

Project Procurement and Supply Chain

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PMG 433

Lecture 7



The background features a series of vertical panels of varying heights and colors (dark blue, brown, orange, white). Overlaid on these panels are several white line-art icons: a graduation cap, a laptop with a play button, a target with an arrow, an open book, a magnifying glass, a bar chart, and a group of people.

Procurement systems in Project Management

Lecture 7

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Course Agenda

Chapter

At the end of this session, participants will be able to:

1. Define project procurement systems.
2. Explain the procurement management process.
3. Identify procurement methods.
4. Understand procurement documentation.
5. Describe e-procurement systems.
6. Evaluate procurement performance.
7. Apply AI in project procurement

What is Procurement?

Definition

- Procurement is the process of obtaining goods, services, and works from external sources to meet project requirements.
- Procurement management is performed throughout the project life cycle

Objectives

- Obtain required resources
- Minimize costs
- Ensure quality
- Reduce risks
- Meet project schedule

Definition

- According to the **PMBOK® Guide (Project Management Body of Knowledge)**,
- **Project Procurement Management** includes the processes required to **purchase or acquire products, services, or results needed from outside the project team**.
- It also involves managing contracts and relationships with suppliers, contractors, consultants, and vendors throughout the project life cycle.

Project Procurement Management includes

- Plan Procurement Management
- Conduct Procurement
- Control Procurement

1. Plan Procurement Management

Purpose: Determine what to procure, when to procure it, and how to procure it.

Key Activities:

- Make-or-Buy Analysis
- Procurement strategy development
- Defining procurement requirements
- Preparing procurement documents
- Selecting contract types
- Developing the Procurement Management Plan

Key Outputs:

- Procurement Management Plan
- Procurement Statement of Work (SOW)
- Bid documents (RFI, RFQ, RFP)
- Source selection criteria

Make-or-Buy Analysis

Factors

- Cost
- Time
- Expertise
- Risk
- Quality
- Strategic importance

Example

Should a company build software internally or outsource development?

Procurement Documents

Document

Purpose

RFI (Request for Information)

Gather information about potential suppliers and available solutions.

RFQ (Request for Quotation)

Obtain price quotations for clearly defined goods or services.

RFP (Request for Proposal)

Request detailed technical and commercial proposals for complex procurements.

ITB (Invitation to Bid)

Invite suppliers to submit competitive bids for well-defined requirements.

Contract

Legally binding agreement between buyer and seller.

- **2. Conduct Procurements**

- **Purpose:** Obtain seller responses, evaluate proposals, select suppliers, negotiate contracts, and award contracts.

- **Key Activities:**

- Advertise procurement opportunities
- Receive supplier proposals
- Evaluate bids
- Conduct negotiations
- Select suppliers
- Award contracts

- **Key Outputs:**

- Selected sellers
- Signed contracts
- Resource calendars
- Change requests (if needed)

- **3. Control Procurements**

- **Purpose:** Monitor contract performance, manage relationships with suppliers, and ensure both parties fulfill contractual obligations.

- **Key Activities:**

- Monitor supplier performance
- Inspect deliverables
- Manage contract changes
- Resolve disputes
- Process payments
- Close procurement contracts

- **Key Outputs:**

- Work performance information
- Procurement documentation updates
- Closed contracts
- Lessons learned

Plan Procurement Management

PMBOK Procurement Management Flow

Determine procurement requirements

Prepare procurement documents

Conduct Procurements

Evaluate proposals

Negotiate contracts

Award contracts

Control Procurements

Monitor supplier performance

Contract closure

1. Competitive Procurement

- The buyer solicits bids or proposals from multiple qualified sellers.
- **Examples**
 - Request for Proposal (RFP)
 - Request for Quotation (RFQ)
 - Invitation for Bid (IFB/ITB)
- **Advantages**
 - Fair competition
 - Better pricing
 - Greater transparency

2. Sole-Source Procurement

- The buyer purchases from only one supplier because no reasonable alternative exists.
- **Typical Reasons**
 - Unique expertise
 - Proprietary technology
 - Emergency procurement
 - Compatibility with existing systems

3. Single-Source Procurement

- The buyer chooses one supplier from several available suppliers.
- Unlike sole-source procurement, alternatives exist, but one supplier is selected based on strategic or business reasons.

4. Procurement through Framework Agreements

- The buyer establishes long-term agreements with one or more suppliers for future purchases.
- **Benefits**
 - Reduced procurement time
 - Lower administrative effort
 - Stable supplier relationships

Project procurement management is closely integrated with:

- **Project Scope Management** –Defines what must be procured.
- **Project Schedule Management** –Ensures timely procurement.
- **Project Cost Management** –Controls procurement costs.
- **Project Risk Management** –Identifies and mitigates supplier and contract risks.
- **Project Quality Management** –Ensures procured deliverables meet quality standards.
- **Project Stakeholder Management** –Coordinates with suppliers, contractors, and clients.

What is a Procurement System?

A Procurement System is

- An integrated framework of policies, procedures, technologies, people, and controls used to plan, execute, monitor, and close procurement activities throughout the project life cycle.
- A procurement system provides standardized procedures for acquiring goods and services

Components of a Procurement System

People



Policies



Procedures



Technology



Suppliers



Contracts



Performance Monitoring

1. Traditional Procurement System (Design–Bid–Build)

Definition:

The project owner hires a designer to complete the design before selecting a contractor through competitive bidding.

Characteristics:

- Separate contracts for design and construction
- Design completed before construction begins
- Competitive tendering
- Well-defined project scope

Advantages:

- Transparent procurement process
- Competitive pricing
- High owner control

Disadvantages:

- Longer project duration
- Limited contractor involvement during design
- Changes can be costly

Best for:

Projects with clearly defined requirements

2. Design–Build Procurement System

Definition:

A single contractor is responsible for both the design and construction of the project.

Characteristics:

- One contract
- Single point of responsibility
- Overlapping design and construction phases

Advantages:

- Faster project completion
- Better coordination
- Reduced disputes

Disadvantages:

- Less owner control over design
- Difficult to compare proposals

Best for:

Fast-track and complex projects.

3. Construction Management Procurement System

- **Definition:**

A Construction Manager (CM) is appointed to manage planning, coordination, and execution while multiple contractors perform the work.

- **Characteristics:**

- Professional management
- Multiple trade contracts
- Early contractor involvement

- **Advantages:**

- Flexible project execution
- Better cost control
- Faster delivery

- **Disadvantages:**

- Complex coordination
- Higher management effort

4. Management Contracting System

- **Definition:**

- A management contractor oversees subcontractors and coordinates project execution on behalf of the owner.

- **Advantages:**

- Early project start
- Flexibility
- Efficient coordination

- **Disadvantages:**

- Increased management costs
- Greater contractual complexity

5. Engineering, Procurement, and Construction (EPC)

- **Definition:**

A single contractor is responsible for engineering, procurement, construction, and project delivery.

- **Characteristics:**

- Turnkey approach
- Single point of accountability
- Fixed completion targets

- **Advantages:**

- Simplified contract management
- Cost and schedule certainty
- Reduced owner involvement

- **Disadvantages:**

- Higher initial contract value
- Less flexibility after contract award

- **Best for:**

Large industrial, energy, and infrastructure projects

6. Electronic Procurement (E-Procurement)

- **Definition:**

A digital procurement system that uses information technology to manage purchasing activities electronically.

- **Features:**

- Electronic tendering
- Online supplier portals
- Electronic purchase orders
- Digital contract management
- Electronic invoicing

- **Advantages:**

- Faster procurement
- Lower administrative costs
- Improved transparency
- Better supplier communication

Comparison of Procurement Systems

Procurement System	Number of Main Contracts	Main Advantage	Best Suited For
Traditional (Design–Bid–Build)	Two (Design & Construction)	Competitive pricing and owner control	Well-defined projects
Design–Build	One	Faster delivery and single responsibility	Fast-track projects
Construction Management	Multiple	Flexibility and professional management	Large, complex projects
Management Contracting	Multiple	Early project start	Complex projects with phased work
Public–Private Partnership (PPP)	Long-term partnership	Risk sharing and private financing	Public infrastructure
Engineering, Procurement & Construction (EPC)	One	Turnkey delivery	Industrial and infrastructure projects
E-Procurement	Digital platform	Speed, transparency, and automation	Organizations adopting digital procurement

- Competitive Bidding
- Open Tender
- Restricted Tender
- Single Source
- Direct Procurement
- Framework Agreements
- Competitive Negotiation

Comparison of Procurement Methods

Procurement Method	Competition	Best Used For	Main Advantage
Open Tendering	High	Public projects	Transparency
Selective Tendering	Medium	Specialized projects	Better-qualified suppliers
RFQ	Medium	Standard goods and services	Price comparison
RFP	Medium	Complex projects	Best overall value
RFI	None	Market research	Supplier information gathering
Single-Source	Low	Strategic suppliers	Speed and continuity
Sole-Source	None	Unique products or services	Only feasible option
Direct Procurement	None	Small or urgent purchases	Simplicity
Framework Agreement	Limited	Recurring purchases	Efficiency and consistency ²⁸

- Fixed Price Contract
- Cost Reimbursable Contract
- Time and Material Contract
- Unit Price Contract
- Comparison table

Comparison of Procurement Contract Types

Feature	Fixed-Price (FP)	Cost-Reimbursable (CR)	Time & Material (T&M)
Cost certainty	High	Low	Medium
Scope definition	Well defined	Uncertain	Partially defined
Buyer risk	Low	High	Medium
Seller risk	High	Low	Medium
Flexibility	Low	High	Medium
Administration	Simple	Complex	Moderate
Best for	Construction, equipment	R&D, innovation	Consulting, maintenance

Supplier Selection Criteria

- Price
- Quality
- Experience
- Capacity
- Financial Stability
- Risk
- Past Performance
- Sustainability

Supplier Evaluation Matrix

Criteria	Weight
Price	30%
Quality	25%
Delivery	20%
Technical Capability	15%
Financial Strength	10%

E-Procurement

- Characteristics
- Electronic catalogs
- Electronic bidding
- Supplier portals
- Online approvals
- Electronic payments

Benefits

- Faster
- Transparent
- Lower cost
- Reduced paperwork

Examples

- SAP
- Oracle
- Microsoft Dynamics
- Odoo

Functions

- Purchase Orders
- Inventory
- Contracts
- Finance
- Supplier Database

Applications

- Supplier selection
- Spend analytics
- Contract review
- Predictive procurement

- **Risk prediction**
- Supplier performance analysis
- Negotiation support
- Chatbots
- Fraud detection

Procurement Risks

- Supplier failure
- Schedule delays
- Cost escalation
- Poor quality
- Legal disputes
- Currency fluctuations
- Political risks
- Cybersecurity

Risk Mitigation

- Multiple suppliers
- Performance bonds
- Insurance
- Contract clauses
- Supplier audits
- Continuous monitoring

Procurement KPIs

- Procurement Cycle Time
- Cost Savings
- Supplier Quality
- On-Time Delivery
- Contract Compliance
- Purchase Price Variance
- Supplier Performance Index

- Transparency
- Fair Competition
- Confidentiality
- Conflict of Interest
- Compliance
- Anti-Corruption

Emerging Technologies

- Artificial Intelligence
- Blockchain
- Smart Contracts
- IoT
- Digital Twins
- Robotic Process Automation (RPA)
- Predictive Analytics
- Cloud Procurement

Summary

- Procurement systems are critical to project success.
- Effective procurement aligns cost, quality, time, and risk objectives.
- Digital platforms and AI improve procurement efficiency, transparency, and decision-making.
- Supplier selection, contract management, and performance monitoring are continuous processes throughout the project life cycle.

Summary of Learning Objectives

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1. Define project procurement systems.
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 5. Describe e-procurement systems.
 6. Evaluate procurement performance.
 7. Apply AI in project procurement

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Thank You