

Webinar: Understanding and Optimizing Inventory in Supply Chains



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Supply Chain Management Series Inventory Planning and Management

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www.scl.gatech.edu/invmgmt & www.scl.gatech.edu/SCMS



Presentation Agenda

- **Inventory Management in the Age of Globalization**
- **A holistic approach to Inventory Management**
 - Distribution Requirements Planning
 - Materials Requirements Planning
- **Examples of Distribution Models**
- **Key Performance Indicators for Inventory Management**



The Main Drivers of Globalization

- **Reductions in tariff and non-tariff barriers to trade**

 - GATT & WTO

- **Preferential duty programs**

 - (Generalized System of Preferences & Caribbean Basin Initiative in the U.S., et al)**

- **Free Trade Agreements**

- **Global use of the ocean container (*Think in terms of... "inventory on the water"*)**



The Main Drivers of Globalization

● The advent of Outsourcing

- Manufacturing (*Who owns inventory at different phases of procurement & production?*)
- I.T. management
- Logistics services (*Who is taking care of your inventory?*)



● Technology

- Transportation, Telecom, hardware/software & Internet
- Real-time access to supply chain-related information (*Where is my inventory and what will become of it?*)

Supply Chain Management

(The short, tactical version)

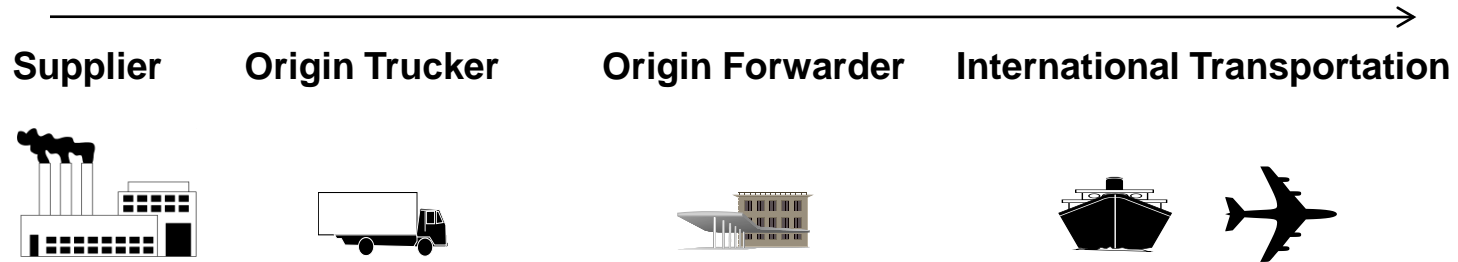
● **A time phased approach to forecasting and meeting the demand for raw materials, work in process and/or finished goods**



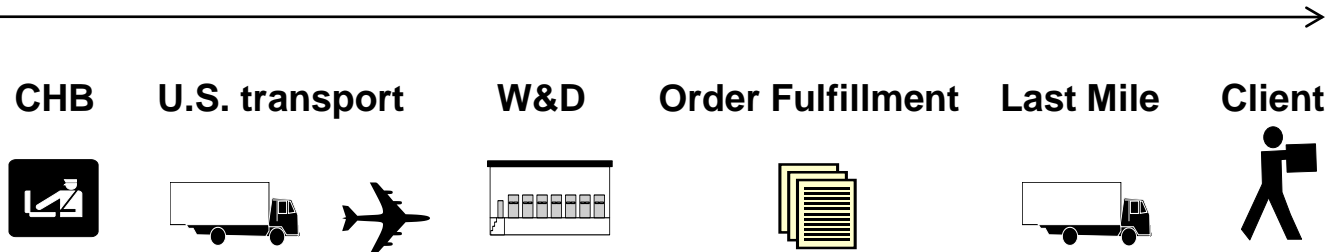
● **The 3 pillars of supply chain management are:**

- Landed cost
- Lead time rationalization
- Inventory management

A Basic Global Supply Chain

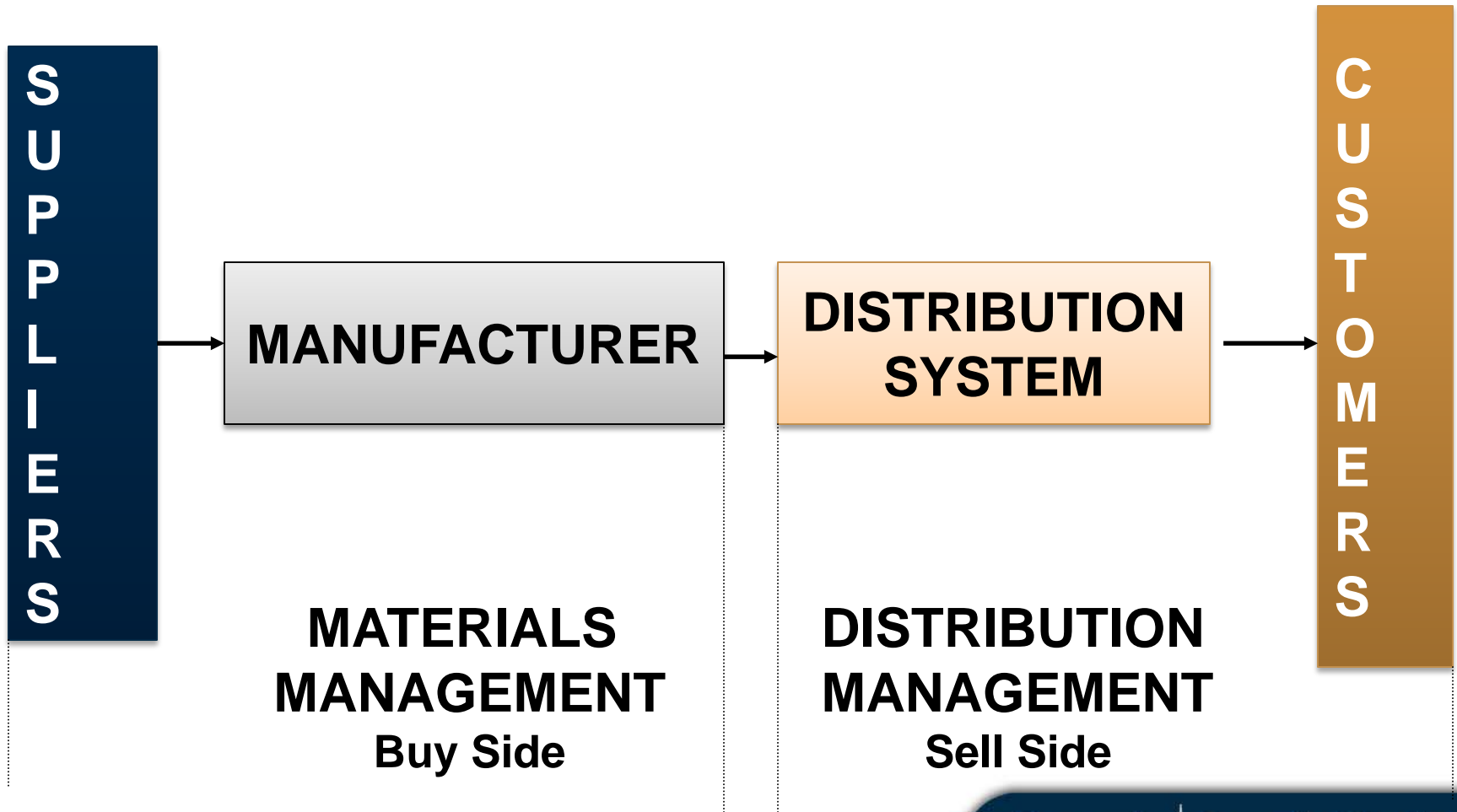


Origin: Somewhere Overseas



Destination: Somewhere in the U.S.A.

Inventory Management: Buy Side & Sell Side Activities



A Supply Chain Metaphor

- **To a very real extent, SCM is a balancing act between the need to maximize sales/profits and the amount that must be invested in inventories**
- **That balancing act begins with a forecast and SCM then comes down to making adjustments between forecasted and actual sales**
 - Focus on types of supply chain variation
- **Within that framework landed costs, lead times and inventory investment reign supreme**

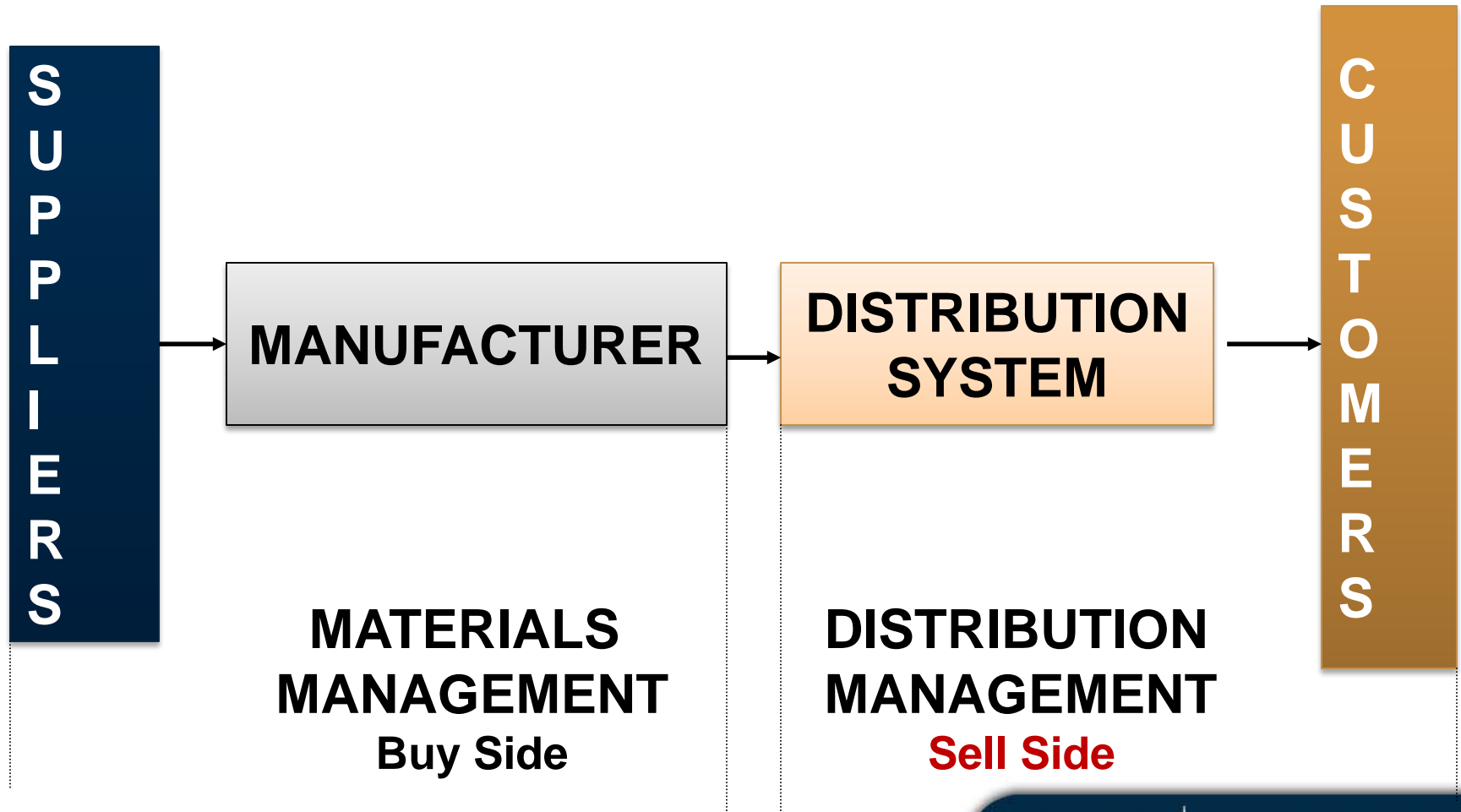




A Holistic Approach to Inventory Management



Inventory Management: Buy Side & Sell Side Activities



Distribution Requirements Planning

- **Calculates time-phased requirements in specific quantities**
- **Used for independent demand products (finished goods)**
- **Conceptually similar to the principles of MRP**
 - Gross to Net Exploding
 - Lead-time Offsetting
- **Heavily influenced by customer orders**
- **Consumption of the forecast integral to the process**



Elements of the DRP Discipline

- **Time periods (known as time buckets) must be specified**
- **Gross Requirements**
 - Forecast
 - Backlog of open customer orders
 - Inter-network resupply orders
- **Scheduled Receipts**
 - Vendor purchases
 - Internetwork resupply orders

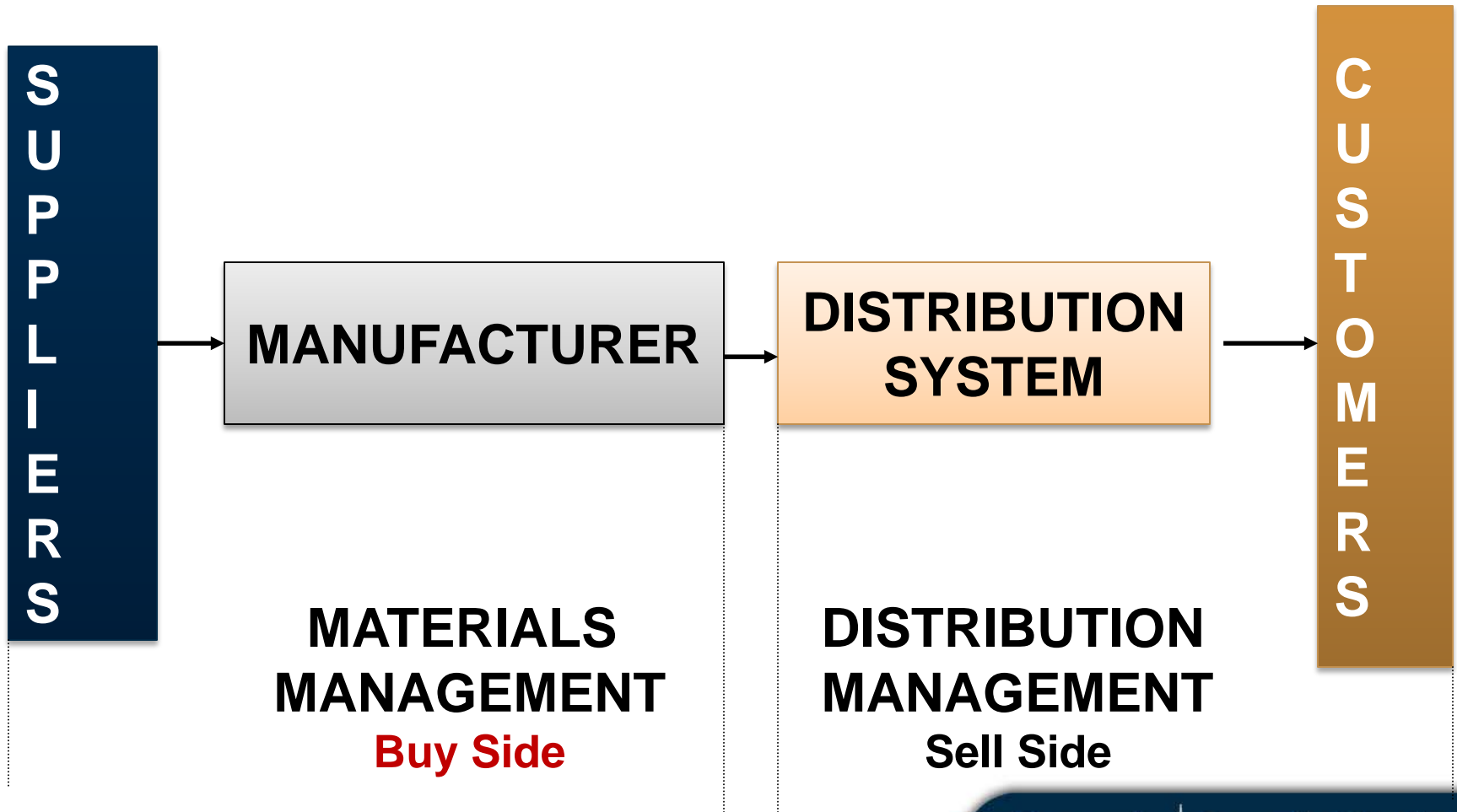


Elements of the DRP Discipline

- **On-hand Balance (based on Projected On-Hand)**
- **Planned Order Receipt**
 - Date & quantity of order
- **Planned Order Release**
 - Based on “Lead Time Offsetting”
 - Variances in leads times are a killer



Inventory Management: Buy Side & Sell Side Activities



Materials Requirements Planning

- **Dependent demand items**
- **Plan for the purchase and/or production of components required for the MPS**
- **Key variables are Bill of Material (BOM) & available inventories**
- **Gross to Net Exploding & Lead-time Offsetting are essential**
- **Shows quantities needed and time required (by time buckets)**
- **Determines what to order, in what quantity, when to order it, as well as when to schedule final delivery**



The Heart of the Tactical Matter: Material Requirements Planning (Buy Side)

Material Requirements Planning (MRP)-A set of techniques that use Bill of Material data, inventory data and the master production schedule to calculate requirements for materials. It makes recommendations to release replenishment orders for material. Further, because it is **time-phased**, it make recommendations to reschedule open orders when due dates and need dates are not in phase. Time-phased MRP begins with the items listed on the MPS and determines (1) the quantity of all components and materials required to fabricate those items and (2) the date that the components and material are required. Time-phased MRP is accomplished by **exploding** the bill of material, adjusting for inventory quantities on hand or on order, and **offsetting** the net requirements by the appropriate lead times.

Source: APICS Dictionary

The Nexus of Forecasting, Purchasing, Inventory Management & Distribution

● **Gross-to-Net Exploding**

- ◎ An exercise whereby the original (gross) requirement for a product is reduced by:
 - Inventory on hand
 - Confirmed order receipts
 - Confirmed order releases
 - Planned order releases



● **Lead time off-setting**

- ◎ Orders are placed for products on a date that “off-sets” cumulative lead times with the desired date of receipt
 - P.O. preparation/acceptance
 - Production time
 - Transportation lead time
 - Customs clearance
 - Domestic distribution



Examples of Distribution Models



Examples of Distribution Models

● Fast Moving Consumer Goods

- “Pull” Model
- Replenishment based on POS info
- Sales “consume” the forecast
- Requires a well developed W&D network



● Just In Time (JIT)

- Pioneered by Toyota
- Pull model
- “Call Offs” to a production line
- Vendors close to mfg. site
- Small lot sizes based on demand
- No use of purchase orders

Examples of Distribution Models

● Cross-Dock Operations

- Origin containers can be from single or multiple vendors
- Ocean containers arrive at domestic port and transferred to cross dock operation
- Containers are stripped and transferred to 53' trailers for shipment to inland DC's or retail stores
- "Postponement" is feasible
- Emphasis on speed



Examples of Distribution Models

● Direct-To-Store (Retail)

- Used by larger retailers
- Goods received from multiple vendors at origin and consolidated into ocean containers by store-specific needs
- Goods prepared as “Retail-Ready”
- Also known as “DC By-Pass”
- Requires advanced Enterprise Resource Planning capabilities
- Saves time & money at destination



Examples of Distribution Models

● Vendor-Managed Inventories

- Manufacturing environment
- Vendor owns raw materials until used in a production process
- Vendor is responsible for all facets of inventory management
- Requires real-time visibility of inventory levels
- MRP capabilities critical to success
- Coordination of Min/Max Levels and lead times critical to success



Regardless of the Model or Type of Inventory: I.M.-Related Costs to Consider

● Ordering costs

- Clerical & Admin support

● Carrying costs

- Cost of capital
- Opportunity cost

● Storage costs

- Lease
- Payroll
- Systems
- Materials handling equipment
- Maintenance
- Supplies



Regardless of the Model or Type of Inventory: I.M.-Related Costs to Consider

● **Transportation costs**

- Ocean, air, surface
- Returns & reverse logistics

● **Risk management**

- Theft, pilferage & damage
- Insurance
- Security

● **Stock-out costs**

- Expedited transport
- Back-order processing
- Lost sales
- Depletion of customer goodwill





Inventory Management: Key Performance Indicators



Supply Chain & Inventory Management

Key Performance Indicators

- **Forecast accuracy**
- **Inventory \$ value**
- **Inventory aging**
- **Amounts & reductions in S.S.**
- **Budget compliance**
 - Headcount, payroll, over time
- **Target landed costs**
 - Transportation & Customs as a percentage of total cost
- **Lead-time compliance**
- **Logistics cost per unit (item, carton, pallet)**



Supply Chain & Inventory Management

Key Performance Indicators

- **Order accuracy**
- **Order fill rate**
- **Back orders & lost orders (number and dollar value)**
 - Recovery time on back orders
- **Number of incidents (theft, loss, et al)**
 - Number of claims
- **Insurance premiums**
- **Dollar value of shrink**





Webinar Summary



Supply Chain Management

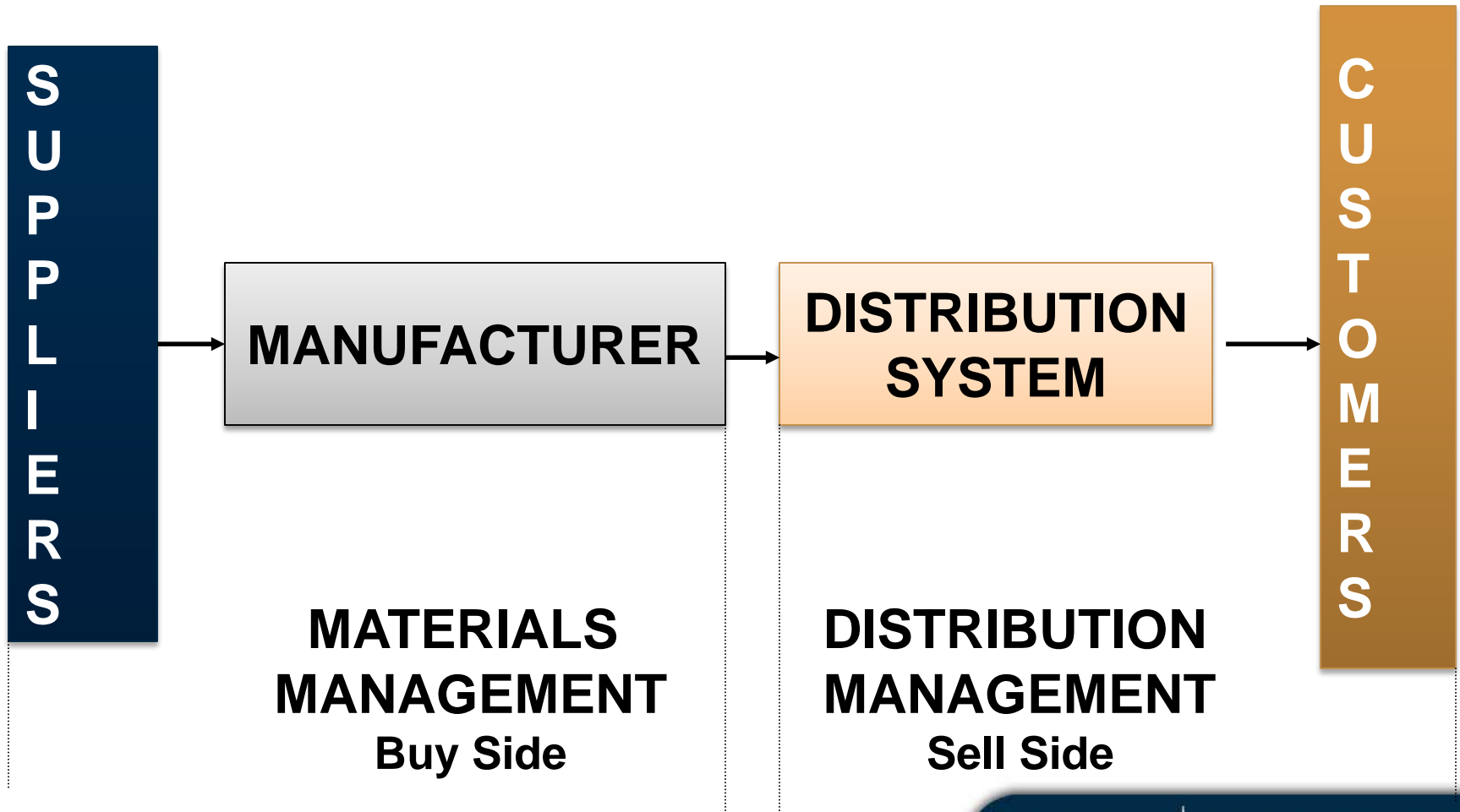
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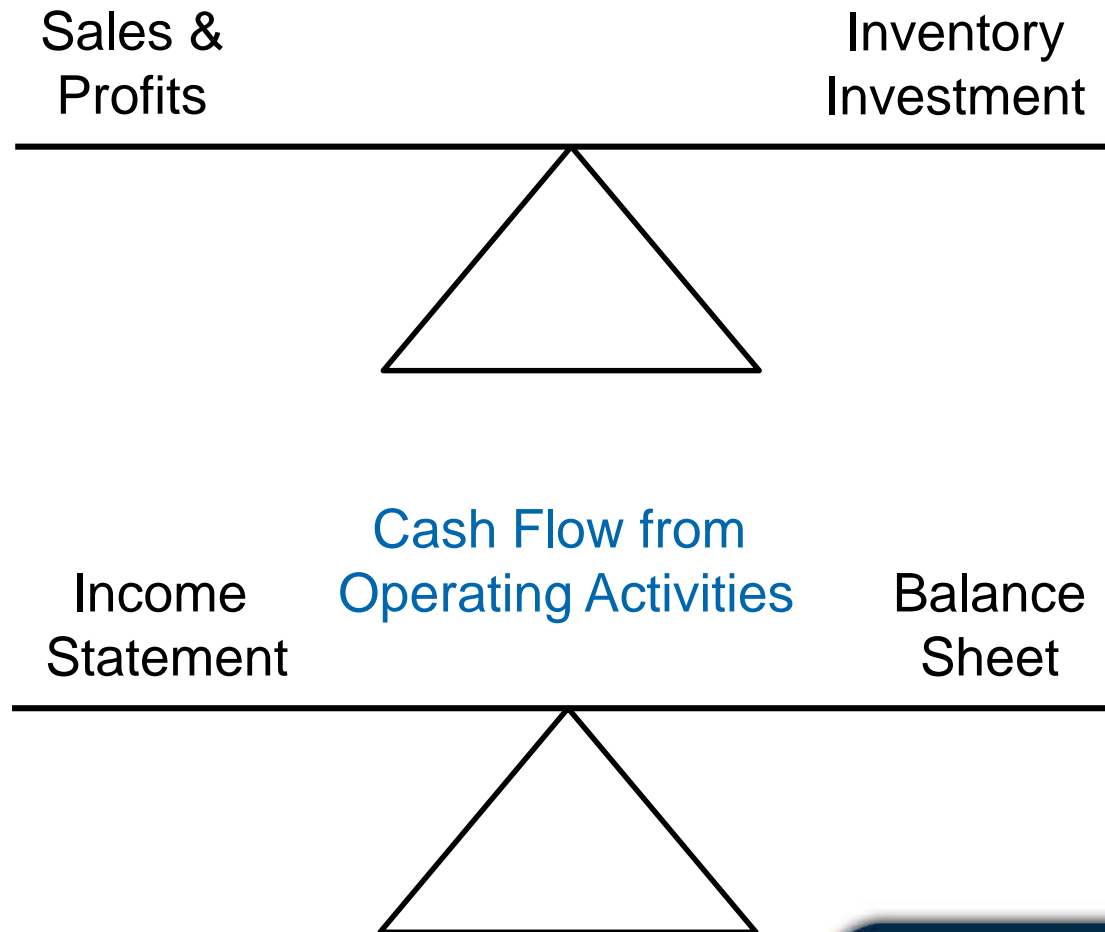


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