key Features

1. Considers **social, economic, and environmental effects**
2. Includes both **tangible and intangible impacts**
3. Focuses on **society as a whole**, not just investors

4. Helps in **policy-making and resource allocation**

Components of SCBA

1. Social Costs

Costs borne by society due to a project:

- **Direct costs:** Construction, labor, materials
- **Indirect costs:** Environmental damage, displacement of people, pollution
- **Opportunity costs:** Loss of alternative uses of resources

2. Social Benefits

Benefits to society:

- **Direct benefits:** Increased production, jobs, income
- **Indirect benefits:** Better health, education, infrastructure
- **Intangible benefits:** Improved quality of life, social equity

Steps in SCBA

1. **Identify all costs and benefits** (financial, social, environmental)
2. **Quantify in monetary terms** wherever possible
3. **Discount future costs and benefits** to present value (using social discount rate)
4. **Compare total social benefits and costs**
5. **Decision Rule:**
 - If **Social Benefit > Social Cost**, project is socially desirable
 - If **Social Cost > Social Benefit**, project should be rejected

Formulas

- **Net Social Benefit (NSB)** = Social Benefits – Social Costs
- **Social Benefit-Cost Ratio (BCR)** = Social Benefits ÷ Social Costs

BCR > 1 → Project is beneficial to society

BCR < 1 → Project is not socially justified

Example

A new public hospital:

Costs: Land + Construction + Operating costs = \$50 million

Benefits: Improved health, reduced mortality, jobs, better productivity = \$80 million

- $NSB = 80 - 50 = \$30 \text{ million}$ → socially beneficial
- $BCR = 80 \div 50 = 1.6$ → more benefits than costs

Importance of SCBA

- Guides **government investment decisions**
- Ensures **equity and sustainability**
- Highlights **hidden social and environmental impacts**
- Helps prioritize **projects with maximum social welfare**

Exam-ready definition

Social Cost-Benefit Analysis (SCBA) is a systematic method of comparing the total social benefits and social costs of a project or policy to determine whether it is desirable from the viewpoint of society as a whole.

*RATIONALE OF SOCIAL COST-BENEFIT ANALYSIS (SCBA)

The **rationale** is the **reason why SCBA is conducted**—why governments, planners, and economists use it to evaluate projects. It goes beyond financial profit and considers **societal welfare**.

Key Reasons / Rationale

1. Maximizing Social Welfare

- The main goal is to ensure that **resources are used for projects that benefit society as a whole**.
- SCBA identifies projects where **social benefits exceed social costs**.

2. Accounting for Externalities

- Many projects have **positive and negative externalities** (effects on third parties).
- Example: A factory may provide jobs (**benefit**) but pollute the river (**cost**).
- SCBA incorporates these externalities to give a **true picture of societal impact**.

3. Prioritization of Projects

- Resources are **limited**, especially for governments.
- SCBA helps in **ranking projects by net social benefit or benefit-cost ratio** to allocate resources efficiently.

4. Decision Making Under Uncertainty

- SCBA uses **quantitative and qualitative data**, allowing decision-makers to evaluate **trade-offs between economic, social, and environmental factors**.

5. Encouraging Sustainable Development

- Ensures projects are **environmentally, socially, and economically sustainable**.
- Prevents investment in projects that may generate profit but harm society or environment.

6. Transparency and Accountability

- Provides a **structured framework** for evaluating projects.
- Makes **government or organizational decisions more objective**, fair, and accountable to the public.

Summary

The **rationale of SCBA** is to ensure that **public resources are invested in projects that maximize overall social welfare**, considering all benefits and costs, including **economic, social, and environmental impacts**, rather than just private profits

***METHODS FOLLOWED BY FINANCIAL INSTITUTIONS**

Financial institutions (banks, development banks, NBFCs) use several **methods to evaluate, appraise, and finance projects**. These methods ensure that funds are lent **safely, profitably, and with minimum risk**.

1. Financial Appraisal / Accounting Methods

Used to check the **financial feasibility of a project**:

- **Payback Period (PP)** – Time to recover the investment
- **Net Present Value (NPV)** – Present value of future cash flows minus investment
- **Internal Rate of Return (IRR)** – Rate at which $NPV = 0$
- **Profitability Index (PI)** – Ratio of present value of benefits to costs
- **Accounting Rate of Return (ARR)** – Based on accounting profits

Checks whether a project is financially viable

2. Economic / Social Appraisal

Used for **projects of national importance or public benefit**:

- **Social Cost-Benefit Analysis (SCBA)** – Compares social benefits and costs

- **Economic Rate of Return (ERR)** – Measures return from a societal perspective
- Focuses on **externalities and social welfare**

3. Market / Commercial Appraisal

Assesses the **market and commercial viability** of the project:

- Market demand and supply analysis
- Competitor analysis
- Price trends and sales forecasts
- Marketing and distribution feasibility

Ensures that the project can survive in the real market

4. Technical Appraisal

Checks **technical feasibility and efficiency**:

- Technology used in production
- Availability of raw materials and infrastructure
- Plant capacity, layout, and equipment selection
- Labour and management requirements

Ensures the project is technically sound

5. Managerial / Organizational Appraisal

Evaluates **management capability**:

- Experience and qualifications of promoters
- Organizational structure
- Decision-making and operational efficiency
- Risk management practices

Critical for successful project execution

6. Legal Appraisal

- Verifies **licenses, permits, land ownership**
- Checks **compliance with statutory regulations** (pollution, labor, taxation)
- Identifies **legal risks**

Protects financial institutions from legal liability

7. Risk Analysis

Financial institutions assess:

- **Financial risks:** cost overruns, interest rates
- **Market risks:** demand fluctuations
- **Technical risks:** production delays, technology failure
- **Environmental risks:** pollution, regulatory changes

Often involves **sensitivity analysis, scenario analysis, or Monte Carlo simulation**

8. Security / Collateral Appraisal

- For loans, banks examine **collateral or guarantee**
- Asset valuation of machinery, property, land
- Guarantees from promoters or third parties

Reduces default risk

Summary Table

Appraisal Type	Purpose
Financial	Profitability, cash flow, payback
Economic/Social	Social welfare, national impact
Market/Commercial	Demand, price, competition
Technical	Technology, materials, capacity
Managerial	Management ability, execution risk
Legal	Compliance, statutory approvals
Risk Analysis	Identify & quantify risks
Security/Collateral	Safeguard loans

Conclusion

Financial institutions combine **financial, technical, market, managerial, and legal appraisals** to **ensure the project is viable, sustainable, and low risk** before lending or investing

***PROJECT SCHEDULING**

Project Scheduling is the process of **planning and organizing tasks, activities, and resources over time** to ensure that a project is completed **on time, within scope, and within budget**. It is a key part of **project management**.

Key Definition

Project Scheduling: The process of defining the sequence, duration, and timing of project activities, assigning resources, and setting deadlines to achieve project objectives efficiently.

Objectives of Project Scheduling

1. Ensure the project is **completed on time**
2. Optimize the use of **resources** (human, equipment, materials)
3. Identify **critical tasks and dependencies**
4. Provide a **timeline for monitoring progress**
5. Facilitate **coordination between teams and stakeholders**

Steps in Project Scheduling

1. Define Activities

Break the project into **specific tasks or work packages**

Use **Work Breakdown Structure (WBS)**

2. Determine Activity Sequence

Identify **dependencies**:

- **Finish-to-Start (FS)**
- **Start-to-Start (SS)**
- **Finish-to-Finish (FF)**
- **Start-to-Finish (SF)**

3. Estimate Activity Duration

Time required for each task

Consider resources, complexity, and constraints

4. Assign Resources

Allocate **labor, equipment, and materials** to tasks

Avoid over allocation

5. Develop Schedule

- Use **Gantt charts, network diagrams, or project management software**
- Identify **critical path** to find tasks that determine project duration

6. Review & Optimize

Check for **bottlenecks, slack, and resource conflicts**

Adjust tasks or resources as needed

7. Monitor and Control

Track progress

Update schedule based on **delays or changes**

Tools & Techniques for Project Scheduling

Tool/Technique	Purpose
Gantt Chart	Visual timeline of tasks
Critical Path Method (CPM)	Identify tasks that determine project duration
Program Evaluation and Review Technique (PERT)	Handle uncertainty in task durations
Project Management Software (MS Project, Primavera)	Automated scheduling and monitoring

Example

A construction project may have:

- Activities: Foundation, Framing, Plumbing, Electrical, Painting
- Dependencies: Framing cannot start until Foundation is complete
- Duration: Foundation (5 days), Framing (10 days), etc.
- Schedule: Represented in a **Gantt chart** showing start and end dates

Importance

- Prevents **delays and cost overruns**
- Improves **coordination and communication**
- Helps in **resource optimization**
- Facilitates **progress monitoring and timely decision-making**

*PERT AND CPM NETWORKS

PERT (Program Evaluation and Review Technique) and **CPM (Critical Path Method)** are two widely used **network-based project scheduling techniques**. They help **plan, schedule, and control complex projects**.

1. PERT (Program Evaluation and Review Technique)

Definition:

PERT is a **probabilistic network technique** used for **projects where activity durations are uncertain**. It estimates **time using optimistic, pessimistic, and most likely durations**.

Developed by: U.S. Navy for the Polaris Missile Project

Features of PERT

- Focuses on **time and schedule**
- Uses **three time estimates** for each activity:
 - **Optimistic (O):** Minimum time
 - **Pessimistic (P):** Maximum time
 - **Most Likely (M):** Normal time
- Calculates **Expected Time (TE):**

$$TE = \frac{O + 4M + P}{6}$$

- Uses **probabilistic approach** → considers uncertainty

Steps in PERT

1. Identify project activities
2. Determine **sequence and dependencies**
3. Construct **network diagram**
4. Estimate activity durations
5. Calculate **expected time for each activity**
6. Identify **critical path**
7. Calculate **project duration and slack for non-critical activities**

2. CPM (Critical Path Method)

Definition:

CPM is a **deterministic network technique** used for **projects with known activity durations**. It identifies the **critical path** to determine **minimum project duration**.

Developed by: DuPont Corporation and Remington Rand

Features of CPM

- Uses **fixed/deterministic activity durations**
- Focuses on **time-cost trade-offs**
- Identifies **critical and non-critical activities**
- Helps in **resource allocation and project optimization**

Steps in CPM

1. List all activities
2. Determine **dependencies**
3. Construct **network diagram**
4. Assign **fixed durations**
5. Identify **critical path** (longest path in network)
6. Calculate **slack/float** for non-critical activities
7. Update schedule if **time-cost optimization** is needed

Critical Path Concept

- **Critical Path:** Longest path through the network
- **Critical Activities:** No slack → any delay delays the project
- **Non-critical Activities:** Have slack → can be delayed without affecting project duration

Comparison Table: PERT vs CPM

Feature	PERT	CPM
Time estimates	Probabilistic (O, M, P)	Deterministic (fixed)
Focus	Time (scheduling)	Time and cost
Activity durations	Uncertain	Certain
Network	Event-oriented (nodes = events)	Activity-oriented (nodes = activities)
Use	Research & development projects	Construction, industrial projects
Flexibility	High (uncertainty handled)	Moderate (requires fixed durations)

Simple Example

Activity Predecessor Duration (days)

A	–	4
B	A	5
C	A	3
D	B, C	6

- **Critical Path:** $A \rightarrow B \rightarrow D = 4 + 5 + 6 = 15$ days
- C is **non-critical**, has slack = 2 days

Uses

- Project planning and scheduling
- Identifying tasks that **cannot be delayed**
- Resource allocation and optimization
- Time-cost trade-off analysis (CPM)

Exam-ready definitions

- **PERT:** A probabilistic network technique used to estimate project duration when activity times are uncertain.
- **CPM:** A deterministic network technique used to identify the critical path and schedule project activities with known durations

UNIT-4

*MONITORING AND CONTROLLING

Monitoring and Controlling is the phase where you make sure the project stays on track.

It focuses on:

Tracking performance

- Comparing **actual results vs. the plan**
- Identifying problems early
- Taking corrective or preventive action

Key activities

- **Measure progress** (schedule, cost, scope, quality)
- **Monitor risks and issues**
- **Control changes** (via change requests)
- **Review KPIs and reports**
- **Ensure deliverables meet requirements**
- **Communicate status to stakeholders**

Typical tools & techniques

- KPIs & dashboards
- Earned Value Management (EVM)
- Variance analysis
- Status reports
- Change control systems
- Risk reassessments

Simple example

If a project is supposed to be 50% done but is only 35% complete:

- You detect the variance (monitoring)
- You analyze why it happened
- You adjust resources, scope, or schedule (controlling)

*PLAN–MONITOR–CONTROL CYCLE

The **Plan–Monitor–Control cycle** is a continuous management loop used to ensure objectives are achieved efficiently.

1. Plan

Define **what** needs to be done and **how**.

- Set objectives and targets
- Define scope, schedule, cost, and quality standards
- Identify risks and resources
- Develop action plans

Output: Baselines, policies, schedules, KPIs

2. Monitor

Track performance against the plan.

- Measure actual progress and results
- Collect data and performance reports
- Identify variances and issues

Output: Performance data, variance reports

3. Control

Take action to correct or improve performance.

- Analyze root causes of variances
- Implement corrective or preventive actions
- Approve and manage changes
- Update plans if necessary

Output: Adjusted plans, change requests, improved performance

Cycle Nature

- The process is **continuous and iterative**
- Control actions often lead to **re-planning**
- Ensures alignment with goals despite change

***DATA COLLECTION AND REPORTING**

Data collection and reporting is the process of gathering relevant data, analyzing it, and communicating results to support decision-making and control.

1. Data Collection

Involves systematically gathering accurate and timely information.

- Identify what data is needed (KPIs, metrics)
- Determine data sources (systems, surveys, observations)
- Use tools like forms, sensors, software, or logs
- Ensure data accuracy, consistency, and completeness

Examples: sales figures, progress updates, cost data, quality metrics

Data Reporting

Transforms collected data into meaningful information.

- Analyze and summarize data
- Compare actual results with plans or targets
- Present findings using reports, dashboards, or charts
- Share insights with stakeholders

Examples: status reports, performance dashboards, variance reports

Importance

- Supports **monitoring and controlling**
- Enables timely corrective actions
- Improves transparency and accountability
- Aids informed decision-making

Project Control

Project control is the process of ensuring a project stays aligned with its plan by continuously monitoring performance and taking corrective action when deviations occur.

Key aspects of Project Control

- Compare **actual performance vs. planned baselines**
- Identify variances in **scope, time, cost, and quality**
- Analyze causes of deviations
- Implement **corrective and preventive actions**
- Manage and approve changes
- Update project plans and forecasts

Inputs to Project Control

- Project management plan

- Performance data
- Progress reports
- Risk and issue logs

Tools & Techniques

- KPIs and dashboards
- Earned Value Management (EVM)
- Variance and trend analysis
- Change control systems
- Status meetings and reports

Outputs

- Corrective actions
- Change requests
- Updated plans and forecasts
- Performance reports

***EVALUATION AND TERMINATION**

Evaluation and termination is the final phase of a project where performance is assessed and the project is formally closed.

1. Evaluation

Involves assessing the project's overall performance and outcomes.

- Compare results with original objectives and baselines
- Evaluate cost, time, scope, and quality performance
- Assess stakeholder satisfaction
- Review risk management and team performance
- Document **lessons learned**

Purpose: Determine project success and identify improvements for future projects.

2. Termination

The formal process of ending the project.

- Obtain formal acceptance of deliverables
- Close contracts and release resources
- Hand over deliverables to operations/client
- Archive project documents
- Issue final reports and close accounts

Types of termination:

- **Normal** (project completed successfully)
- **Premature** (ended early)
- **Perpetual** (project keeps extending)

***PROJECT AUDITING**

Project auditing is a systematic and independent review of a project to evaluate whether activities, processes, and outcomes comply with plans, standards, and organizational policies.

Objectives of Project Auditing

- Assess project performance (cost, time, scope, quality)
- Ensure compliance with procedures and contracts
- Identify risks, issues, and control weaknesses
- Verify accuracy of reports and data
- Recommend corrective and preventive actions

Types of Project Audits

- **Performance audit** – checks efficiency and effectiveness
- **Compliance audit** – checks adherence to rules and standards
- **Financial audit** – reviews costs and financial controls
- **Technical audit** – evaluates technical quality and specifications

When audits are conducted

- During the project (periodic or phase audits)
- At project completion (post-implementation audit)

Importance

- Improves transparency and accountability
- Enhances project control and governance
- Provides lessons learned for future projects

***PROJECT TERMINATION**

Project termination is the formal process of bringing a project to an end, either after successful completion or before completion, by officially closing all project activities.

Key activities in Project Termination

- Obtain **formal acceptance** of deliverables

- Complete final testing and handover
- Close contracts and settle payments
- Release project resources and team members
- Archive project documents and records
- Prepare and issue the **final project report**
- Document lessons learned

Types of Project Termination

1. **Normal termination** – project completed successfully
2. **Premature termination** – project ended before completion
3. **Perpetual termination** – project never formally closed and keeps extending
4. **Failed project termination** – project stopped due to non-achievement of objectives

Importance

- Ensures accountability and proper closure
- Prevents scope creep and unnecessary costs
- Captures learning for future projects
- Enables smooth transition to operations