ENTERPRISE RESOURCE PLANNING

ERP Modules:
Procurement and Inventory Management

Raghu B. A.

Department of Computer Science and Engineering

raghubarao@pes.edu

ENTERPRISE RESOURCE PLANNING

ERP Modules:
Procurement and Inventory Management

Raghu B. A.

Department of Computer Science and Engineering

Procurement Management:

Topic Agenda – Chapter 22

1.Overview

2.**Procurement Management**
- Process
- Types of Procurement
- Maturity Model
- Master data
- KPIs for ERP Procurement
- Solutions

3.Inventory Management

Inventory Management: Topic Agenda

1. Overview
2. Procurement
3. **Inventory Management**
   - Process
   - Concept of IM Pyramid
   - IM Processes for ERP
   - Solutions for ERP IM
   - KPIs for ERP IM

Procurement Management: Procurement Process

🔵 *Definition:*
- *"Procurement is the process of sourcing materials from vendor, inspecting it and finally paying the vendor for the accepted materials."*
- Procurement is a requirement for almost every org
- Hence considered a fundamental module of any ERP
- It is a transaction intensive process
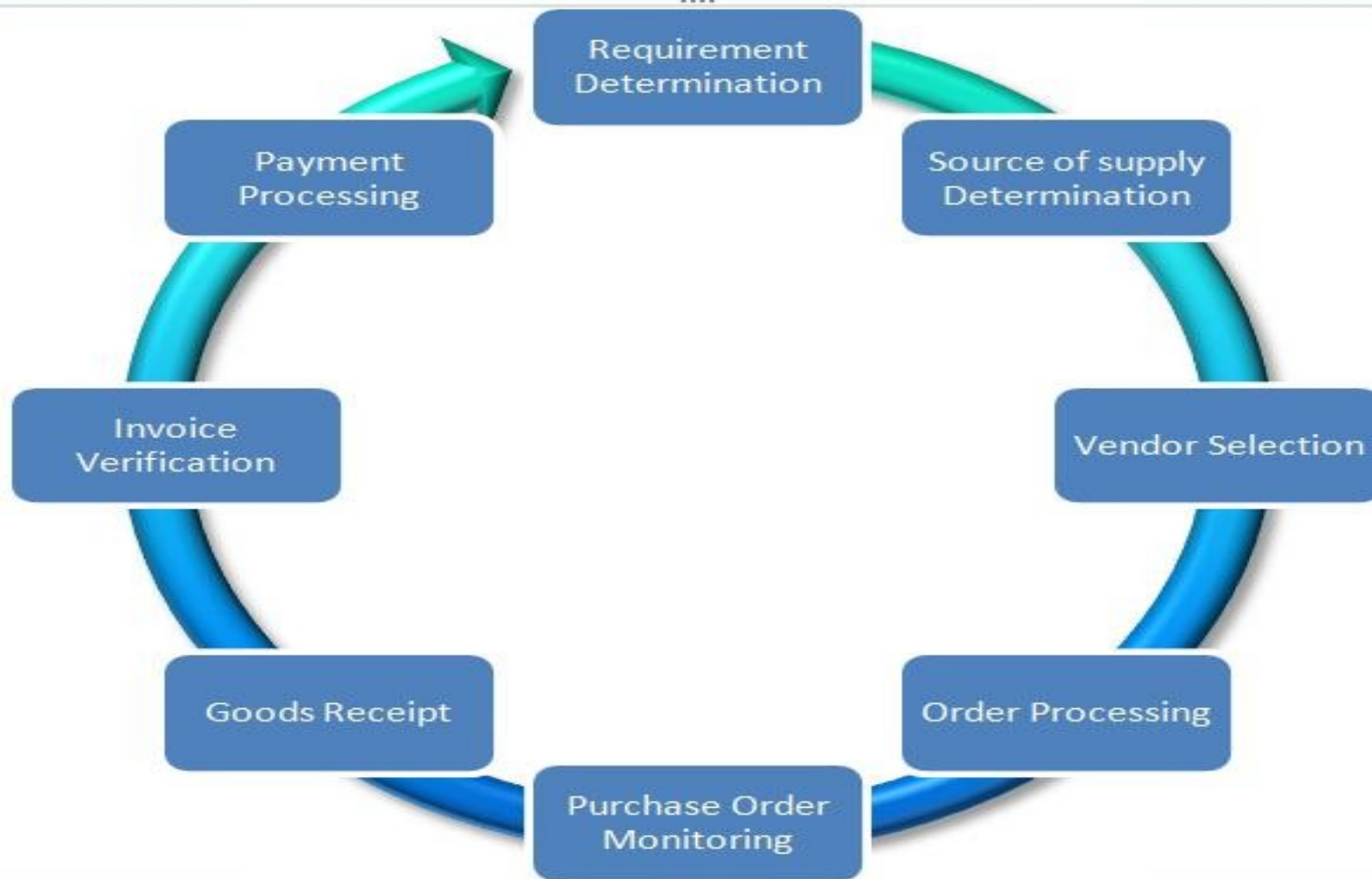
Procurement Management: Procurement Process

- Determining what to buy and how much – Procurement Planning

- Determination of the source of supply

- Selecting the vendor

- Purchase Order (PO) creation

- Goods Receipt (GR)

- Invoice verification

- Processing vendor payment
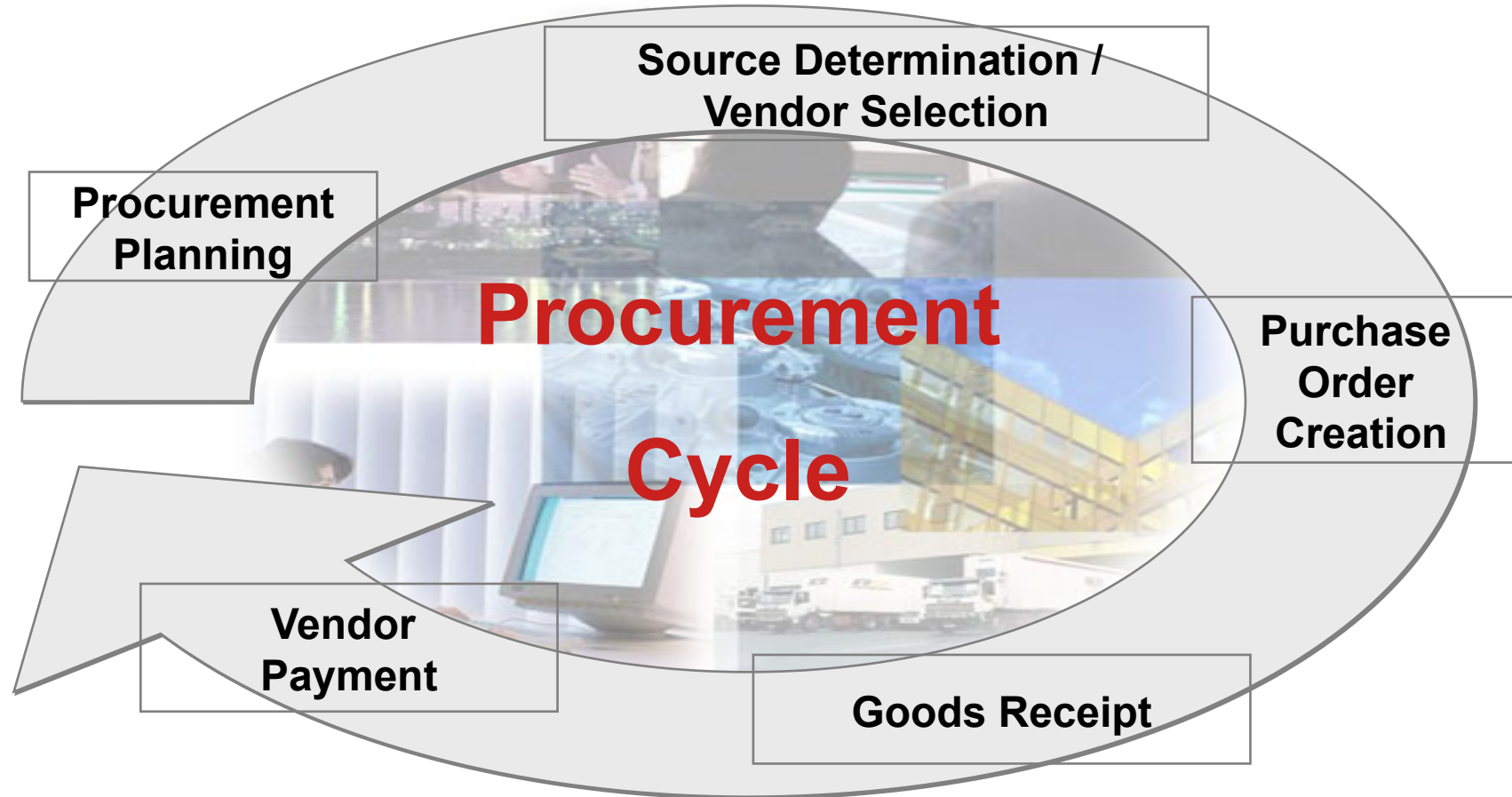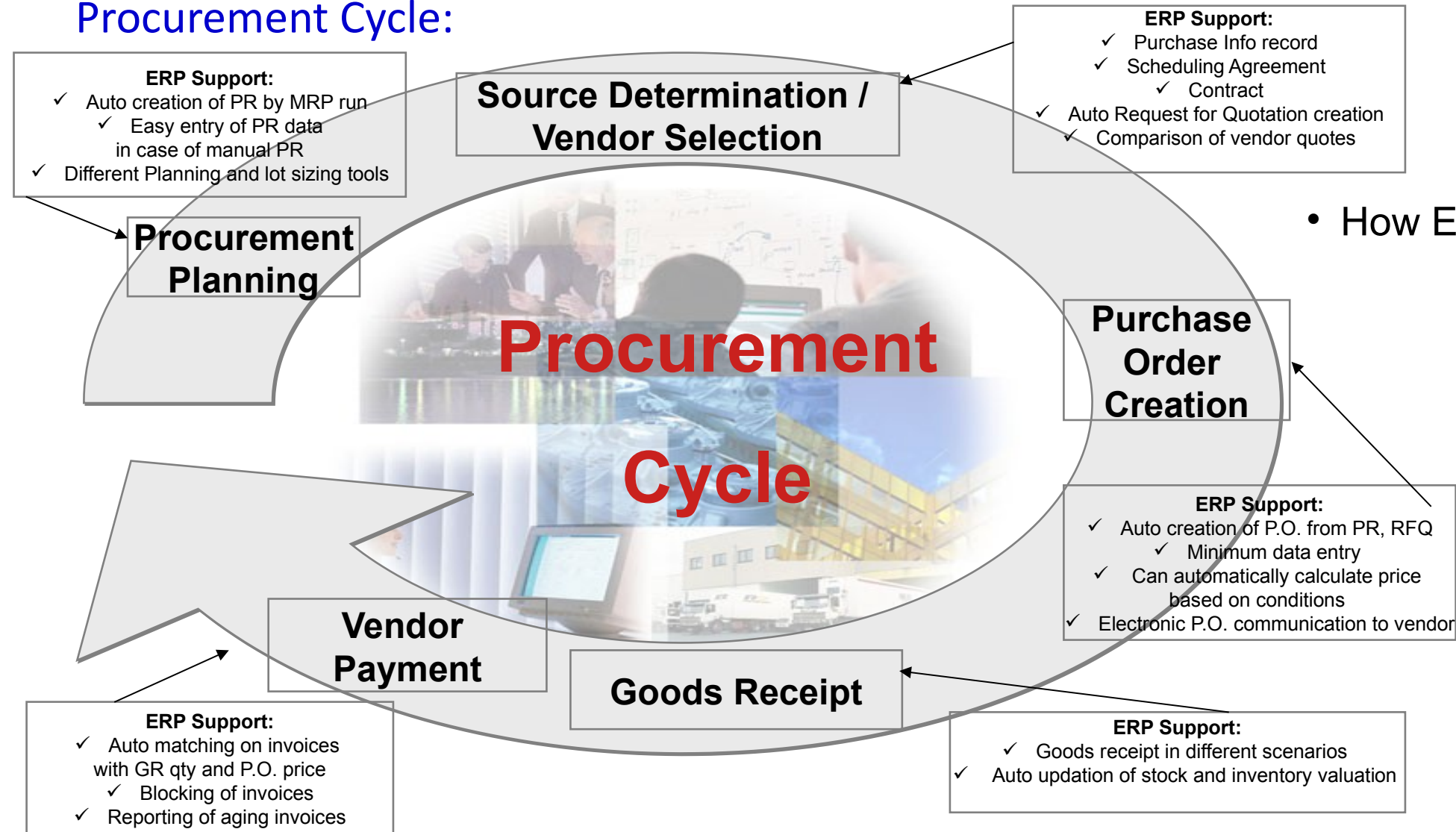
Procurement Management: Procurement Process

Procurement Cycle:

ENTERPRISE RESOURCE PLANNING (ERP)
ERP Modules: Procurement and Inventory Management

Procurement Cycle:

ERP Support:
- ✓ Auto creation of PR by MRP run
- ✓ Easy entry of PR data in case of manual PR
- ✓ Different Planning and lot sizing tools

ERP Support:
- ✓ Purchase Info record
- ✓ Scheduling Agreement
- ✓ Contract
- ✓ Auto Request for Quotation creation
- ✓ Comparison of vendor quotes

Source Determination / Vendor Selection

Procurement Planning

Procurement Cycle

Purchase Order Creation

- • How ERP make this process more efficient

ERP Support:
- ✓ Auto creation of P.O. from PR, RFQ
- ✓ Minimum data entry
- ✓ Can automatically calculate price based on conditions
- ✓ Electronic P.O. communication to vendor

Vendor Payment

Goods Receipt

ERP Support:
- ✓ Auto matching on invoices with GR qty and P.O. price
- ✓ Blocking of invoices
- ✓ Reporting of aging invoices

ERP Support:
- ✓ Goods receipt in different scenarios
- ✓ Auto updation of stock and inventory valuation

Procurement Management:

How ERPs Support Procurement Process

- **Determining what to buy and how much –** Procurement Planning
  - Auto generation of PR by MRP run
- **Determination of the source of supply**
  - Purchase information record
- **Selecting the Vendor (or Supplier)**

  - Scheduling agreement & contracts

  - Comparison of vendor quotes
- **Purchase order creation**
  - Auto creation of PO from PR, RFQ & e-communication to vendor
- Goods receipt
- Invoice verification
- Processing vendor payment

Procurement Management:

How ERPs Support Procurement Process

- Determining what to buy and how much – Procurement Planning
- Determination of the source of supply
- Selecting the vendor
- Purchase order (PO) creation
- **Goods receipt (GR)**
  - Quality inspection and shelf life expiration check
  - Under/Over delivery check & report
  - Auto updation of stock and inventory valuation
- Invoice verification
- **Processing vendor payment**
  - Auto (3-way) matching of invoice with GR, and PO
  - Blocking/reporting of invoices & their aging

Procurement Management:

- ERP's functionality to support Procurement process

  - ✓ Purchase Requisition
  - ✓ Contract (Quantity contract, Value contract)
  - ✓ Quota Arrangement
  - ✓ Delivery Schedule (Forecast Schedule, Farm Schedule)
  - ✓ Source List
  - ✓ RFQ
  - ✓ Quotation
  - ✓ Purchase Order (and Blanket Purchase order)

Procurement Management:

How ERPs Support Procurement Process

🔵Some Important Functionality of ERP
- Procurement Requisition (PR)
- Contracts
- Quota arrangement
- Forecast delivery schedule
- Detailed/Firm delivery schedule
- Source list
- RFQ (Request for Quotation)
- Converting PR to PO
- PO (Purchase Order)
  - Blanket PO

Procurement Management:

Procurement Process Variants for Different Types of Procurement

- Procurement of Materials and Services
- Procurement of Direct and Indirect Items
- Commodity Procurement
- Govt / PSU Procurement

- Typical Challenges
    1) Service cannot be inventorized
    2) Difficult to specify service specifications
    3) Price comparison is complex
    4) Goods receipt is replaced by service entry and acceptance for service procurement

Procurement Management:

- Differences between Material And Service Procurements

Material Procurement	Service Procurement
Materials can be inventorizied	Services can not be inventorizied
Specifications are clearly defined during material procurement	Some time it is difficult to define a service specification during procurement
For a given specification price comparison is simple	For a given specification service price comparison is difficult – price may differ by time of purchase, ambience etc.

Procurement Management:

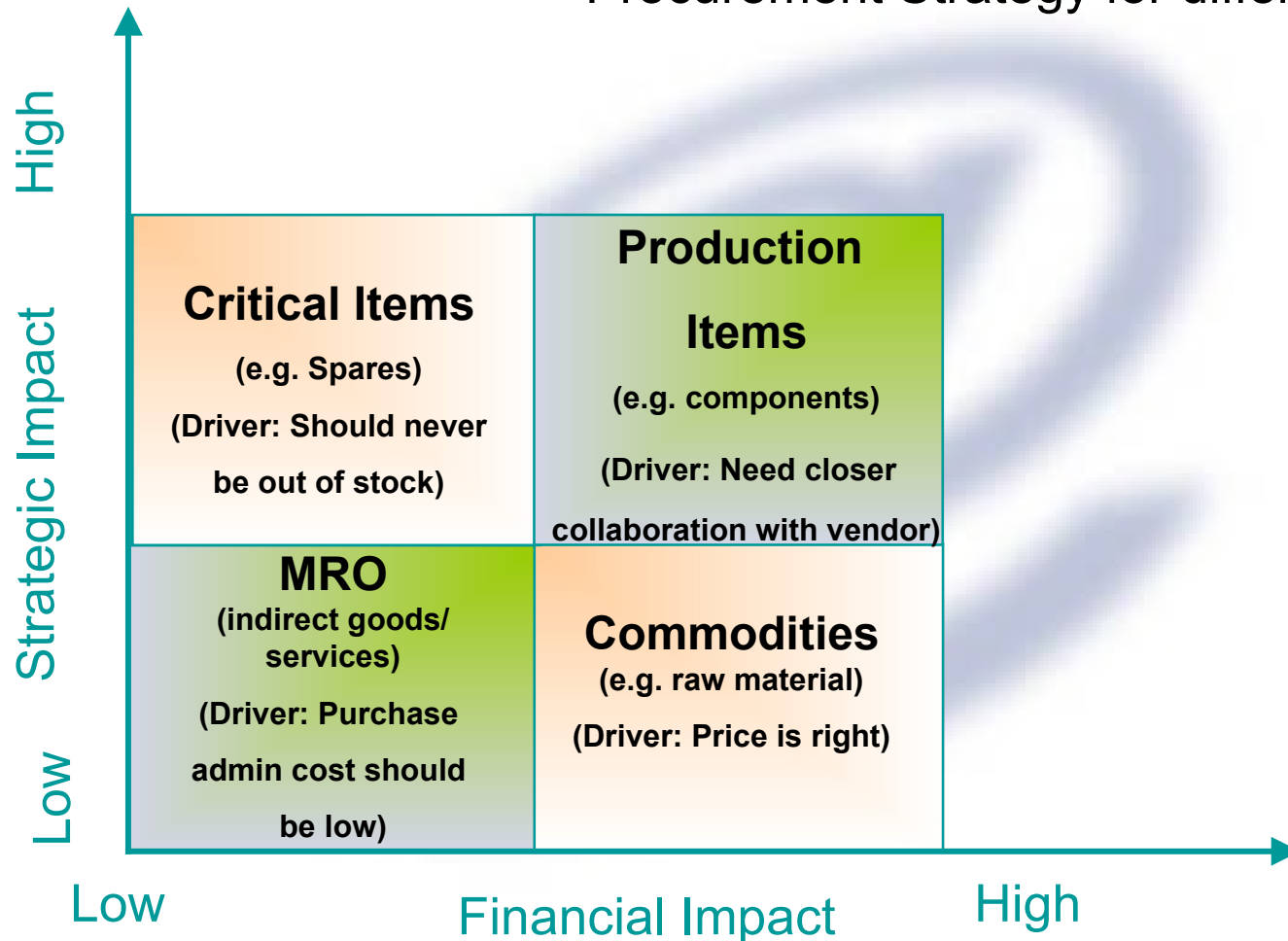- Difference between Direct And Indirect Procurements

Direct Items	Indirect Items
Demand driven by Market demand of End items	Demand not driven by end item demand and mostly driven by past consumption trend
Involvement for procurement department is much higher here as they need to collaborate with supplier to design the component or product.	Involvement for procurement department is much lower here as mostly off the shelf items are procured.
Generally contribute a significant portion by value of total monthly procurement spend	Generally contribute a small portion by value of total monthly procurement spend as these are typically low value items.
Planning is done generally through planning runs of MRP or Advanced planning systems.	Planning is consumption based. In some cases purchase requisitions are created manually.
Procurement is always done by procurement team.	Procurement can be done by procurement team and also by end user / employee through E Procurement or Portal.
Backend integration needed with ERP solutions is much higher here for reasons like delivery schedules release	Backend integration needed with ERP solutions is lower here.

Procurement Management:

Procurement Strategy for different item groups

MRO refers to Maintenance, Repair and Operation supplies.

Strategic Impact (vertical axis: Low to High)

Financial Impact (horizontal axis: Low to High)

Critical Items
(e.g. Spares)
(Driver: Should never be out of stock)

Production Items
(e.g. components)
(Driver: Need closer collaboration with vendor)

MRO
(indirect goods/ services)
(Driver: Purchase admin cost should be low)

Commodities
(e.g. raw material)
(Driver: Price is right)

Procurement Management: • Master Data For ERP Procurement
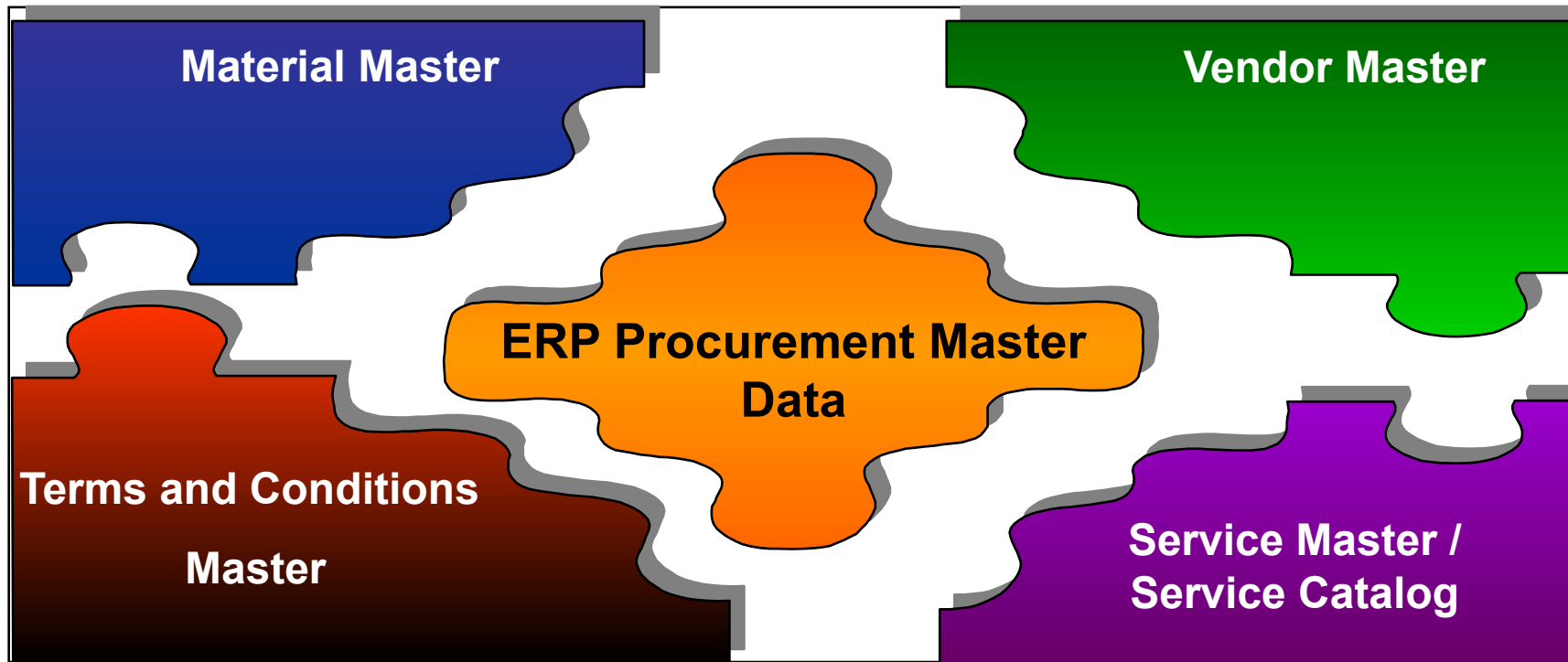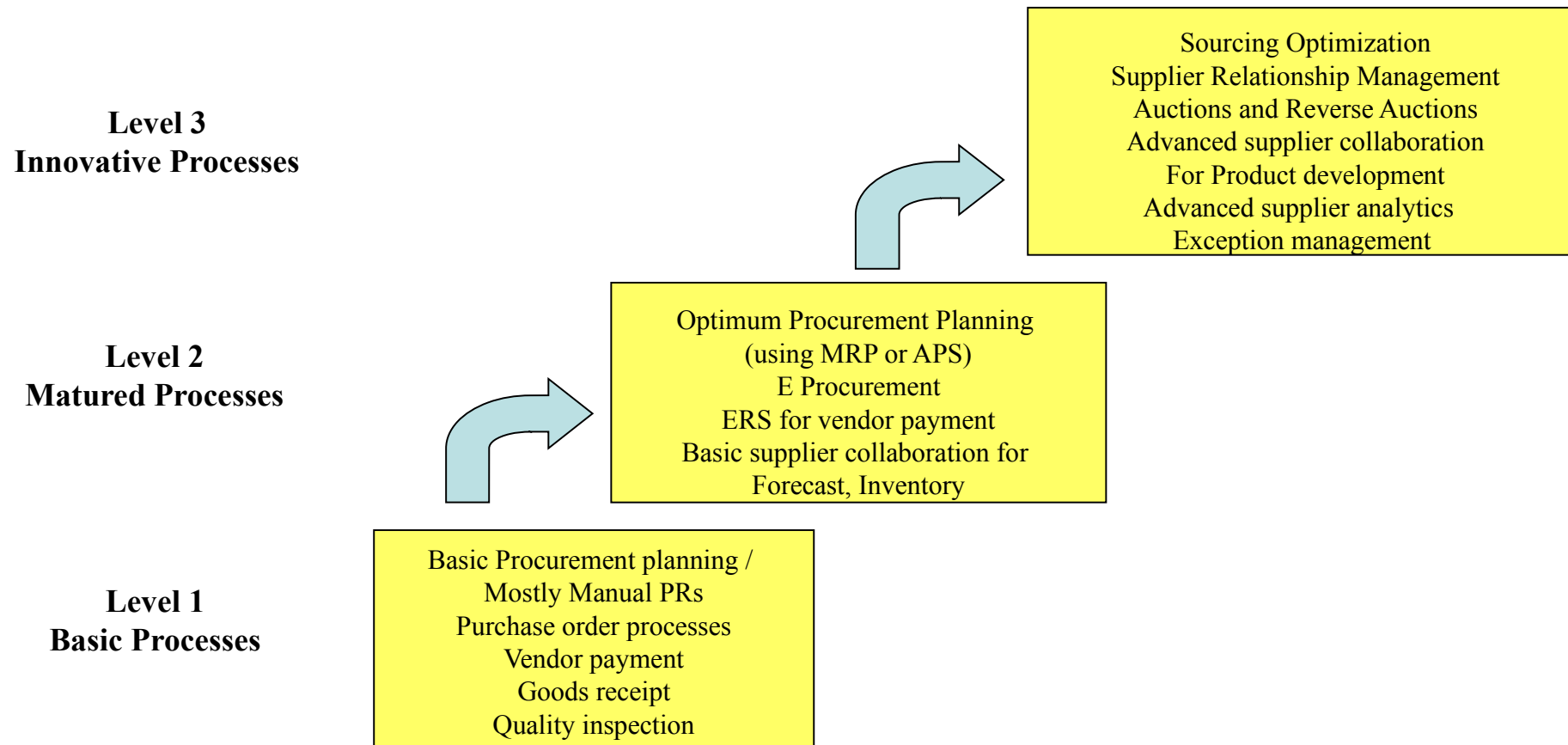
Procurement Management:

- Level 1: Basic Processes
  - Basic Procurement planning
  - Manual PRs & POs
  - Vendor payment
  - Goods Receipt
  - Quality Inspection

- Level 2: Matured Processes
  - Optimum Procurement planning
  - E-procurement
  - Collaboration with suppliers for Forecasting, Inventory

- Level 3: Innovative Processes
  - Sourcing optimization
  - SRM
  - Auctions and reverse auctions
  - Advanced collaboration with suppliers
  - Advanced Supplier Analytics
  - Exception management

Procurement Maturity Model and Item based Procurement Strategy

ERP Modules: Procurement and Inventory Management

Procurement Management: • Procurement Maturity Model

Level 3
Innovative Processes

Sourcing Optimization
Supplier Relationship Management
Auctions and Reverse Auctions
Advanced supplier collaboration
For Product development
Advanced supplier analytics
Exception management

Level 2
Matured Processes

Optimum Procurement Planning
(using MRP or APS)
E Procurement
ERS for vendor payment
Basic supplier collaboration for
Forecast, Inventory

Level 1
Basic Processes

Basic Procurement planning /
Mostly Manual PRs
Purchase order processes
Vendor payment
Goods receipt
Quality inspection

Procurement Management:

Master Data for ERP Procurement

1) Material Master
2) Vendor Master
3) Terms & Conditions Master
4) Service Master Record & Service Catalog

Procurement Management: KPIs for Procurement

#	Measure	Definition
1	Cost Savings	Departments contribution to the financial success of the organization.
2	Supplier Performance	Performance of suppliers on price, delivery, quality, service, etc.
3	Procurement Cycle Time	Average time taken between requisition submission and PO placement
4	Procurement ROI	Ratio of savings made by operating costs. Measures dept's cost efficiency.
5	Contract Compliance	No. of exceptions in contract – quantity, price, etc.
6	Purchasing Analysis	Order value analysis – net order value, ABC analysis, frequency analysis, etc.

Procurement Management:

- Common Procurement KPIs

✓ Cost Savings

✓ Supplier performance

✓ Procurement cycle Time

✓ Procurement ROI

✓ Contract Compliance

✓ Purchasing analysis

Procurement Management: ERP Solutions for Procurement

- Oracle Offerings
    1) Internet Procurement
    2) Purchasing Intelligence
    3) Online Supplier Portal
    4) Purchasing
    5) Oracle Sourcing
    6) Procurement Contracts
    7) Daily Business Intelligence
    8) Quality
- SAP Offerings
    1) Consumption based planning
    2) Reorder point planning
    3) Forecast based planning
    4) MRP based planning

ENTERPRISE RESOURCE PLANNING

ERP Modules:
Procurement and Inventory Management

Raghu B. A.
Department of Computer Science and Engineering

Procurement Management: Topic Agenda

1. Overview
2. Procurement
3. **Inventory Management**
   - Process
   - Concept of IM Pyramid
   - IM Processes for ERP
   - Solutions for ERP IM
   - KPIs for ERP IM

Inventory Management: Processes in ERP

- Concept of IM Pyramid
   A) InventoryTransaction Processes
   B) Inventory Control Processes
   C) Inventory Planning Processes
   D) Strategic IM Processes

ERP Modules: Procurement and Inventory Management

Procurement Management: Inventory Management Process

- Concept of IM Pyramid
  1. Transactions & Inv Control (Lose)
  2. Inventory Planning (Maintain)
  3. Strategic IM Processes (Gain)

INVENTORY MANAGEMENT PYRAMID

STRATEGIC INVENTORY OPTIMIZATION
- DEPLOYMENT STRATEGY- DETERMINE STRATEGIC LOCATIONS TO HOLD INVENTORY AND HOW MUCH TO HOLD AT EACH LOCATION/ECHELON
- CHANNEL INTEGRATION WITH SUPPLIERS
- ADOPTING BEST PRACTICES LIKE VMI, CPFR, JIT AND CROSS DOCKING

INVENTORY PLANNING
- USING INVENTORY MODELS TO DETERMINE OPTIMAL INVENTORY POLICIES
- USE QUANTITATIVE MODELS TO DETERMINE SAFETY STOCK, CYCLE STOCK, COST OF INVENTORY ETC.
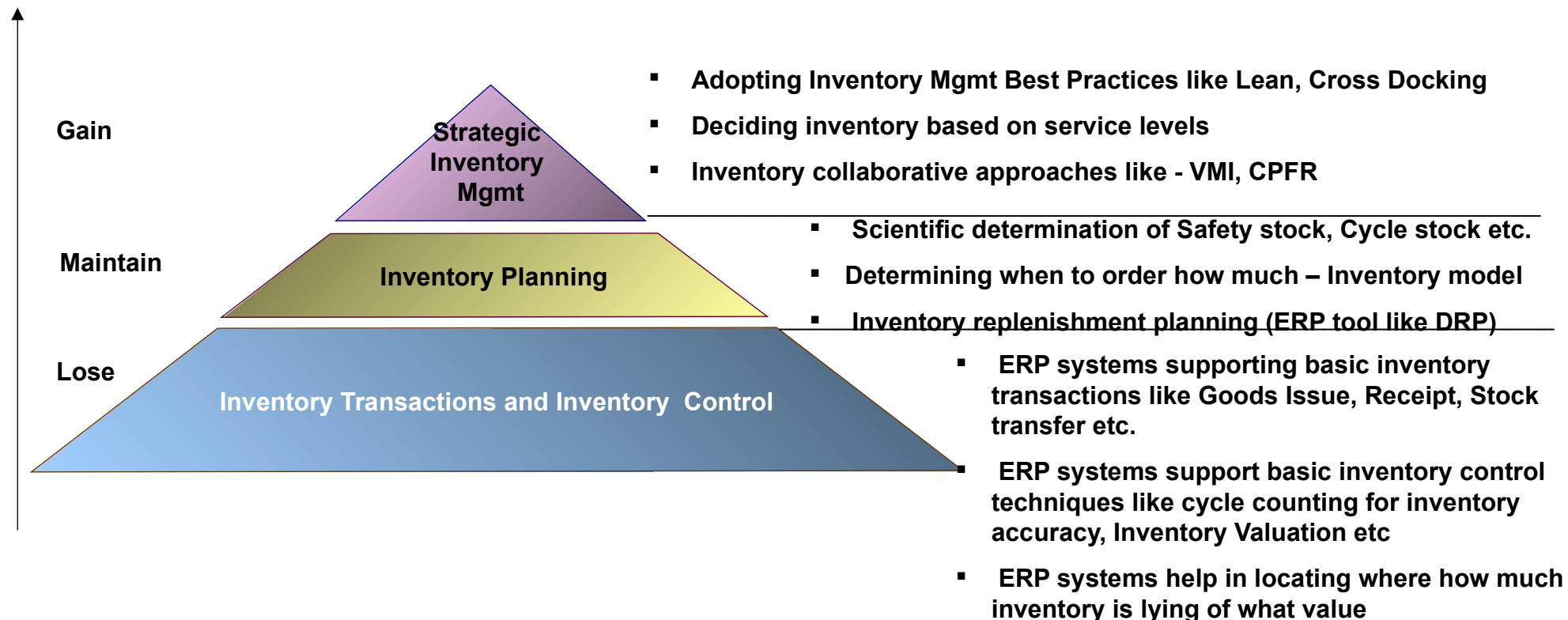
INVENTORY CONTROL
- IMPLEMENT SYSTEMS TO RECORD ALL INVENTORY TRANSACTIONS
- CYCLE COUNTING FOR INVENTORY ACCURACY
- INVENTORY TRACKING CAPABILITIES
- INVENTORY VALUATION PROCESSES

ENTERPRISE RESOURCE PLANNING (ERP)
ERP Modules: Procurement and Inventory Management

Procurement Management:

- ERP can support all levels of Inventory Management Pyramid

Gain

Strategic Inventory Mgmt
- Adopting Inventory Mgmt Best Practices like Lean, Cross Docking
- Deciding inventory based on service levels
- Inventory collaborative approaches like - VMI, CPFR

Maintain

Inventory Planning
- Scientific determination of Safety stock, Cycle stock etc.
- Determining when to order how much – Inventory model
- Inventory replenishment planning (ERP tool like DRP)

Lose

Inventory Transactions and Inventory Control
- ERP systems supporting basic inventory transactions like Goods Issue, Receipt, Stock transfer etc.
- ERP systems support basic inventory control techniques like cycle counting for inventory accuracy, Inventory Valuation etc
- ERP systems help in locating where how much inventory is lying of what value

ERP Modules: Procurement and Inventory Management

Inventory Management: Processes in ERP

Inventory Transaction Processes
- ✓   Goods receipt
- ✓   Goods issue
- ✓   Reservations
- ✓   Stock transfer

Inventory Control Processes
- ✓   Physical inventory
- ✓   Cycle counting
- ✓   Stock Valuation Processes

Inventory Planning Processes / Inventory Models
- ✓   Q Model / EOQ Model
- ✓   P Model / Periodic Review System
- ✓   Min – Max Models
- ✓   Two Bin Models

ENTERPRISE RESOURCE PLANNING (ERP)

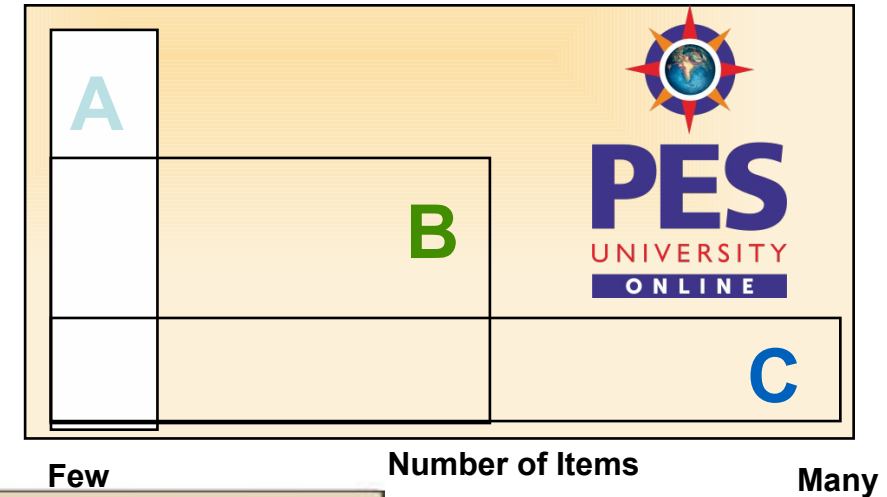## ERP Modules: Procurement and Inventory Management

- The A items account for 60.5% of the value and 13.3% of the items
- The B items account for 25% of the value and 26.7% Of the items
- The C items account for 14.5% of the value and 60% of items

Inventory Management: Processes in ERP

High

A

B

C

Annual
$ value
of items

Low

Few   Number of Items   Many
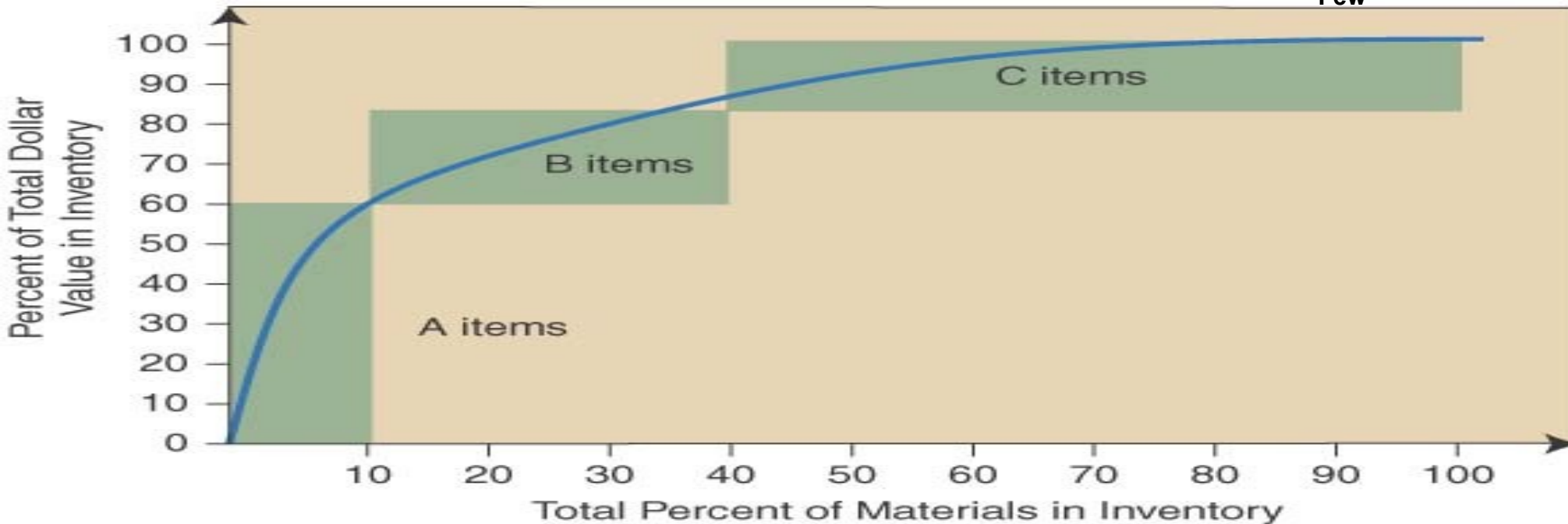
ABC classification helps in classifying inventory and allocating control efforts as per importance

A – Very Important,   B – Moderate Important,   C – Least Important

Inventory Management:

KPIs for Inventory Management

1) Stock outs

2) Inventory turn

3) Inventory Carrying Costs

4) SKU Turnover

5) Inventory Aging

6) Inventory Cycle Counting Accuracy

7) Inventory Obsolescence as a % of Total Inventory

8) Shrinkage

9) Storage Space Utilization

Inventory Management: IM Processes in ERP

A) Transaction Processes
  1) Goods Receipt (GR)
  2) Goods Issue
  3) Reservations
  4) Stock Transfer

B) Inventory Control Processes
  1) Quality Control
      a) Physical Inventory
      b) Cycle Counting
      c) Stock Overview
  2) Value Control / Stock Valuation
      1) ABC Classification of Materials

C) Inventory Planning Processes
  1) Design better process for replenishment
  2) Supporting processing/handling of exceptions
  3) Scientific approach to reordering – when & what quantity

D) Strategic IM Processes

Inventory Management: IM Processes in ERP

Concept of IM Pyramid

A) Transaction Processes

1) Goods Receipt (GR)
    1) ASN = Advanced Shipping Notice (from supplier)
    2) Receiving goods (PO / Delivery Schedule)
    3) Damage identification
    4) Unloading & unpacking
    5) Capture Lot # details
    6) Reconcile PO – Delivery Schedule – GR
    7) Returns – quality not acceptable
    8) Bar codes, RFID – simpler, faster process
2) Goods Issue
    1) Create ASN (to customer)
    2) Packing and loading
    3) Issue goods and post in ERP-IM
    4) Receive POD (proof of delivery) from customer
3) Reservations
    1) By customer for a later date. Ensure availability.
4) Stock Transfer
    1) Plant to Plant, to Company, to Stores, to Warehouse, to Dealer

Inventory Management: IM Processes in ERP

- Concept of IM Pyramid
A) Transaction Processes
B) Inventory Control Processes
  1) Quality Control
    a) Physical Inventory
      a) To match System Inv is a challenge
    b) Cycle Counting
      a) A method of physical inventory counting in periodic intervals
      b) Policy based on ABC class of items
      c) Pareto analysis
    c) Stock Overview
      a) Stocks at different levels – ERP enabled
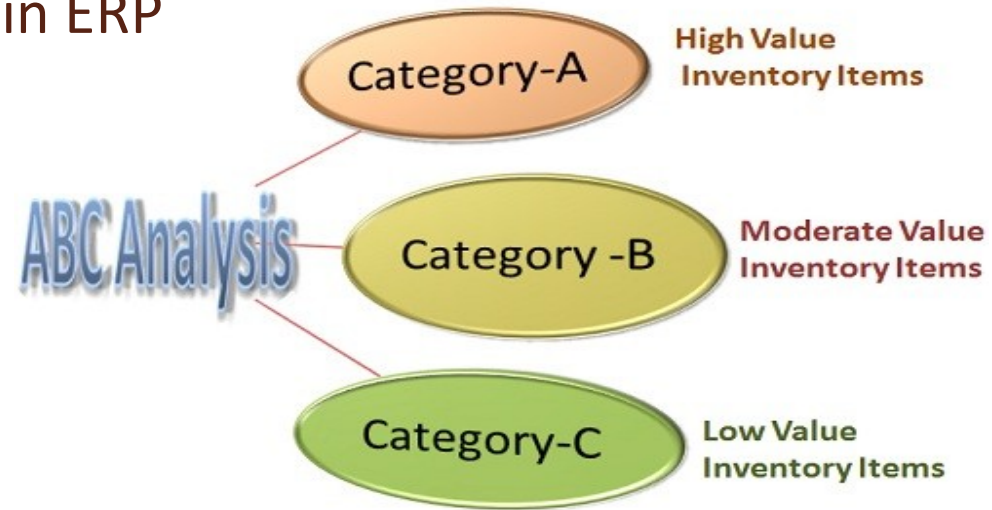
  2) Value control / Stock Valuation
    A) ABC Classification of materials
    B) Valuation methods available
      A) Moving average price
      B) Std price (in Matl Master)

ABC Analysis

Category-A — High Value Inventory Items

Category -B — Moderate Value Inventory Items

Category-C — Low Value Inventory Items

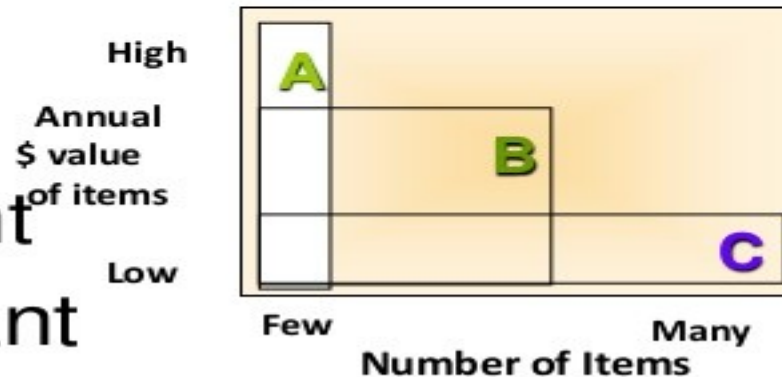Inventory Management: IM Processes in ERP

ABC Classification System

Classifying inventory according to annual value of consumption of the items.

A - very important

B - mod. important

C - least important

High

Annual $ value of items

Low

A

B

C

Few   Many
Number of Items

Inventory Management:

CLASSIFICATION OF INVENTORY

Classification	Full form	Criterion employed
ABC Analysis	Always Better Control	Usage Value (i.e. Consumption per period x price per unit)
GOLF Analysis	Govt, ordinary, local, foreign	Source procurement
SOS Analysis	Seasonal off seasonal	Seasonality
HML Analysis	High Medium Low	Unit Price i.e. does not take consumption into account
FSND Analysis	Fast, slow, non-monetary, material demands	Issues from store
SDE Analysis	Scarce, difficult, easy	Procurement difficulties

Inventory Management:　　　IM Processes in ERP

● Concept of IM Pyramid

A) Transaction Processes

B) Inventory Control Processes

C) Inventory Planning Processes

- Two basic drivers for better inventory planning
- i) Never have a stock out
  - for finished goods
    - Customer dissatisfaction
    - Lost sales
  - for raw materials
    - Production loss
- i. Never carry excess inventory
  - Increases cost of operation
  - Chance of obsolescence
  - Heavy markdown
- Solutions to overcome / prevent :
1) Design better process for replenishment
2) Supporting processing / handling of exceptions
3) Scientific approach to reordering – when & how much (quantity)
  - Q model, P model, Min-Max model, 2-bins model

D)

Inventory Management: Inventory Management Process in ERP

- Inventory Models supported by ERPs
  1) Q model
     - EOQ model – reorder point ordering, qty is constant
  2) P model
     - Periodic review
     - Opposite of Q model – qty differs, freq is constant
  3) Min-max model
     - Pre-define min and max stock level
     - Order when stock on hand is at/near min level
  4) Two bin model
     - Use 2 bins
     - Order when first bin is empty

Inventory Management: Strategic Inventory Management Processes

- Process of Inventory Collaboration
  - VMI – vendor managed inventory
  - Wal-Mart and P&G collaboration
- Deciding Inventory based on service levels
  - Critical items, high service levels => high inventory
  - Low service levels => low inventory
- Best practice processes
  - Cross docking
    - Effective coordination of inbound & outbound shipments
    - Example: Wal-Mart
    - SAP, Oracle, Manhattan Associates
- Lean Inventory Management
  - Lean principles
  - Reduce waste from supply chain
  - Kanban or JIT

ERP Modules: Procurement and Inventory Management

Inventory Management: KPIs for Inventory Management

Measures	Definition
Stock outs	#incidents of stock not available when reqd
Inventory Turn	Annual sales/avg inventory level
Inventory Carrying Cost	Σ all costs of finished goods
SKU turnover	# SKU cycles/turns
Inventory Aging	Total Gross Inv% for specific periods
Shrinkage	Costs of breakage, pilferage, deterioration of inv.
Storage space utilization	Volume of storage / total storage capacity in %
Inv Obsolescence as a %age of Total Inventory	Obsolete & scrap inv. / gross inv. value

Inventory Management: Solutions for Inventory Management

- Stock outs - #incidents of stock not available when required
- Inventory Turns - Annual sales/average inventory level
- Inventory Carrying Cost - Σ all costs of finished goods
- SKU Turnover - # SKU cycles/turns
- Inventory Ageing - Total Gross Inv% for specific periods
- Shrinkage - Costs of breakage, pilferage, deterioration of inv.
- Storage Space Utilization - Volume of storage / total storage capacity in %
- Inv Obsolescence as a %age of Total Inventory - Obsolete & scrap inv. / Gross inv. value

Inventory Management: Solutions for Inventory Management

1)Oracle Offerings
2)SAP Offerings
3)IBM offerings
• ERP vs Best of breed

Topic Summary

- P&IM is an important area management of product
- Procurement definition
- Procurement cycle
- Scenarios: Material vs. Service procurements
- Procurement maturity model
- Inventory management pyramid
- Inventory models
- KPIs for procurement and inventory processes

THANK YOU

Raghu B. A.

Department of Computer Science and Engineering

raghubarao@pes.edu