

# Supply Chain Inventory Management



# From Previous Session

- Supply chain structures **vary** significantly depending on the type of business, organizational size, and operating environment. (Centralized Vs Decentralized)
- Geographic location plays a critical role in **shaping** supply chain strategy, influencing transportation, supplier access, and lead times.
- **Customization** of supply chain processes is essential to align with business goals, customer expectations, and market conditions.
- Inventory acts as a **buffer** between supply and demand, ensuring continuity in operations and customer service



# What is Inventory

## Inventory

- Represents one of the **most valuable** assets for any business, particularly within manufacturing & supply chain management.
- Inventory refers to all the **items and materials** a company holds, ranging from raw materials awaiting production to finished goods ready for sales and MRO.

Effective **inventory management** ensures a business can meet customer demand without accumulating excessive inventory, which ties up capital and increases storage costs.





# Management Vs Control

## **Inventory Management**

Broad, strategic focus

Inventory management is the overall process of overseeing and controlling the ordering, storage, and use of a company's inventory. It includes forecasting, replenishment, lead time analysis, stock planning, and demand analysis.

Key responsibilities:

- Determining how much inventory to order and when to order
- Setting reorder points and safety stock levels
- Managing supplier relationships
- Forecasting demand
- Analyzing inventory turnover and performance



# Management Vs Control

## **Inventory Control**

Narrower, operational focus

Inventory control refers to the day-to-day activities that ensure physical inventory is accurately tracked, stored, and managed. It's about ensuring the right quantity of products is in the right place at the right time.

Key responsibilities:

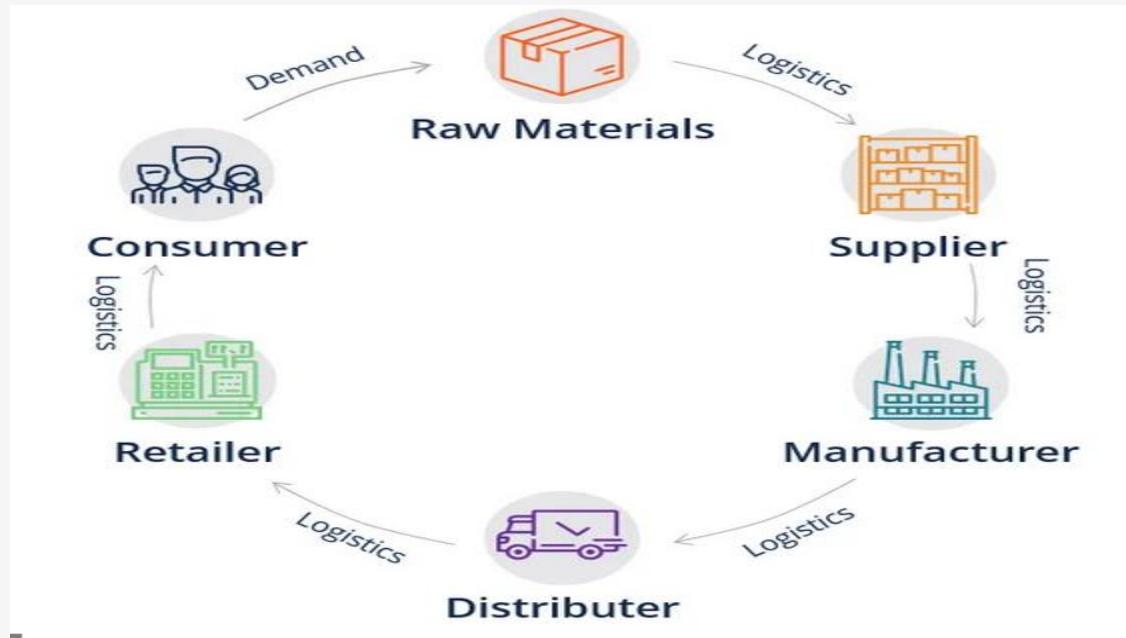
- Monitoring stock levels in real-time
- Managing stock locations (e.g., shelves, bins)
- Performing cycle counts and audits
- Preventing theft, damage, or spoilage
- Handling stock discrepancies
- Using tools like barcoding, RFID, or ERP systems



# Management Vs Control

Aspect	Inventory Management	Inventory Control
Scope	Strategic / broad	Tactical / operational
Focus	Planning and Optimization	Monitoring and Accuracy
Goal	Ensure availability & reduce holding costs	Ensure inventory accuracy and reduce waste
Activities	Forecasting, Ordering, Supplier Mgmt	Counting, tracking, loss prevention
Tools used	ERP systems, demand planning tools	Barcode scanners, inventory control systems

# Role of Inventory within Supply Chain Life Cycle



Inventory is an integral to the supply chain, bridging production and customer fulfillment. Proper inventory management ensures that materials work in progress and finished products flow efficiently from one stage to the next, aligning production schedules with market demand.

# Types of Inventory



1

Raw Materials

2

Work in Progress  
(WIP)

3

Finished Goods

3

MRO

4

Packing Materials



Retailers

Pre-Packaged & ready for sale — the retailer doesn't assemble or modify them. Considered inventory until they are sold

# Types of Inventory



1

## Raw Materials

- Boeing (Aerospace Manufacturer)

Inventory Examples: Aluminum sheets, Wiring

- Nestlé (Food & Beverage)

Inventory Examples: Cocoa, sugar, milk powder, coffee beans

# Types of Inventory



2

## Work in Progress (WIP)

- Toyota (Automobile Manufacturer)  
Inventory Examples: Partially assembled vehicles, unpainted car bodies
- Intel (Semiconductor Manufacturer)  
Inventory Examples: In-process microchips or not yet fully fabricated

# Types of Inventory

3



## Finished Goods

- Apple (Consumer Electronics Retailer & Manufacturer)  
Inventory Examples: iPhones, MacBooks, iPads ready for sale in stores
- Nike (Footwear and Apparel)  
Inventory Examples: Sneakers,

# Types of Inventory



- Amazon (Fulfillment Centers)  
Inventory Examples: Packing tape, tools, cleaning supplies, scanners — all used to maintain operations
- Saudia Airlines  
Inventory Examples: Aircraft maintenance tools, lubricants, safety equipment

# Types of Inventory



- FedEx

Inventory Examples: Shipping boxes, bubble wrap, pallet wrap

4

Packing Materials

# Types of Inventory



Clothing Retailer

**Zara**

Inventory Examples: Finished fashion items (dresses, shirts, jeans) in stores and warehouses

Electronics Retailer

**Best Buy**

Inventory Examples: TVs, laptops, phones, headphones — all held for resale

Retailers

Grocery Retailer

**Kroger / Tesco**

Inventory Examples: Fresh produce, canned goods, dairy products, cleaning supplies

# Main Players

## Major Players in the Retail Supply Chain



### Manufacturers

Produce the goods, using machines, raw materials, and labor.



### Wholesalers

Purchase goods from manufacturers and sell them to retailers in bulk quantities.



### Retailers

Sell the goods in small quantities to the end-user at a higher price.



### Consumer

End-user who buys the goods (or "shops") from the retailer for personal use.

# Main Players

Feature	Manufacturer	Distributor	Wholesaler	Retailer
Creates product	✓	✗	✗	✗
Buys in bulk	✗	✓	✓	✓
Sells to end customer	✗	✗	✗	✓
Adds branding/marketing	Sometimes	No	No	Yes
Stores inventory	Sometimes	Yes	Yes	Yes

# Example

Role	Example	Function in Supply Chain
Manufacturer	Nike Inc. (factories in Vietnam, China, etc.)	Produces the shoes from raw materials.
Distributor	Ingram Micro, or Nike's regional distribution centers	Moves bulk products from Nike to wholesalers or retailers; may handle storage
Wholesaler	Footwear wholesalers like Zappos' warehouse (if selling B2B)	Buys in bulk from distributors/manufacturers, sells to retailers. Usually doesn't sell directly to consumers.
Retailer	Foot Locker, Nike Store, Amazon	Sells directly to the final customer. Often buys from wholesaler or distributor.

# Example

Role	Example in Saudi Arabia	Function in Supply Chain
Manufacturer	<b>Nova Water (Health Water Bottling Co. Ltd.)</b>	<b>Produces</b> the bottled water at its factory (e.g., in Al Kharj).
Distributor	<b>Tamimi Logistics</b> or Nova's own distribution fleet	<b>Distributes</b> bottled water across the Kingdom to wholesalers and large retailers.
Wholesaler	<b>BinDawood Group Warehouse</b> , local food & beverage wholesalers in Riyadh/Jeddah	<b>Buys large quantities</b> and sells to small shops, restaurants, etc.
Retailer	<b>Panda, Tamimi Markets, Baqala</b> (local grocery), or <b>online grocery apps like Nana</b>	<b>Sells directly</b> to end consumers. Offers convenience and packaging for retail purchase.

# From Previous Session

- The Difference between Inventory Management Vs Inventory Control
- Inventory Types (Raw, WIP, Finished Goods, MRO, Packing Materials, etc)
- Main Players in Supply Chain (MFR, Distributors, Retailers and Consumers)
- Types of Inventory Costs (Definitions, Examples)

# What is Inventory Costs

Inventory costs represent the total expenses associated with acquiring, storing, and managing inventory throughout its lifecycle.

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**Ordering Costs**

**Holding  
(Carrying)  
Costs**



**Stockout  
(Shortage)  
Costs**



**Purchase Costs**



# What is Inventory Costs

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## Ordering Costs

### What:

Costs incurred every time an order is placed to replenish inventory. This includes costs for order processing, shipping, receiving, and inspection.

**Amazon** places millions of orders with suppliers worldwide. Each order requires **administrative work**, **shipping fees**, and **logistics coordination**.

Even if an order is small, these costs remain, so Amazon tries to balance order size and frequency to minimize ordering costs.

### Impact:

Placing many small orders increases ordering costs; placing fewer large orders reduces ordering costs but may increase holding costs.

**Formula:** Total Ordering Cost = Number of Orders per Period × Cost per Order

# What is Inventory Costs

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## Holding (Carrying) Costs

### What:

Costs associated with storing unsold inventory. This includes warehousing rent, utilities, insurance, security, depreciation, and obsolescence risk.

**Apple** produces large quantities of iPhones and other devices. Holding excess inventory ties up capital and risks obsolescence (older models becoming outdated quickly). Apple's holding costs include storage in warehouses, insurance, and potential markdowns for unsold stock.

### Impact:

Higher inventory levels increase holding costs, so companies like Apple strive to keep inventory lean but sufficient to meet demand.

**Formula:** Holding Cost = Average Inventory Level × Holding Cost per Unit

# What is Inventory Costs

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## Stockout (Shortage) Costs

### What:

Costs when inventory runs out, leading to lost sales, delayed orders, or customer dissatisfaction

Imagine **Nike** runs out of popular sneaker sizes during a major sale. The company loses potential sales, damages customer loyalty, and may lose customers to competitors.

### Impact:

Stockouts can result in lost revenue and damage brand reputation, pushing companies to maintain safety stock or better forecast demand.

**Formula:** Stockout Cost = Number of Stockouts × Cost per Stockout

# What is Inventory Costs

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## Purchase Costs

### What:

The actual cost of buying the inventory items, which might vary based on order size, supplier negotiations, and bulk discounts.

**Walmart** uses its massive buying power to negotiate lower purchase costs from suppliers. By purchasing in bulk, Walmart reduces its per-unit cost, allowing competitive pricing.

### Impact:

Lower purchase costs improve profit margins but may lead to higher holding costs if inventory levels grow too large.



# Summary

Inventory Cost Type	Description	Business Impact
Ordering Cost	Cost per order placed	More orders → higher cost, fewer orders → risk stockouts
Holding Cost	Storage, insurance, depreciation	Higher inventory → higher cost, risk of outdated products
Stockout Cost	Lost sales, customer dissatisfaction	Stockouts → lost revenue & damaged reputation
Purchase Cost	Cost to buy goods	Bulk buying → lower cost but possibly higher holding costs

# What is Inventory Costs

**Formula:** Shrinkage Cost = (Recorded Inventory - Actual Inventory) × Cost per Unit

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## Shrinkage Costs

Losses due to theft,  
damage, or  
inaccuracies in  
inventory records



# From Previous Session

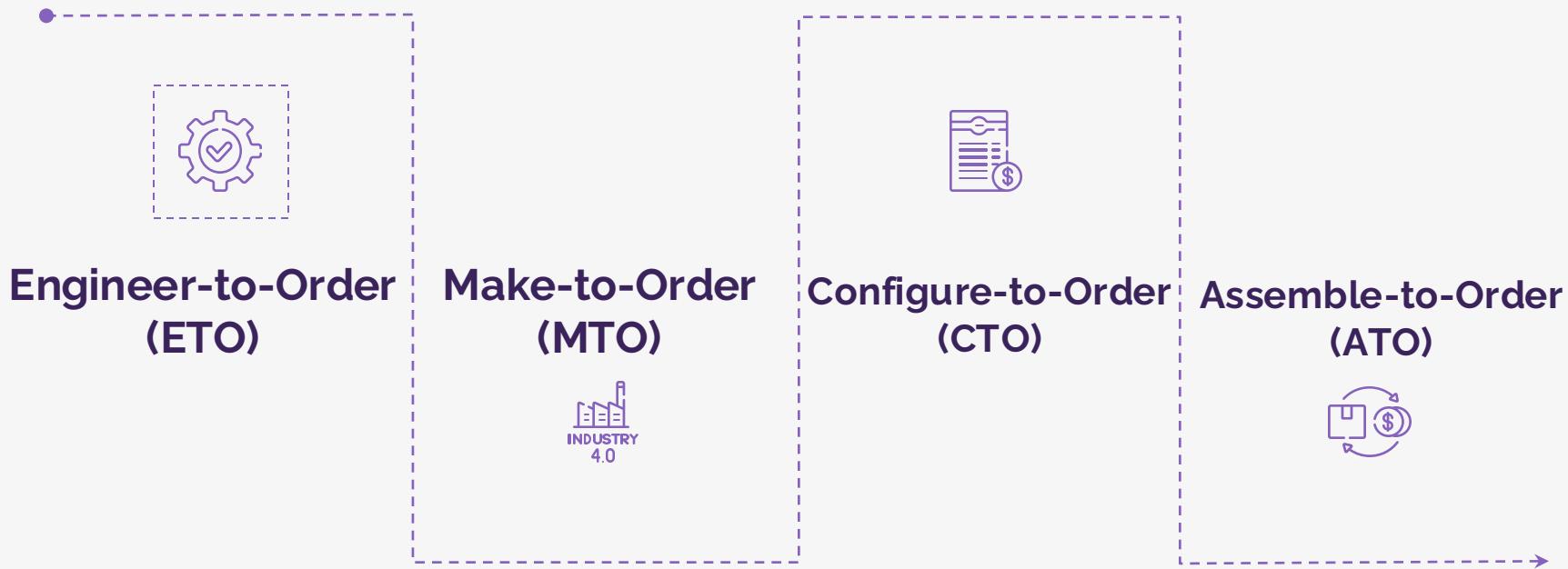
- The Difference between Inventory Management Vs Inventory Control
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# Lead Time

# Manufacturing Strategy and Lead Time

Lead time refers to the total time taken between placing an order to the final delivery of goods or services.



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## Engineer-to-Order (ETO)

Products are designed and engineered from scratch based on unique customer specifications

Custom machinery, specialized equipment

- Longest lead time
- Involves concept design, engineering, prototyping, sourcing, and production
- Custom Designs / Unique Products / Inventory purchased after product designed



# Manufacturing Strategy and Lead Time

Lead time refers to the total time taken between placing an order to the final delivery of goods or services.

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## Make-to-Order (MTO)

Products are manufactured only after receiving a customer order, but the design / components are standard

Industrial parts,  
machinery

- Shorter than ETO, but still substantial
- No production starts until order is confirmed
- Inventory held as raw materials



# Manufacturing Strategy and Lead Time

Lead time refers to the total time taken between placing an order to the final delivery of goods or services.

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## Configure-to-Order (CTO)

Products are configured from a set of pre-defined modules or options, based on customer choices.

Servers, cars with selectable options (e.g., color, engine, interior)

- Shorter lead time
- High responsiveness

# Manufacturing Strategy and Lead Time

Lead time refers to the total time taken between placing an order to the final delivery of goods or services.

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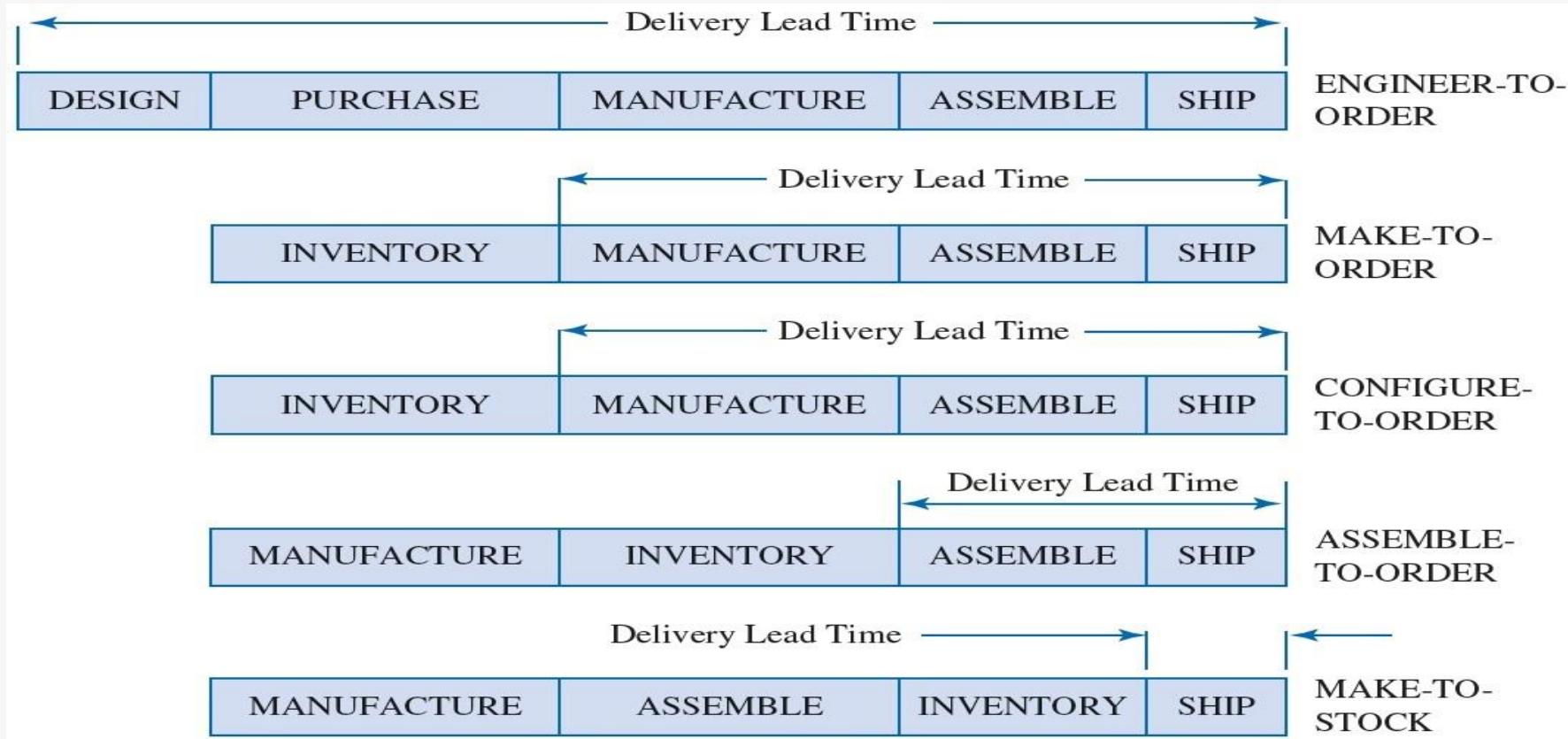
## Assemble-to-Order (ATO)

All components are pre-manufactured and stocked; final assembly is triggered by the customer order.

Personal computers,  
bicycles, fast-food meal  
kits

No Design required  
Only assembly required

# Manufacturing Strategy and Lead Time

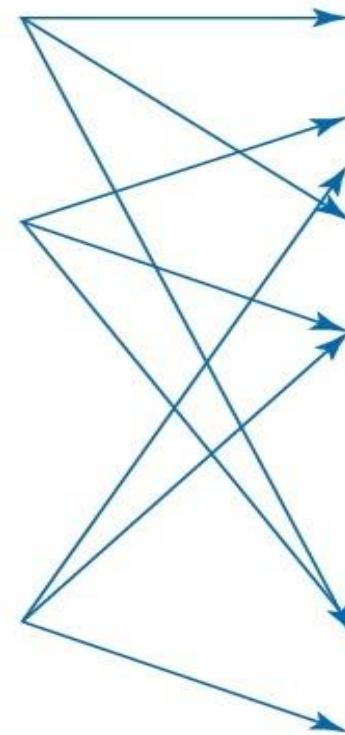


# Manufacturing Strategy and Lead Time

Production Model	Customization	Inventory	Lead Time	Example Products
<b>ETO</b>	Fully custom	None	Longest	Power plants, bridges <b>(Boeing, Bechtel)</b>
<b>MTO</b>	Standard design, custom production	Limited RAW	Long	Heavy equipment <b>(Caterpillar)</b>
<b>CTO</b>	Configured from modules	Partial	Medium	Cars, laptops <b>(Cisco Systems, HP)</b>
<b>ATO</b>	Pre-made parts, assembled on order	High	Short	Bicycles <b>(Subway)</b>
<b>MTS</b>	No customization	Very high	Very short	Groceries <b>(P&amp;G, Unilever)</b>

# Stakeholders' Challenges

FUNCTION	OBJECTIVE	IMPLICATION			
Marketing	<ul style="list-style-type: none"><li>• High Revenues</li><li>• High Product Availability</li></ul>	<table><tr><td>High</td><td rowspan="2">Customer Service</td></tr><tr><td>Low</td></tr></table>	High	Customer Service	Low
High	Customer Service				
Low					
Production	<ul style="list-style-type: none"><li>• Low Production Cost</li><li>• High-Level Production</li><li>• Long Production Runs</li></ul>	<table><tr><td>Many</td><td rowspan="2">Disruptions to Production</td></tr><tr><td>Few</td></tr></table>	Many	Disruptions to Production	Few
Many	Disruptions to Production				
Few					
Finance	<ul style="list-style-type: none"><li>• Low Investment and Cost</li><li>• Fewer Fixed Costs</li><li>• Low Inventories</li></ul>	<table><tr><td>High</td><td rowspan="2">Inventories</td></tr><tr><td>Low</td></tr></table>	High	Inventories	Low
High	Inventories				
Low					



# Marketing Team Objective

Challenge	Explanation
<b>Push for high inventory levels</b>	Marketing wants to avoid stockouts during promotions, leading to pressure for excess inventory.
<b>Unpredictable demand</b>	Marketing campaigns can cause sudden spikes in demand that are hard to forecast or prepare for.
<b>Poor communication with inventory planners</b>	If marketing doesn't share timely campaign plans, inventory teams can't align stock levels.
<b>Obsolescence risk</b>	New products launched for marketing appeal may not sell as expected, leading to slow-moving or obsolete stock.

# Production / Operations Team Objective

Challenge	Explanation
<b>Preference for large batch sizes</b>	Production teams may overproduce to reduce setup costs, leading to excess inventory.
<b>Mismatch with real demand</b>	Production may create items based on forecast or capacity, not real-time sales data.
<b>Limited flexibility</b>	Rigid production schedules make it hard to respond to demand changes quickly.
<b>Raw material inventory issues</b>	Shortages or delays in raw materials can halt production and disrupt finished goods inventory.

# Finance Team Objective

Challenge	Explanation
<b>Pressure to reduce inventory</b>	Finance wants lower inventory to free up cash, which may conflict with marketing or production needs.
<b>Inventory carrying costs</b>	High inventory levels increase warehousing, insurance, and opportunity costs.
<b>Risk of inventory write-downs</b>	Excess or obsolete inventory affects balance sheets and requires financial adjustments.

# Inventory Valuation Methods



**Moving Average Price (MAP)**



**Weighted Average Cost (WAC)**



**FIFO (First-In, First-Out)**



**LIFO (Not Accepted by IFRS)**

# Inventory Valuation Methods

Method	Industries/Use Cases	Popular ERP Systems	Global Usage
<b>MAP</b>	Manufacturing, SAP-based companies	SAP, Oracle	🔥 Very High
<b>WAC</b>	Distribution, Small Business, Periodic use	QuickBooks, NetSuite	🔥 High
<b>FIFO</b>	Food, Pharma, Inventory with shelf life	All major ERPs	🔥 Very High
<b>LIFO</b>	US-only legacy systems	US based systems	✳️ Declining

# Inventory Valuation Methods

Method	Example
MAP	<p>Your current stock is: 100 units @ \$10 → Inventory Value = \$1,000 Then you buy: 50 units @ \$12 → Cost = \$600</p> <p><b>MAP (Real-time update):</b> <b>New MAP = <math>(1000 + 600) / 150 = \\$10.67</math></b></p> <p>This price is now applied to <b>future goods issues</b> (in systems like SAP).</p>
WAC	Same but not in a real time or per transaction (Done Monthly, Quarterly or Annually)

# Inventory Valuation Methods

Method	Example																								
FIFO	<table border="1"><thead><tr><th>Date</th><th>QTY</th><th>Unit Price</th><th>Total</th></tr></thead><tbody><tr><td>Jan 2025</td><td>100</td><td>\$10</td><td>\$ 1000</td></tr><tr><td>Feb 2025</td><td>150</td><td>\$12</td><td>\$ 1800</td></tr><tr><td>Mar 2025</td><td>200</td><td>\$11</td><td>\$ 2200</td></tr><tr><td>Total</td><td>450</td><td></td><td>\$ 5000</td></tr></tbody></table>	Date	QTY	Unit Price	Total	Jan 2025	100	\$10	\$ 1000	Feb 2025	150	\$12	\$ 1800	Mar 2025	200	\$11	\$ 2200	Total	450		\$ 5000	Jan 2025	100	\$10	\$ 1000
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You then <b>sell 300 units</b> by April.																									
Sell oldest first:																									
100 units @ \$10 = <b>\$1,000</b> and 150 units @ \$12 = <b>\$1,800</b> and 50 units @ \$11 = <b>\$550</b>																									
<b>COGS = \$3,350</b>																									
<b>Ending Inventory = 150 units @ \$11 = \$1,650</b>																									



# Inventory Classification



Instead of managing all inventory the same way, companies use classification to **apply different policies** depending on the importance of each item.

Inventory classification is the **process of categorizing inventory items into groups** based on specific criteria such as **value, demand, usage, or criticality**.

The purpose is to **prioritize resources, optimize stock levels, and improve control**.



# Why Do We Need Inventory Classification



## Better resource allocation

focus on high-value or critical items



## Risk management

ensure critical and scarce items are always available



## Cost reduction

avoid excess stock of low-value items

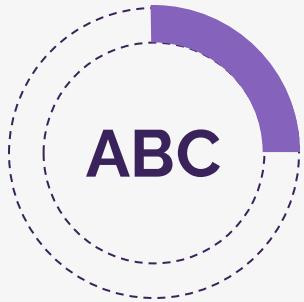


## Support Org. strategy

e.g., fast fashion (Zara) or just-in-time (Toyota)



There are multiple ways to classify inventory. The most common frameworks are:



## Value

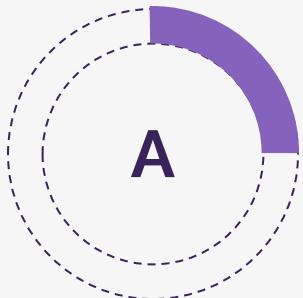
Based on Pareto principle (80/20 rule)

**A items:** High Value, low-quantity (need strict control).

**B items:** Moderate Value and usage.

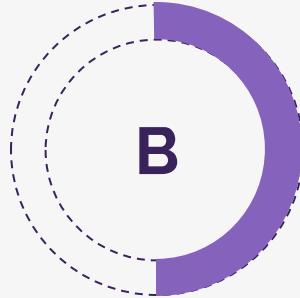
**C items:** Low value, high quantity (less strict control).

# ABC - Based on Pareto principle



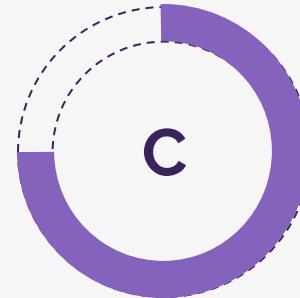
High-value, low-quantity

- Typically 10% of items but 70% of total inventory value.
- Require strict control, accurate forecasting, frequent review, and close supplier relationships.
- Example: Aircraft engines for Boeing



Moderate value and usage

- Around 20% of items but 20% of inventory value.
- Controlled with moderate attention, regular review.
- Example: Spare parts for manufacturing.



Low value, high quantity

- Around 70% of items but only 10% of inventory value.
- Simple controls, bulk ordering, less frequent reviews.
- Example: Office stationery, screws, nuts, bolts at Toyota plants





## Retail Store Inventory

# Retail Store Inventory

Item	Annual Demand (units)	Unit Cost (\$)
Laptop	500	800
Smartphone	1,000	600
Tablet	800	300
Headphones	2,000	50
USB Drives	5,000	10
Chargers	3,000	15
Mouse	4,000	8

# Retail Store Inventory

## Step 1: Calculate Annual Consumption Value

**Annual Consumption Value** = Annual Demand × Unit Cost

Item	Demand	Cost	Annual Value (\$)
Laptop	500	800	400,000
Smartphone	1,000	600	600,000
Tablet	800	300	240,000
Headphones	2,000	50	100,000
USB Drives	5,000	10	50,000
Chargers	3,000	15	45,000
Mouse	4,000	8	32,000

**Total Value** = 1,467,000

# Retail Store Inventory

**Step 2:** Rank Items by Value (Highest → Lowest)

Item	Annual Value (\$)
Smartphone	600,000
Laptop	400,000
Tablet	240,000
Headphones	100,000
USB Drives	50,000
Chargers	45,000
Mouse	32,000

**Total Value = 1,467,000**

# Retail Store Inventory

**Step 3:** Calculate % of Total & Cumulative %

Item	Value (\$)	% of Total	Cumulative %
Smartphone	600,000	41%	41%
Laptop	400,000	27%	68%
Tablet	240,000	16%	84%
Headphones	100,000	7%	91%
USB Drives	50,000	3%	94%
Chargers	45,000	3%	97%
Mouse	32,000	2%	100%

**Total Value = 1,467,000**

# Retail Store Inventory

## Step 4: Classify into A, B, C

Item	Value (\$)	Cumulative %	ABC
Smartphone	600,000	41%	A
Laptop	400,000	68%	A
Tablet	240,000	84%	B
Headphones	100,000	91%	C
USB Drives	50,000	94%	C
Chargers	45,000	97%	C
Mouse	32,000	100%	C

**A items** = top ~70–80% of value →

**B items** = next ~15–25% →

**C items** = last ~5% →

Smartphones, Laptops

Tablets

Headphones, USBs, Chargers, Mouse

# Retail Store Inventory

**A items** = top ~70–80% of value →

Smartphones, Laptops

**B items** = next ~15–25% →

Tablets

**C items** = last ~5% →

Headphones, USBs, Chargers, Mouse

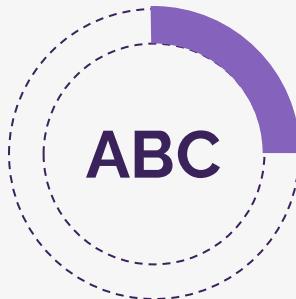
Class	Items	Control Policy
A	Smartphone, Laptop	Very tight control (accurate records, frequent review)
B	Tablet	Moderate control (periodic review)
C	Headphones, USB Drives, Chargers, Mouse	Less control (Bulk ordering)

Even though Mouse **(4,000 units)** is the highest in count, it is C-class because its contribution to value is very small. Meanwhile, **Smartphones & Laptops** make up 68% of total value despite being fewer in quantity → they deserve maximum attention.

# From Previous Session

- The Lead Time in relations to Inventory Management
- Effects of Stakeholders' Interests and Challenges
- Inventory Valuation Methods
- Inventory Classification types and application

# There are multiple ways to classify inventory. The most common frameworks are:



## Value

Based on Pareto principle (80/20 rule)

**A items:** High Value, low-quantity (need strict control).

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**C items:** Low value, high quantity (less strict control).



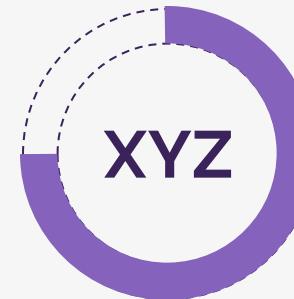
## Movement

Based on consumption rate.

**Fast:** High demand, rapid movement.

**Slow:** Medium demand.

**Non-moving:** Obsolete or rarely used.



## Demand

Based on predictability of demand.

**X:** Stable demand (e.g., milk for grocery stores).

**Y:** Variable demand (seasonal clothes).

**Z:** Highly unpredictable demand (fashion trends).

There are multiple ways to classify inventory. The most common frameworks are:



## Usage

Used in manufacturing & healthcare



## Scarcity

Based on availability in the market

**Vital:** Must always be in stock (no substitutes).

**Essential:** Needed, but alternatives exist.

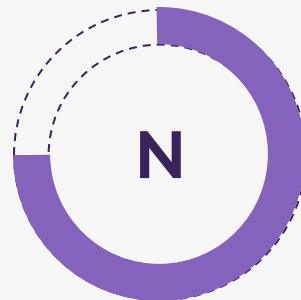
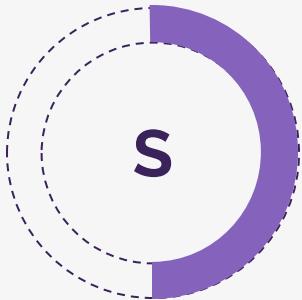
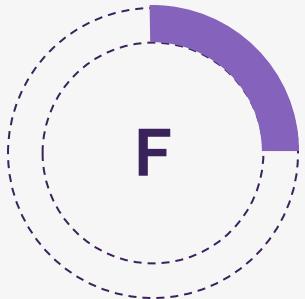
**Desirable:** Optional items.

**Scarce:** Imported or rare items.

**Difficult:** Limited Suppliers.

**Easy:** Widely available.

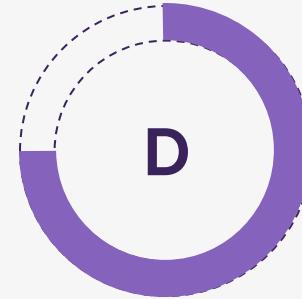
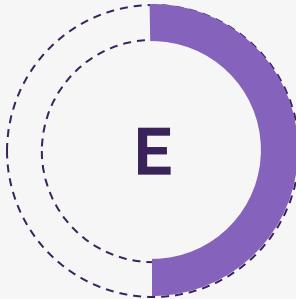
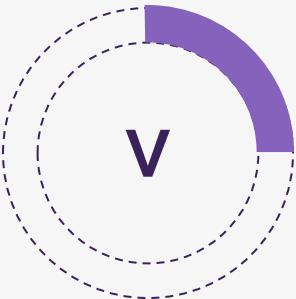




When using FSN classification, keep in mind:

- **Time frame selection:** The review period (e.g., 6 months vs. 12 months) greatly impacts classification.
- **Dynamic nature:** Items can shift from F → S → N, so periodic reclassification is essential.
- **Stocking policies:**
  - Fast-moving → maintain higher safety stock and frequent replenishment.
  - Slow-moving → smaller stocks, more cautious ordering.
  - Non-moving → write-off.
- **Space utilization:** Non-moving items can block valuable storage space.

# VED



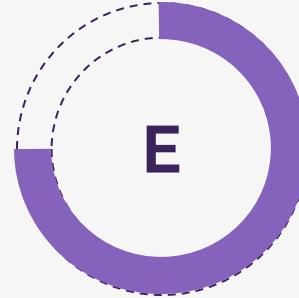
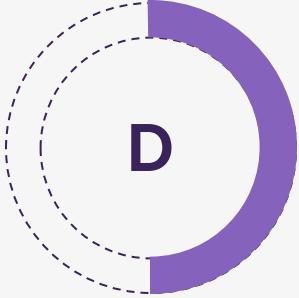
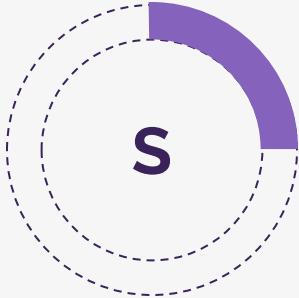
VED classification is a method in **inventory management** used to prioritize items based on their **criticality for operations or production**

**V = Vital:** Items that are essential for the functioning of the operation or production process. A stockout of these items may cause serious disruption or even complete shutdown. **Ventilators, Life Saving Drugs**

**E = Essential:** Items that are important but not as critical as vital ones. A stockout can cause operational difficulties, increased costs, or reduced efficiency, but work may continue in some form. **General antibiotics, surgical gloves.**

**D = Desirable:** Items whose absence does not significantly affect operations. These are often non-critical, comfort, or luxury items. **Vitamin supplements**

# SDE



**SDE classification** is an inventory management technique used to categorize items based on their **availability or scarcity in the market**.

## S – Scarce items

Items that are difficult to obtain due to limited sources, import restrictions, or supplier monopoly.

Usually require long lead times and high procurement effort.

Example: Rare earth metals, specialized machine spares

## D – Difficult items

Items that are not very scarce but are still difficult to procure due to constraints such as fewer suppliers, complex specifications, or dependency on import. Procurement may require moderate lead time and effort.

Example: Specific alloys, customized spare parts.

## E – Easily available items

Items that are readily available in the market, either domestically or from multiple suppliers.

Short lead times, low procurement risk.

Example: Standard fasteners, common raw materials like steel or packaging material.



## Mix Classification

# ABC – XYZ Matrix

	X (Predictable Demand)	Y (Moderate Variability)	Z (Unpredictable Demand)
A (High Value)	<b>AX</b> → High-value, stable demand. Critical items. Tight control, accurate forecasting, frequent review. (Jet Engine SP, Semiconductor)	<b>AY</b> → High-value, but seasonal/trend-driven. Careful safety stock, advanced forecasting. (Premium smartphones with seasonal launches)	<b>AZ</b> → High-value, erratic demand. Very risky. Low stock, possible make-to-order, close supplier collaboration. (Specialized Turbines)
B (Medium Value)	<b>BX</b> → Medium-value, stable demand. Automated replenishment, economic order quantities. (Lubricants)	<b>BY</b> → Medium-value, moderately variable. Some buffer stock, regular monitoring. (Construction Materials) depend on Schedule	<b>BZ</b> → Medium-value, erratic demand. Order when required, minimal stocking. (Emergency Replacement Pumps, Customs Molds)
C (Low Value)	<b>CX</b> → Low-value, stable demand. Bulk orders, blanket agreements, minimal effort in monitoring. (Nuts, Bolts)	<b>CY</b> → Low-value, moderate variability. Small safety stock if cheap, otherwise order on demand. (Seasonal Decoration items, Work uniform)	<b>CZ</b> → Low-value, unpredictable demand. Lowest priority. Typically order on demand or eliminate from stock. (Special Paint Colors)

# Criteria Used for Classification



**Monetary value**

ABC



**Usage / consumption**

ABC / FSN



**Criticality / impact on operations**

VED



**Availability in market**

SDE



# Discussion Points

What Other  
Mix can we  
apply



# From Previous Session

- Inventory Classification types and application

# ABC – XYZ Matrix

Classification	Procurement Strategy	Oil and Gas Industry Example
A-X (H value, predictable D)	Long-term Agreement, vendor-managed inventory, strict quality control	Standard-grade drilling pipes, premium lubricants used daily in rigs
A-Y (H value, variable D)	Dual sourcing, maintain buffer stock, flexible agreements	Gas turbine spare parts (usage fluctuates with maintenance cycles)
A-Z (H value, unpredictable D)	Procure only on confirmed orders	Rare replacement parts for offshore platforms or subsea equipment
B-X (M value, predictable D)	Bulk buying, stable supplier relations	Industrial paints,
B-Y (M value, variable D)	Limited safety stock, flexible sourcing	Specialty valves for refineries
B-Z (M value, unpredictable D)	Procure only on confirmed orders	Customized gaskets or seals for old machinery
C-X (L value, predictable D)	Bulk purchase, automated replenishment	Nuts, bolts, washers, PPE consumables like gloves and masks
C-Y (L value, variable D)	Order in small lots when needed	Special hand tools for maintenance crews
C-Z (L value, unpredictable D)	Avoid stocking, procure only if required	Outdated office consumables, rarely used repair kits



# Incoterms



# What is Incoterms

**Incoterm** stands for International Commercial (Commerce) Terms.

They are standard rules set by the International Chamber of Commerce (ICC) that define the responsibilities of buyers and sellers in global trade.



## Shipping Cost

Who pays for shipping?



## Insurance

Who arranges insurance?



## Responsibility

Who is responsible if goods are damaged during transport?



## Risk Transfer

At what point does ownership (risk) transfer from seller to buyer?

# How is Incoterms Affect Inventory

Inventory managers care about:



## Risk & Responsibility

Knowing when goods are officially theirs.



## Lead Time

Depending on who arranges shipping, delivery times may vary



## Cost Control

Some Incoterms mean the seller covers more cost; others mean the buyer does.



## Stock Availability

Late shipments or customs delays directly affect inventory levels.

# Incoterms Types – FOB – Free On Board

## Seller



Delivers goods to the port and loads them onto the ship.

## Buyer



Takes responsibility from that point (including freight, insurance, customs).

## Example



Apple buys components from suppliers in China on FOB Shanghai. Once the chips are loaded on the ship in Shanghai, Apple owns them and must manage the shipping to California.

## Inventory Impact



Apple must plan for shipping time + customs clearance in its inventory lead time.

# DDP – Delivered Duty Paid

## Seller



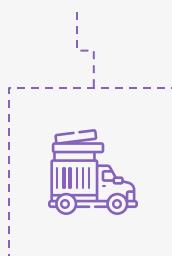
handles everything:  
shipping, insurance,  
customs, and delivery  
to the buyer's door

## Buyer



N/A

## Example



Amazon Global Store often uses DDP for customers. When you order a product from the U.S. to Saudi Arabia, Amazon arranges customs clearance and door delivery.

## Inventory Impact



Buyer has almost zero logistics responsibility, but may pay higher prices. Inventory becomes easier to plan because goods arrive “ready to stock.”

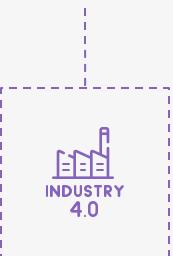
# EXW – Ex Works

## Seller



Makes goods available at their own warehouse/factory.

## Buyer



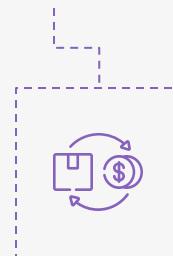
Does everything else: pickup, transport, customs, insurance.

## Example



A German machinery maker sells equipment EXW Berlin. Tesla (buyer) must arrange pickup, shipping, and import into the U.S.

## Inventory Impact



must plan for shipping time + customs clearance in its inventory lead time.

# CIF (Cost, Insurance, and Freight)

## Seller



Pays for shipping and insurance up to the buyer's port.

## Buyer



Takes responsibility after the goods arrive at their port.

## Example



A European retailer (like H&M) importing clothes from Bangladesh may use CIF Hamburg. The Bangladeshi supplier handles shipping & insurance until Hamburg port, then H&M takes over.

## Inventory Impact



Minimize the in transit risk

# FCA (Free Carrier)

## Seller



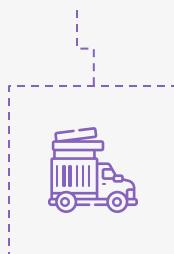
Delivers the goods to a carrier or another person nominated by the buyer

## Buyer



Takes responsibility after the goods handed over to the carrier.

## Example



Seller delivers the goods to the airline's cargo terminal at Riyadh Airport, cleared for export. From that moment, risk passes to the OOK buyer, who pays for the flight, insurance, and customs in destination (airport)

## Inventory Impact



Early Risk Ownership

# Incoterms

Incoterm	When Risk Transfers	Who Holds Risk Before Transfer
FOB (Free on Board)	When goods are <b>loaded on board the vessel</b> at the port of shipment	Seller
CIF (Cost, Insurance & Freight) CIP (Air)	When goods are <b>loaded on board the vessel</b> at the port of shipment (same as FOB)	Seller (even though seller pays freight & insurance, risk transfers once goods are on the ship)
FCA (Free Carrier)	When goods are <b>delivered to the carrier or buyer's nominated person</b> at the agreed place (e.g., airport terminal, warehouse)	Seller
EXW (Ex Works)	When goods are made available at the <b>seller's premises</b> (factory/warehouse dock). Buyer takes risk from the door.	Buyer (almost everything is on buyer from the start)
DDP (Delivered Duty Paid)	Only when goods are <b>delivered to the buyer's premises or agreed destination, cleared of import duties</b>	Seller (keeps risk the longest)

Incoterm	Transport Mode	Where Risk Transfers	Notes
<b>FOB – Free on Board</b>	Sea / Inland Waterway only	When goods are loaded on vessel at port of shipment	Not valid for airports
<b>CIF – Cost, Insurance &amp; Freight</b>	Sea / Inland Waterway only	When goods are on board at port of shipment	Seller also pays insurance
<b>EXW – Ex Works</b>	Any mode (Air, Sea, Road, Rail)	At seller's premises	Buyer takes full responsibility
<b>FCA – Free Carrier</b>	Any mode	When goods are delivered to the carrier at named place (e.g., airport, warehouse)	Common for air freight
<b>DDP – Delivered Duty Paid</b>	Any mode	At buyer's premises	Seller pays all costs, including customs duties

# Criteria for Choosing Incoterms

## Control over Logistics

Companies with strong logistics teams (e.g., **Apple, Walmart**) prefer **FOB** because they want control over shipping costs, carriers, and reliability.

Smaller buyers often choose **DDP** so the seller handles logistics.

## Customs Complexity

If the buyer is not experienced in customs clearance, **DDP** is safer (seller pays duties and clears goods).



## Risk MGT

Industries where goods are **fragile, or high-value** (e.g., pharmaceuticals, luxury goods) may prefer **CIF** to ensure seller covers insurance.

## Cash Flow

Buyers with **tight budgets** may prefer **EXW** or **FOB**, paying only for what they can control. Buyers that want an **all-inclusive cost** prefer **DDP**.



# Modes of Transportation in Supply Chain



# Air Transport (Airplanes)

Movement of goods through air cargo.

## Criteria to Select:

High value, urgent, or perishable goods (shelf life)  
When speed outweighs cost.

## Pros

Fastest mode globally.  
Secure, less theft.  
Reliable schedules.

## Cons

Most expensive.  
Limited capacity.  
Weather restrictions.

**Example** **Fashion (Zara, H&M)** → fast replenishment. **Healthcare (Pfizer)** → vaccines, medical supplies. **Electronics (Apple, Dell)** → chips, high-value components.



# Sea Transport (Ships, Containers)

Movement of goods over oceans using cargo vessels.

## Criteria to Select:

- Large, heavy, or bulk shipments.
- Cost efficiency over long distances.

## Pros

- Cheapest per unit for large volumes.
- Handles oversized goods.
- Global connectivity.

## Cons

- Slowest mode.
- Risk of port congestion & delays.
- Customs & documentation heavy.

## Example

**Oil & Gas** → crude oil, Large Pipes   **Automotive (Toyota, Tesla)** → vehicle export/import.   **Retail (IKEA, Walmart)** → furniture, consumer goods.



# Road Transport (Trucks, Vans)

Movement of goods via highways/roads.

## Criteria to Select:

Short to medium distances.

Flexible door-to-door delivery.

Suitable for fragmented/last-mile distribution.



## Pros

High flexibility (goes anywhere).

Fast for short distances.

Ideal for last-mile delivery.

## Cons

Limited capacity.

Vulnerable to traffic, fuel prices, and regulations.

Higher cost for long distances.

**Example: E-commerce & Retail** (Amazon, Noon, Jahez) → last-mile delivery. **FMCG** (Coca-Cola, Nestlé) → supermarket distribution.

# Multimodal Transport (Combination: Air , Road, Sea, etc )

Using more than one mode in a single supply chain journey.

## Criteria to Select:

Global shipments requiring flexibility.

When cost vs. speed balance is needed.

## Pros

Optimizes cost + speed.

Door-to-door global coverage.

More flexible and reliable.

## Cons

Requires coordination.

Higher risk of delays at transfer points.

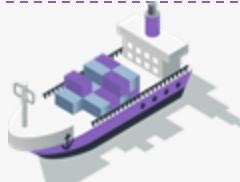
## Example

**E-commerce (Amazon, Alibaba)** → ships bulk by sea, then air/road for faster delivery. **Automotive** → combine sea + rail + road to distribute vehicles globally.



# Other Examples





Mode	Cost	Speed	Capacity	Flexibility	Reliability	Best For
Road 🚚	Medium	Medium	Medium	High	Medium	Local distribution, last-mile delivery, e-commerce
Rail 🚂	Low	Medium	High	Low	High	Bulk over land (coal, metals, agriculture)
Air	High	Very High	Low	Medium	High	Urgent, high-value goods (electronics, pharma, fashion)
Sea 🛢️	Very Low	Low	Very High	Low	Medium	Global bulk shipments (oil, furniture, cars, retail goods)
Pipeline	Very Low	Continuous	High	Very Low	High	Oil, gas, chemicals, continuous liquids transport
Multimodal 🔄	Balanced	Balanced	Medium	High	Medium/High	Global trade, e-commerce, automotive supply chains



# Assignment # 1 Reaction Paper

# Assignment #1 Reaction Paper -Toyota JIT Management -



## Summary (25%)

- Summarize the main points of the assigned paper clearly and concisely.
- Focus on Toyota's approach to JIT, the principles behind it, and its impact on efficiency and competitiveness.

## Your Reaction (30%)

- Reflect on what you found effective or impressive about Toyota's JIT approach.
- Highlight any challenges or risks you believe Toyota should consider from a different perspective.

## Comparative Case (25%)

- Identify a similar case from another company that implemented a lean management system.
- Summarize what happened in that case and compare it with Toyota's experience.

## Clarity, Structure, and Writing Quality (20)

Ensure your writing is well-organized, free of grammatical errors, and professionally presented.

# Format Requirements

2 pages

## Font

Times New Roman, size 12,  
double-spaced.



## Submission

Upload your paper as a  
PDF



## Deadline

September 30, 2025 12 AM



Toyota JIT System

# Risk Management in Global Supply Chain



# Types of Supply Chain Risks

## Supply Risks

when suppliers fail to deliver.

Causes: natural disasters, strikes, factory shutdowns.



## Financial Risks

Cost and currency fluctuations.

Causes: foreign exchange volatility, tariffs, etc

## Transportation Risks

delays or damage in transit.

Causes: port congestion, piracy, accidents, container shortages.

**Ever Given ship blocking Suez Canal in 2021**

## Demand Risks

Sudden changes in customer demand.

Causes: economic downturn, consumer trends, pandemics.

## Regulatory Risks

new laws

# Mian Inventory Management Risks

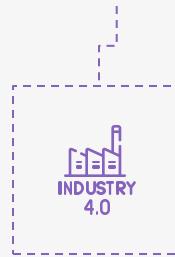
## Overstocking



**Risk:** High holding costs, wastage, obsolescence.

**Example:** H&M in 2018 had over \$4.3 billion unsold clothes, which forced them into heavy discounting.

## Stockouts



**Risk:** Lost sales, unhappy customers, prod. stoppage.

**Example:** During Toyota's SC disruption after 2011 Japan earthquake, factories stopped because critical parts were missing.

## Demand Uncertainty



**Risk:** Not knowing how much customers will actually buy.

**Example:** Nintendo Wii (2006) faced shortages because demand was underestimated, leading to customer frustration and lost sales.

## SC Disruptions



**Risk:** Delays due to strikes, natural disasters, or geopolitical issues.

**Example:** Apple faced iPhone delays in 2020 because of COVID-19 shutdowns in China.

# Main Risk Response Strategies

## Risk Avoidance



Change strategy to avoid risk.  
Example: Zara produces clothes in smaller batches, reducing the risk of excess inventory.

## Risk Mitigation



**Reduce impact/liability**  
Example: Toyota uses a **JIT + dual sourcing strategy** to reduce supplier risk after the 2011 disaster.

## Risk Transfer

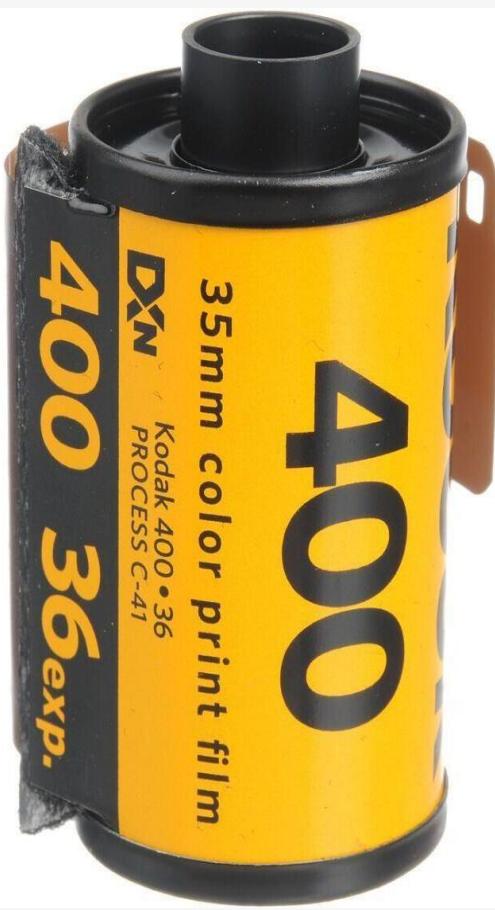


**Share the risk**  
Example: Many retailers use **vendor-managed inventory (VMI)**, where suppliers carry part of the risk. Walmart does this with its suppliers.

## Risk Acceptance



Accepts a small % of lost/damaged packages and simply refunds customers.



# Kodak's Failure

- Kodak was once the **global leader in photography** (film, cameras, and chemicals).
- In 1975, a Kodak engineer (Steven Sasson) developed the **first prototype digital camera**.
- Instead of investing, Kodak shelved it, fearing digital would cannibalize their **film inventory business**

# Key Inventory & Risk Failures

## Obsolescence Risk Ignored

- Film rolls, and printing paper became rapidly outdated as digital cameras grew.
- Kodak should have **mitigated obsolescence risk** by shifting to digital production early.
- Instead, they overstocked traditional film inventory, which became unsellable.

## Failure to Diversify & Transfer Risk

Kodak was overly dependent on **film sales**, which accounted for most of their revenue.

Competitors like **Canon, Sony, and Nikon** partnered with electronics suppliers and quickly captured the market.

## Inaccurate Forecasting & Market Response

Kodak forecasted that film would remain dominant.

But by the early 2000s, digital cameras and later smartphones wiped out demand almost completely.

# Stockouts (Inventory Shortages)

**Avoid:** Improve demand forecasting accuracy with AI/ML tools.

**Mitigate:** Maintain safety stock, implement reorder point systems, and establish multiple suppliers.

**Transfer:** Use vendor-managed inventory (VMI), where suppliers hold responsibility for stock availability.

**Accept:** For non-critical, low-demand items, allow occasional stockouts.

**Example:** Procter & Gamble (P&G) uses VMI with Walmart to ensure shelves are always stocked.

# Overstocking (Excess Inventory)

**Avoid:** Adopt lean inventory practices and just-in-time (JIT) models.

**Mitigate:** Apply ABC/XYZ analysis to prioritize what to stock heavily vs. lightly.

**Transfer:** Negotiate return-to-vendor agreements for unsold stock.

**Accept:** For strategic items with long lead times, accept some overstock.

**Example:** Zara mitigates risk by producing in small batches and replenishing frequently based on real-time sales data.

# Supply Chain Disruptions

**Avoid:** Don't depend on single suppliers or regions.

**Mitigate:** Dual sourcing, nearshoring, safety stock, and supplier risk monitoring.

**Transfer:** Use contracts with penalty clauses or supply chain insurance.

**Accept:** For low-cost, low-impact items, accept occasional disruption.

**Example:** Apple started diversifying away from sole reliance on China by investing in India and Vietnam manufacturing.

# Main Risk Response Strategies

Strategy	Definition	Walmart Example	Amazon Example
Acceptance	Acknowledging the risk and budgeting for it, instead of fixing it.	Accepts spoilage of perishable food (fruits/vegetables) as normal business waste.	Accepts a small % of lost/damaged packages and simply refunds customers.
Avoidance	Changing the process so the risk doesn't occur at all.	Limits seasonal stock purchases (e.g., Christmas goods) to avoid huge unsold surpluses.	Uses pre-order systems for new products (like Kindle or Echo devices) to avoid overproduction.
Mitigation	Reducing the likelihood or impact of the risk.	Keeps <b>safety stock</b> of high-demand consumer goods (toilet paper, cleaning supplies). Uses AI for demand forecasting.	Built <b>fulfillment centers near customers</b> + robotics to reduce stockouts and delivery delays.
Transfer	Shifting the risk to another party through contracts, insurance, or outsourcing.	Uses <b>Vendor-Managed Inventory (VMI)</b> with suppliers like P&G, so the supplier bears inventory risk.	Sellers on <b>Amazon FBA</b> transfer storage & logistics risk to Amazon, while Amazon insures shipments.



## Inventory Turn

# Inventory Turnover (Turn)

## What is it

how many times a company sells and replaces its inventory during a given period (usually a year)



Tells me **how efficiently a company manages inventory.**

- High turnover = Company sells products quickly (less money stuck in inventory).
- Low turnover = Products move slowly, risk of **overstock, obsolescence, or waste.**



## How to Calculate

Inventory Turnover =  
Cost of Goods Sold (COGS) /  
Average Inventory

## Why it is Important

# How Management Use Inventory Turn



## Efficiency

Are we moving stock too slowly



## Benchmarking

Compare the Performance with Peers / Industry



## Cash Flow

Fast Turn = Quicker Cash Flow



## Decision Making

Adjust purchasing, pricing, or promotions



# \$ 1,000,000

Company sells goods in a year (COGS).



# \$ 200,000

Average Inventory



# 5

Inventory Turn

This **Company sold and replaced its inventory 5 times in a year**

- If the industry average = 8, Company A is **slower than competitors** (risk of too much stock).
- If the industry average = 3, Company A is **more efficient than competitors**.

# Example of Effect of Slow / None Moving

Usage \$ 500,000

Avg Inv. 1,000,000

Turn = 0.5

Usage \$ 500,000

Avg Inv. 600,000

Turn = 0.83

\$400,000 of that inventory is  
obsolete spare parts

By cleaning up non-moving stock, the turnover **improves**, giving a clearer picture of efficiency.

# MRO Inventory



## Low Turns Vs Retails

Spare Parts for Critical Equipment



## Benchmarking

0.5 to 1.5 is average



## Slow-moving items

Turbines Spares Stay up to 5 Years

# From Previous Session

- Risk Management in Global Supply Chain
- Inventory Management Risk
- Main Risk Response Strategies
- Inventory Turn and its objectives

# Purchasing / Procurement

Purchasing is not only a “buying” activity; it’s the foundation of supply chain performance.



# Cascade Table

## LEVELS OF STRATEGY



Level	Example
<b>Vision</b>	"Save people money so they can live better."
<b>Business Strategy</b>	Cost leadership, operational excellence, customer focus
<b>Supply Chain Strategy</b>	Efficient supply chain, JIT inventory, global sourcing
<b>Procurement Strategy</b>	Category management, long-term supplier partnerships, total cost focus
<b>Category Strategy</b>	Fresh produce & packaged goods: volume, quality, pricing
<b>Supplier Actions</b>	Multi-year contracts, KPIs, sustainability programs, innovation collaboration

# Cascade Table

Level	BP Example	Walmart Example	ExxonMobil Example
Business Strategy	Transition to integrated energy company by 2050	Everyday low prices, cost leadership	Remain low-cost producer, expand NG/petrochemicals
Supply Chain Strategy	Secure oil supply + renewable tech suppliers	Efficient, low-cost supply chain, JIT inventory	Scale efficiency + global leverage
Procurement Strategy	Sustainable procurement, long-term renewable partnerships	Bulk/global sourcing, category management	Category management, cost leadership
Category Strategy	Wind turbines – long-term contracts with Siemens/GE	Fresh produce, packaged foods, electronics	Drilling rigs/services – bulk contracts
Supplier Actions	Renewable project local partnerships	Multi-year contracts with P&G, supplier KPIs	Multi-year logistics & drilling agreements



# Apple Case



# Apple Strategic Supplier Relationships



## Purchasing

Apple's success isn't only design, it's supply chain and procurement.

2011–2012, Apple prepaid **over \$3.9 billion** to secure supply of flash memory chips from suppliers like Toshiba and Samsung.

By locking in supply early, Apple guaranteed low cost, avoided shortages, and ensured iPhones and iPads could launch on time while competitors faced bottlenecks.

## Impact

**Procurement strategy = market dominance.**  
Apple didn't just buy parts; it secured the future of its products.

# Procurement Savings Through Centralization



## Purchasing

SABIC consolidated procurement across business units in the 2010s.

Centralization + strategic sourcing saved **hundreds of millions of dollars** by:

- Leveraging bulk buying power.
- Standardizing supplier contracts.

## Impact

**Effective purchasing** = massive cost savings and better supplier management.

# Purchasing Vs Procurement



## Purchasing

- The transactional process of buying goods and services.
- Focuses on the operational tasks → issuing purchase orders, receiving goods, and making payments.
- Short-term in nature.

## Procurement

- The broader, strategic process of acquiring goods and services.
- Includes supplier selection, negotiation, contracting, relationship management, risk management, and sustainability.
- Long-term and strategic.

# Example Hospital MRI Machine:



## Purchasing

- **Purchasing:** Buy one MRI machine based on doctor's request, process the order, pay the invoice.

## Procurement

- **Procurement:** Analyze hospital's imaging needs, consult multiple vendors (GE, Siemens, Philips), compare performance, negotiate maintenance contracts, ensure regulatory compliance, and build long-term supplier partnership

# Purchasing Vs Procurement

Aspect	Purchasing	Procurement
Definition	Transactional act of buying goods/services.	Strategic process of acquiring goods/services.
Focus	Short-term, cost & transactions.	Long-term, value, risk, and relationships.
Activities	Issuing POs, receiving goods, processing payments.	Sourcing, supplier selection, negotiation, contracts, SRM.
Nature	Operational.	Strategic.
Time Horizon	Immediate needs.	Future planning.
Example	Buying 50 laptops on request.	Negotiating a 3-year laptop supply contract with service.

## Definition

Purchasing is the process of acquiring goods, services, and works from external sources to meet organizational needs.

## Scope:

Involves supplier selection, price negotiation, delivery management, and ensuring right quality & quantity.



# External Vs Internal

Aspect	Internal Purchasing	External Purchasing
Source	Within the organization (subsidiary, department, JV)	Outside third-party vendors
Pricing	Transfer pricing, cost-based	Market-driven, competitive bids
Process	Simplified, policy-driven	Full procurement cycle (RFI, RFP, RFQ, contracts)
Purpose	Resource optimization, synergy, compliance	Cost savings, innovation, broader supplier base
Example	Plant buys from group warehouse	Plant buys from independent supplier

## Importance:

- 50–70% of a manufacturing firm's revenue is spent on purchased goods and services (CIPS, 2023).
- Even a **5% cost saving in purchasing** can equal a **30% increase in sales** in terms of profit impact.

## Example:

Toyota spends billions annually on components from suppliers; purchasing efficiency directly affects car pricing and competitiveness.



# Income Statement



Sales \$100

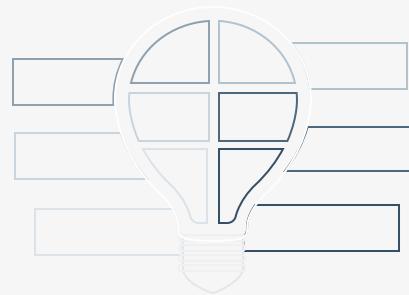
Cost of Goods Sold

Purchases \$50

Other Expenses \$40 \$90

Profit \$10

# Income Statement (with Sales Increase)



Sales \$110

Cost of Goods Sold

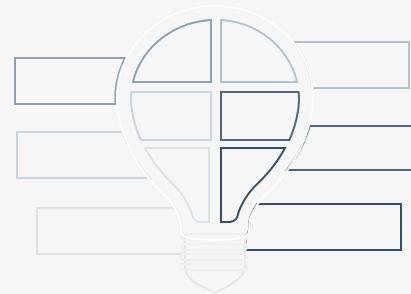
Purchases \$55

Other Expenses \$44 \$99

Profit \$11

To increase profits by \$1, sales must increase by 10%

# Income Statement (with Reduced Purchase Cost)



Sales	\$100
-------	-------

Cost of Goods Sold

Purchases	\$49
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Other Expenses	\$40	<u>\$89</u>
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Profit	\$11
--------	------

To increase profits by \$1, decrease costs by 2%

- A 10% increase in sales has the same impact on profits as a 2% decrease in the purchase cost

# Purchasing Objectives



**Sustainability**



**Continuous supply**

Avoid stock outs & production delays.



**Right quality**

Meeting technical & safety standards



**Cost efficiency**

Lowest total cost of ownership, not just cheapest price



**Supplier relationship**

Collaboration & innovation

# Supplier Relationships Supporting Purchasing Objectives

Purchasing Objective	Real-Life Example	How Supplier Relationship Helps	Result
Quality & Innovation	Toyota & Denso (Automotive)	Joint R&D, early supplier involvement in product design.	High-quality, reliable cars → strong brand reputation.
Cost Efficiency & Supply Continuity	Walmart & P&G (Retail)	Vendor Managed Inventory (VMI), shared sales/inventory data.	Reduced stockouts, lower inventory costs, consistent supply.



# Group Discussion

## Background

In 2021, **Saudi XYZ** (a large downstream steel products manufacturer in the Eastern Province) was under pressure to meet major project deadlines for infrastructure initiative.

The company relied heavily on **imported specialty steel plates** from suppliers in Europe and Asia, since local mills did not produce the exact grade required.

Procurement signed a **three-year contract** with a European supplier in 2019, locking in a “stable price” agreement. However, during the COVID-19 recovery in 2021–2022, **global steel prices doubled**, and demand surged. The European supplier **invoked the force majeure clause**, citing energy shortages and export restrictions, and started **delaying shipments by up to 8 weeks**.

At the same time, a **Chinese supplier** approached Saudi XYZ, offering the same material with **shorter lead times** (4 weeks vs 12 weeks) but with two conditions:

1. **30% higher Price** than the original European contract.
2. XYZ must commit to a **minimum annual volume** for 3 years.

Meanwhile, the procurement team discovered that a local Saudi mill could **modify their production line** to make a close substitute material — but that would take **12 months of R&D and approval**, with upfront investment and risk of technical rejection.

## Question for Group Discussion

If you were the Procurement Manager, which option(s) would you choose and why?

# Some Thoughts

## Practical hybrid approach:

- **Immediate:** Split the requirement — place a short-term order with the Chinese supplier to cover immediate needs (at the higher price), **while** enforcing/renegotiating with the European supplier for partial deliveries and claiming mitigation/compensation as appropriate.
- **Medium-term (2-12 months):** Fast-track a supplier development program with the local mill (co-invest / technical support) to produce the substitute grade within 12 months.
- **Long-term (12+ months):** Move to a **dual-sourcing** strategy (European + local or Chinese + local) with contractual clauses for flexibility and resilience

# Procurement Strategies



## Centralized Procurement

All purchasing decisions made at **headquarters**.



## Decentralized Procurement

Each business unit/site manages its own purchasing.



## Strategic Sourcing

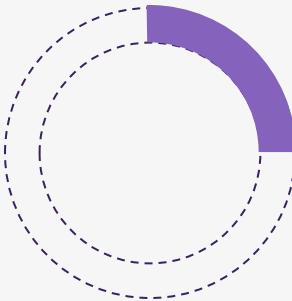
Continuous process of analyzing spend, suppliers, and markets to **choose the best sourcing strategy**.



## Category Management

Grouping purchases by category (e.g., IT, raw materials, logistics) and managing each as a “business unit.”

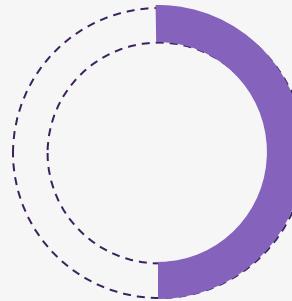
# Centralized Procurement



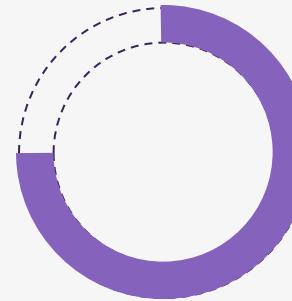
All purchasing decisions made at **headquarters**.

**Advantages:** economies of scale, standardization, stronger supplier power.

**Disadvantages:** less flexibility for local units

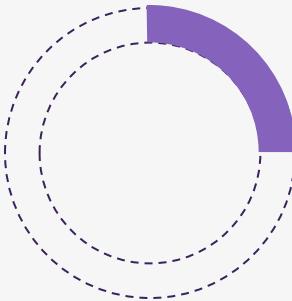


**SABIC (Saudi Arabia)** shifted to centralized procurement in the 2010s. Result: **savings of millions** annually through bulk negotiations and unified contracts.



**Impact:** Stronger control over global supplier base, improved compliance.

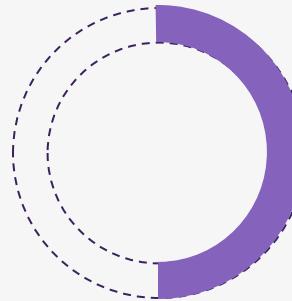
# Decentralized Procurement



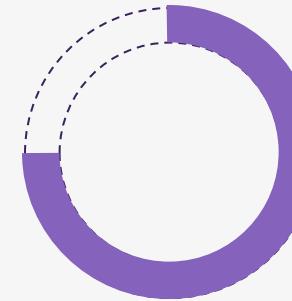
Each business unit/site manages its own purchasing.

**Advantages:** flexibility, faster response to local needs.

**Disadvantages:** higher costs, duplication of suppliers, less bargaining power.

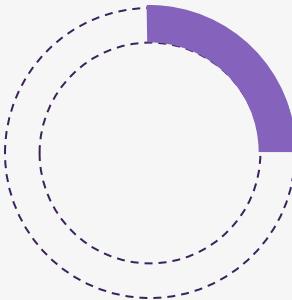


**Boeing (USA)** in the 2000s used decentralized/global outsourcing for the 787 Dreamliner.

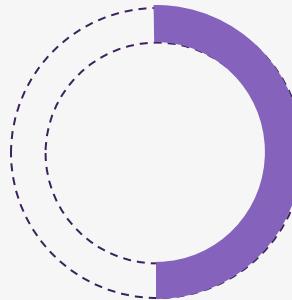


Lesson: decentralization works only if tightly controlled.

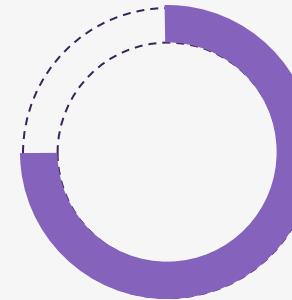
# Strategic Sourcing



Continuous process of analyzing spend, suppliers, and markets to **choose the best sourcing strategy**.  
**Advantages:** cost reduction, innovation, long-term partnerships.  
**Disadvantages:** requires advanced data and skills.

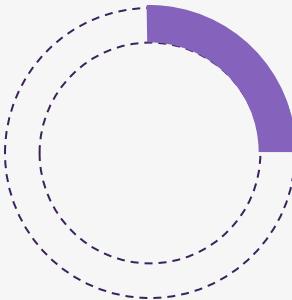


**Procter & Gamble (USA)** implemented strategic sourcing to consolidate global suppliers.



Saved **\$1 billion+ over 3 years** by rationalizing suppliers and negotiating long-term contracts.  
**Impact:** stable supply + reduced costs + innovation from suppliers.

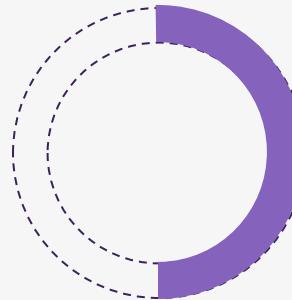
# Category Management



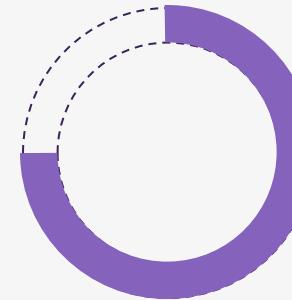
Grouping purchases by category (e.g., IT, raw materials, logistics) and managing each as a “business unit.”

**Advantages:** focused expertise, tailored supplier strategies.

**Disadvantages:** needs skilled category managers.



**Oil and Gas Companies** apply category management to chemicals, drilling equipment, and logistics..



Category strategy in drilling saved **hundreds of millions USD annually** by standardizing specifications and pooling demand.

# Procurement Strategies

Aspect	Normal Procurement	Strategic Sourcing	Category Management
Focus	Transactional – buying goods/services when needed	Strategic – optimizing sourcing decisions across spend categories	Holistic – managing each spend category as a “business unit”
Goal	Get the right product, at the right time, lowest price	Drive long-term value: cost, quality, risk, innovation	Maximize value across the <b>entire category</b> (cost, supply security, supplier innovation, demand mgmt.)
Timeframe	Short-term (per purchase)	Mid to long-term (1-5 years)	Continuous, ongoing lifecycle management
Approach	Reactive (respond to needs)	Proactive (structured sourcing projects)	Proactive & holistic (aligns sourcing with <b>business strategy</b> per category)
Process Example	<b>Apple</b> needs packaging → buys from available supplier offering lowest price	<b>Walmart</b> consolidates trucking spend into multi-year contracts with strategic logistics providers to cut costs and secure capacity	<b>Unilever</b> manages “chemicals” as a category globally: long-term supplier portfolio, sustainability targets, innovation partnerships, risk management

# Chapters Covered

## Chapter # 7 (Ed 9)

SC Fundamental



## Chapter # 1 & 2

Introduction To Materials Management & Manufacturing Process



## Chapter # 7

Purchasing



## Chapter # 9

Inventory Fundamental



## Chapter # 8

Forecasting and Demand Planning

# Procurement Top Risks



# Top Risks

01

Supply Chain  
Disruption

04

Quality Risk

02

Supplier  
Dependency &  
Concentration

05

Compliance &  
Regulatory

03

Price Volatility

06

Cybersecurity &  
Data



# Supply Chain Disruption



## What :

**Delays or stoppages in critical material/equipment delivery due to geopolitical events, disasters, or logistics bottlenecks.**

## ADNOC (UAE, COVID-19 2020)

- Global logistics shutdowns delayed imports of drilling equipment and spare parts.
- ADNOC faced project delays and increased costs because key equipment was stuck overseas.
- How to Tackle: Diversify supplier regions. Build local supplier networks. Keep critical spares stockpiled near operations.

# Supplier Dependency



## What :

Relying on a single supplier for critical safety or production equipment.

## BP (Deepwater Horizon, 2010)

- Blowout preventer (BOP) was supplied by one vendor. When it failed, there was no redundancy.
- Disaster cost BP over \$65B in fines, lawsuits, and cleanup.

## How to Tackle:

Use dual sourcing for critical items. Establish backup frameworks with alternate suppliers. Conduct independent engineering validation of supplier designs

# Price Volatility



## What:

**Extreme swings in raw material and equipment prices (steel, rigs, chemicals).**

## **ExxonMobil (Global Projects, 2008)**

During the oil boom, steel prices spiked by more than 70% in one year.

Gas and offshore projects saw costs balloon by billions USD, eroding margins

## How to Tackle:

Negotiate long-term fixed contracts for steel, cement, and chemicals (CAP).

Use commodity price hedging (financial instruments).

# Quality Risk

What:

**Substandard parts can cause safety hazards and downtime.**



**Kuwait Oil Company (Fake Valves, 2014)**

Discovered counterfeit valves supplied through subcontractors.

Result: safety hazards and millions of USD in downtime.

How to Tackle: Strict Supplier Quality Assurance (SQA). Only source from Approved Vendor Lists (AVL). Mandate API/ISO certifications and third-party inspection.

# Compliance & Regulatory



## What:

Failure to meet local content rules, environmental laws, or international sanctions.

## Shell (Nigeria, Niger Delta)

- Shell faced lawsuits and community tied to supplier and contractor environmental practices.

How to Tackle: Embed compliance requirements in supplier contracts. Partner with local suppliers to meet local content rules.

# Cybersecurity & Data Risk

What:

Procurement and supply chain systems are prime hacker targets.

ExxonMobil (2019 Cyber Attack Reports)

Exxon suppliers were targeted by cybercriminals attempting to breach procurement portals. While no major data leak occurred, it highlighted serious risks in vendor IT security.

How to Tackle: Cybersecurity audits of suppliers. Limit external vendor IT access. Include cybersecurity clauses in contracts.



# Digital Procurement & Technology



# What is Digital Procurement

Digital procurement means using technology, data, and automation to manage the end-to-end procurement process (from supplier selection to payment).

Instead of paper, phone calls, and Excel sheets → companies use AI, cloud platforms, robotics, and analytics.



# Key Technologies in Digital Procurement

## E-Procurement Platforms (Cloud-based /ERP)

Examples: SAP Ariba, Oracle Procurement Cloud.

**What it does:** Automates purchase requisitions, approvals, and supplier management in one platform.

**[Shell]:** Shell uses SAP Ariba to handle thousands of suppliers globally. This allowed them to cut cycle time by 40% for supplier onboarding and increase compliance.

## Robotic Process Automation (RPA)

Software robots that handle repetitive tasks (e.g., invoice checking, data entry).

Example (ExxonMobil): Exxon uses RPA to automatically match purchase orders with invoices, reducing manual work. This cut procure-to-pay errors by 60%

## Artificial Intelligence (AI) & Predictive Analytics

Uses big data to forecast prices, supplier risks, and demand.

Example (BP): BP uses AI-driven analytics to forecast steel and energy market prices, helping procurement managers decide when to lock contracts. They reported savings in the hundreds of millions USD by avoiding peak prices

## Supplier Portals & Marketplaces

Digital platforms where suppliers submit bids, documents, and compliance certifications.

Example (Kuwait Oil Company): Introduced an online supplier portal. Instead of paper bids, suppliers upload tenders digitally. Result: faster evaluation, fewer disputes, and better transparency

## Data Analytics Dashboards

Combines spend analysis, supplier performance, and risk monitoring.

Example (TotalEnergies):

Total developed a procurement dashboard tracking \$30B+ global spend. It shows which suppliers offer best prices, delivery times, and ESG scores. This enabled them to shift spend to more reliable suppliers, improving savings by 10–15% annually.

# Risks / Challenges of Digital Procurement

- Cybersecurity risk → hackers may target procurement systems.
- High implementation cost → ERP systems can cost tens of millions.
- Data quality issues → “garbage in, garbage out.”

# Outsourcing Vs Offshore



# Outsourcing

Hiring an external service provider (a specialist company) to manage some or all of an organization's procurement activities — such as sourcing suppliers, negotiating contracts, purchasing goods/services, or managing supplier performance.

- 



Instead of doing all purchasing activities in-house, a company contracts another expert organization to do it on their behalf.

## Definition

All or Part of your activities

In House Vs Outside



# Scope of Procurement

01

Direct  
Procurement

02

Indirect  
Procurement

03

Strategic  
Sourcing

04

Market  
intelligence

05

SRM

06

Expediting



# Benefits of Procurement Outsourcing

Category	Benefit	Explanation
<b>Cost Savings</b>	Reduced operational costs	Outsourcing firms use economies of scale, better supplier deals, and process automation.
<b>Access to Expertise</b>	Specialized skills and tools	Outsourcing partners bring market intelligence, advanced systems (e.g., SAP Ariba), and experienced procurement teams.
<b>Focus on Core Business</b>	More time for strategic work	Internal teams can focus on innovation, production, and core competencies.
<b>Global Reach</b>	Better supplier networks	Outsourcing firms often have global supply databases and can negotiate better global contracts.

# Risks or Challenges

Risk	Explanation
<b>Loss of Control</b>	The company may have less direct oversight over supplier relationships or purchasing decisions.
<b>Data Security</b>	Sharing sensitive procurement and financial data with third parties.
<b>Quality Issues</b>	The outsourcer's performance directly affects operational quality and delivery.
<b>Cultural Misalignment</b>	Different working styles or communication gaps can affect collaboration.

# Factors to Consider Before Outsourcing Procurement

## 1. Strategic Importance of the Category:

Don't outsource what gives you a competitive advantage (e.g., core materials in oil production).

Focus outsourcing on non-core, repetitive procurement activities (e.g., office supplies).

## 1. Cost-Benefit Analysis:

Evaluate the **total cost of outsourcing** vs. keeping it in-house, including transition and management costs.

## 2. Vendor Capability:

Choose partners with strong **industry expertise, technology platforms, and proven client success**.

## 3. Governance and Performance Metrics:

Define **clear KPIs** such as cost savings, on-time delivery, supplier quality, and compliance.

## 4. Confidentiality and Compliance:

Ensure data protection, confidentiality, and compliance with local and international regulations.

# Examples

## BP – Oil & Gas Sector

**Scope:** Outsourced indirect procurement (IT, office supplies, facilities) to **Accenture** and **IBM**.

### Results/Success:

15–20% cost reduction in indirect spend.

Streamlined procurement processes across multiple regions.

Internal teams could focus on strategic sourcing of critical oilfield equipment.



# Group Discussion

# Case Study

## Background

GlobalTech, a fast-growing electronics manufacturer, faces rising procurement costs, long lead times, and limited visibility across its 400 suppliers. The internal procurement team is small and overwhelmed, leaving little time for strategic sourcing or supplier innovation.

## The Proposal

A global firm, ProcureX Solutions, offers to handle GlobalTech's procurement activities — including sourcing, supplier management, and spend analytics — promising up to 20% cost savings through technology and global leverage.

## The Dilemma

The CEO supports outsourcing to improve efficiency.

However, the Head of Procurement, Ms. Lina, fears:

- Losing control over supplier relationships
- Data confidentiality risks
- Negative team morale or job losses