

# Procurement and Materials Management

## Module 6.2

November 3, 2002

## Purpose

- To describe briefly the process by which materials are procured and managed and how the results may vary.

## Learning Objectives

- Students should be able to list the steps and activities within the overall materials procurement and management process.
- Students should be able to sketch the overall logic diagram.
- Students should be able to describe the importance of process.

## Components of Procurement

- Purchasing Equipment, materials, supplies, labor, services, and subcontractors.
- Purpose is to obtain needed quantity of the required quality, on time, at the lowest "ultimate" or "life-cycle" installed cost.

## Procurement Sequence ... .. (May not apply to all cases.)

1. Requisitions – goods or services are identified as being needed. Purchasing agent/department notified of need and procurement sequence initiated.
2. Prequalification and Bid List Preparation
  - Advertise in trade journals
  - Call/Contact predetermined group
  - Conform to HUG regulations

## Procurement Sequence ...

3. Request for Quotations or Proposals
  - Ask qualified list of vendors to prepare and submit quotes or proposals.
  - Insure that they have ALL pertinent information
4. Bid receipt and evaluation
  - Set firm deadline for receipt (expect to get last minute submittals.)
  - Evaluate submittals on delivery schedule, compliance with plans and specifications, and "ultimate" installed cost.
  - Negotiate firmly but fairly

## Procurement Sequence ...

5. Recommendation and approval for purchase
  - Various dollar amounts should require various levels of approval – balance cost and complexity with administrative effort and cost.
  - Complicated items may require engineering or architectural review.
6. Award and preparation of documents
  - Goods are usually obtained with a purchase order, if purchaser accepts all conditions offered by the vendor.
  - Contracts should be used for services, with both parties signing.

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## Procurement Sequence ...

7. Changes in contract documents
  - All changes must be reviewed and approved by all parties concerned.
  - Make sure that all parties concerned understand changes.
  - Purchase orders and subcontracts are legally binding contracts, if they have been executed properly.

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## Procurement Sequence ...

8. Expediting
  - Involves monitoring all steps of the procurement cycle
  - Should be Proactive NOT Reactive.
  - Include periodic visits on a routine, non-urgent, basis and telephone follow-ups.
  - Check on vendor progress, supply of raw materials, workload, product completed, quality control, delivery schedule
  - Emergencies may require back-up suppliers, or using faster shipping methods, or other removal of bottlenecks.

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## Procurement Sequence ...

9. Shipping
  - Must schedule a method of shipping that gets the item to the project on time
  - Should do a cost evaluation between shipping options, project schedule, storage costs, unloading requirements.
  - Analyze shipping cost in terms of amounts being shipped.

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## Procurement Sequence ...

10. Receiving
  - Make sure that people receiving materials match those materials with the PO and the shipping invoice with a receiving report
  - Make sure that people receiving materials make a quality inspection and report variances promptly and properly
  - Make sure that people receiving materials report shortages properly and immediately.

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## Procurement Sequence ...

11. Storing and inventory
  - Storage cost must be considered.
  - Inventory system should track product information, location, and amount on hand and amount on back order
  - Storage method must provide security and protection
  - Efficient handling must be considered

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## Procurement Costs ... ..

### 1. Purchase cost

- Actual goods/services cost
- Administrative Overhead: requisition, solicit bids, evaluate bids, issue PO's, expedite, receive, store, inventory, etc.
- Need to balance O/H costs with purchase price
- Larger volume means lower unit prices

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## Procurement Costs ... ..

### 2. Shipping Costs

- Consider amount to be shipped
- Must consider speed of shipping method
- Must consider safety and security

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## Procurement Costs ... ..

### 3. Holding Costs

- Storage space; may have to rent warehouse or lay down area
- Warehouse operations overhead
- Deterioration
- Loss through Theft and Misplacement
- Insurance and Interest
- Inefficiencies through Re-handling

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## Procurement Costs ... ..

### 5. Storage costs

- Interrupted production
- Schedule adjustment cost
- Expediting and special handling

Trade Offs between purchase, shipping, handling, and storage costs are important.

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## Class Exercise (Optional)

- Discuss some of the trade-offs between cost, time, and security within the process and make sure you understand the importance.

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## Example Analysis Problem ... ..

- **Objective:** Reduce the Elapsed Time AND Administrative Cost necessary to purchase construction materials.
- **Method:** A stochastic (assume that the activities have random durations, etc.) simulation model using an Activity Based Costing approach to model the process activities.
- **System Phases:**
  - Materials Requirements Planning
  - Purchasing
  - Field Material control
  - Accounts Payable

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**Process Event Table:** Lists the activities to be modeled.

Materials Management Tasks	Name
<b>Materials Requirement Planning</b>	
Receive engineering documentation	C10
Perform Materials Take-off (MTO)	N16
Review engineering material specifications	N11
Review and M.T.O. Complete	C20
Develop purchase descriptions	N25
Assign material coding information	N50
Obtain schedule and cost control information	N40
Summarize material requirements	C65
Distribute purchase requisition for approvals	N70
Obtain in-house approval of requisition	N75
Obtain client approval of requisition	N80
Modify or amend requisition	N100
Distribute approved requisition	N115

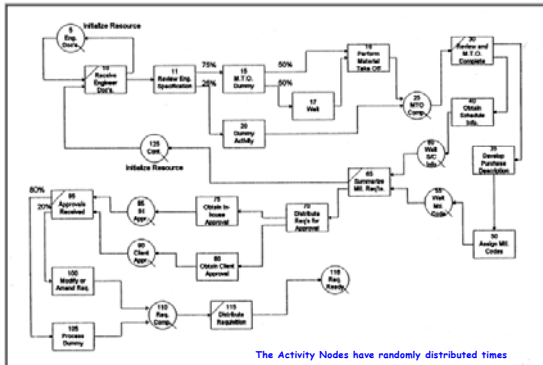
Materials Management Tasks	Name
<b>Purchasing</b>	
Receive approved requisition from MRP	C120
Summarize / consolidate material reqts.	N126
Select / prepare listing of prequalified vendors	N130
Prepare Request for Quotation (RFQ)	N135
Distribute RFQ for approval	N140
Obtain approvals for RFQ	N155
Issue / transmit RFQ to prequalified vendors	C160
Vendor receive Request for Quotation	N165
Vendor translate material requirements	N170
Vendor establishes pricing, terms, exceptions	N175
Vendor prepares response to RFQ	N180
Vendor transmits response to RFQ	C190
Purchasing receives all vendor responses	N195
Bid tabulation is prepared	C200
Commercial / technical evaluation	N205
Purchasing prepares award recommendation	N210
Purchasing distributes tabulation / recommend	N215
Obtain in-house purchasing approval	N220

**Process Event Table:** Lists the activities to be modeled.

Materials Management Tasks	Name
<b>Continued:</b>	
Obtain client purchasing approval	N225
Issue verbal award of purchase order	N250
Revise purchase specification	N255
Obtain approval of revised specifications	N260
Purchasing prepares purchase order	C275
Obtain approval signatures for purchase order	N280
Issue formal purchase order document	N285
Distribute copies of issued purchase order	N290
<b>Field Material Control</b>	
Receive bill of lading or packing slip	C310
Inspect material delivery or shipment	N315
Evaluate against purchase order information	N320
Prepare Material Receiving Report (MRR)	N325
Prepare Overage / Shortage / Damage Report	N330
Transmit reports to all departments	N335

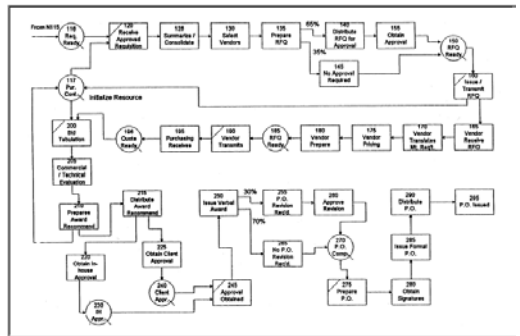
Materials Management Tasks	Name
<b>Accounts Payable</b>	
Receive all purchase order and MRR info.	C355
Vendor prepares and submits invoice	N340
Date stamps invoice and files all documents	N360
Evaluate invoice against P.O. and MRR	N365
Resolve information discrepancies	N370
Add general ledger and cost code info.	N380
Update all accounts payable registers	N385
Obtain invoice (payment) approval	N395
Prepare check request	N400
Voucher prepared early	N405
Voucher prepared late	N407
Review and approval of voucher / invoice file	N410
Obtain signatures for check	N415
Checks mailed or transmitted	N420
Invoice cancelled and all registers updated	N425
Process Finish	C430

**Process Flow Charts:** Requirements and Planning Phase.

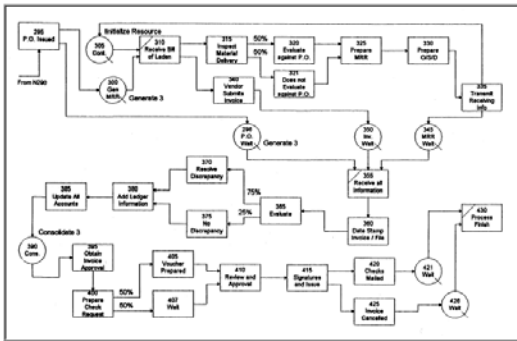


The Activity Nodes have randomly distributed times

**Process Flow Charts:** Purchasing.



**Process Flow Charts:** Receiving and Accounting

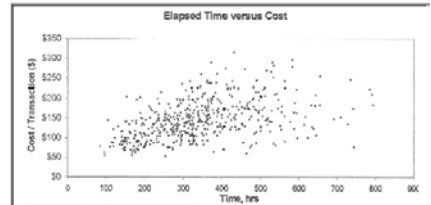


**Results:** A Plot of Elapsed Time versus Activity Cost

Table 1. Summary Results for Procurement Baseline Model

Statistic	Performance Cost	
	Elapsed Time (hrs)	(\$)
Min	90	\$45
Average	249	\$125
Max	598	\$441
Std-Dev	137	\$46
10% Below	174	\$86
10% Above	524	\$205

Shows the possible range of costs and elapsed times.





## Class Assessment

What is the muddiest part of the procurement process for you?