REPUBLIC POLYTECHNIC

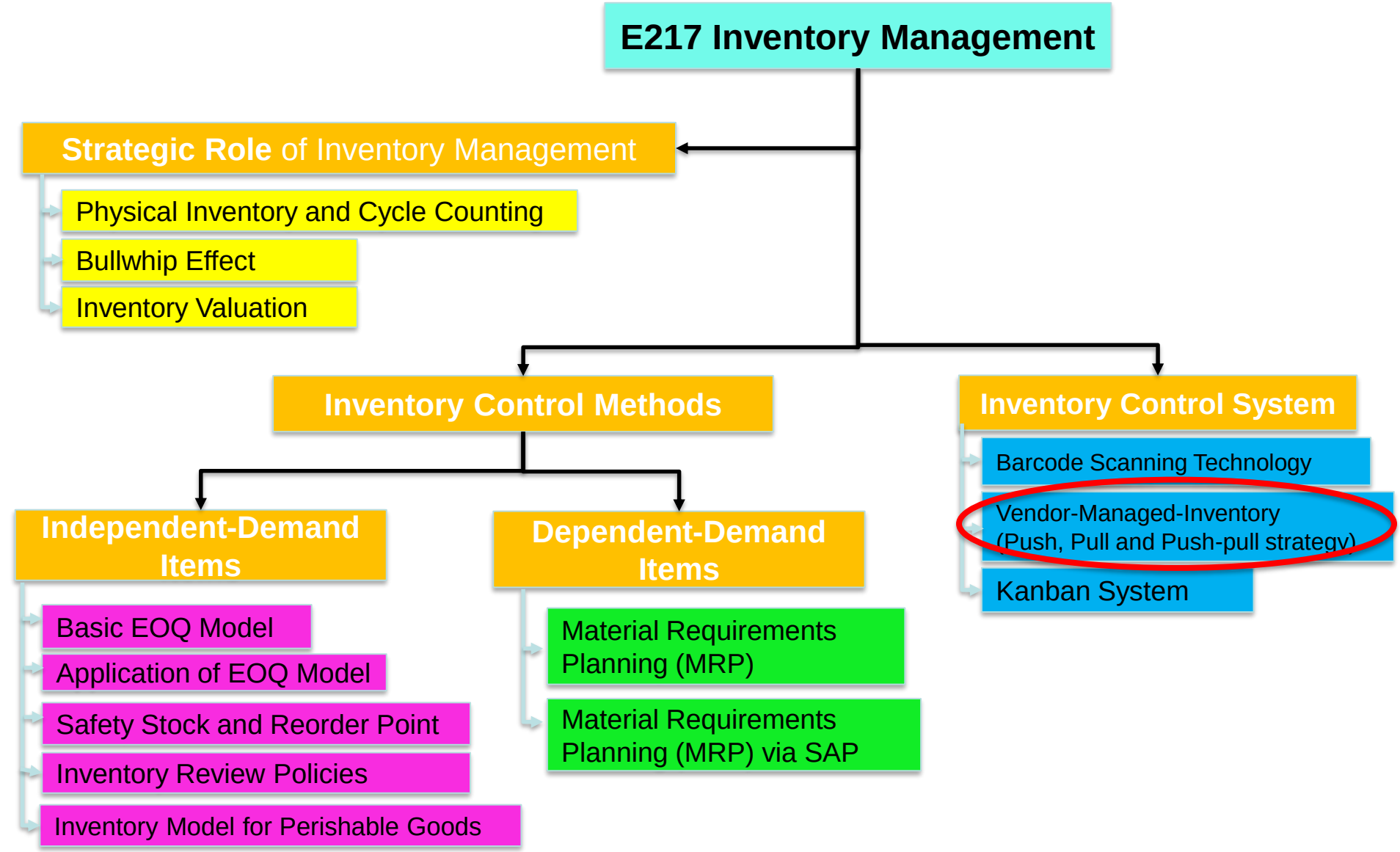
Problem 11

A New Way to Manage Inventory

E217 – Inventory Management

SCHOOL OF ENGINEERING

E217 Inventory Management Topic Tree

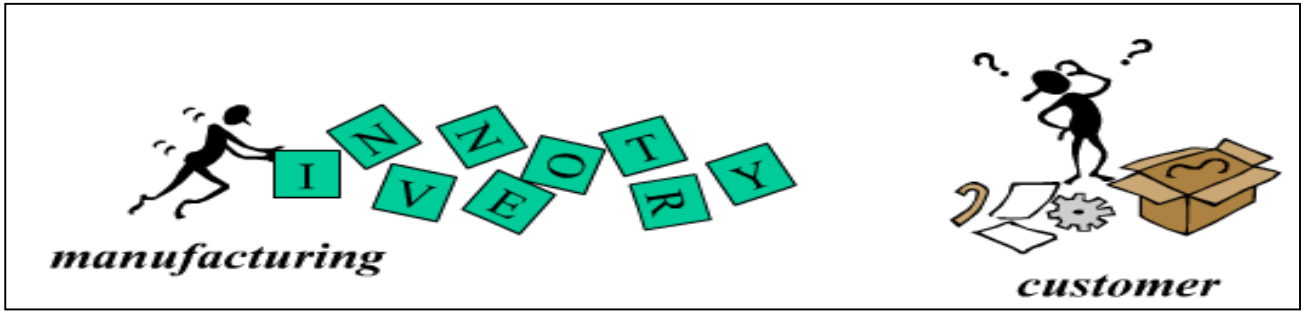


Push & Pull Strategy

- Processes in a supply chain are divided into two categories depending on whether they are executed in response to a customer order (pull) or in anticipation of a customer order (push).
- Push-Based Supply Chain
- Pull-Based Supply Chain
- Push-Pull Supply Chain

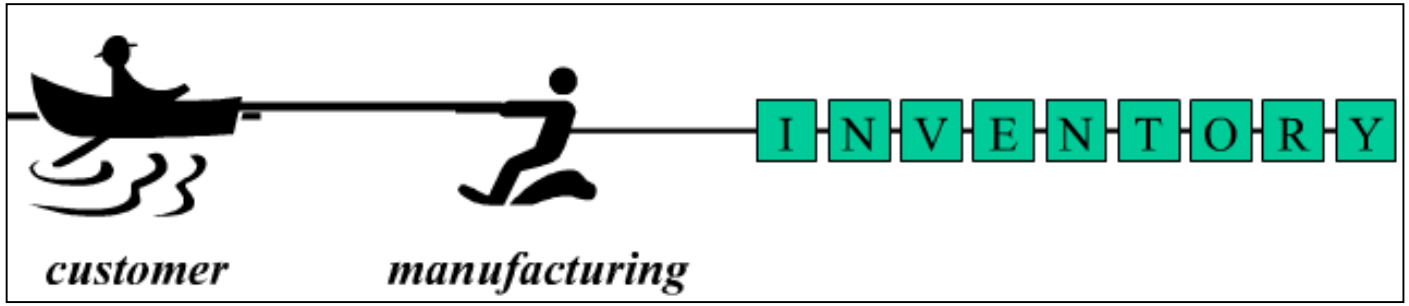
Push-based Supply Chain

- **"Push"** implies that you are pushing inventory into the system with the hopes that someone is going to buy it
- Scale of economies can be enjoyed
- In a **push-based** supply chain, the production and distribution decisions are based on long-term forecasts.
  - *Take a longer time to reach the changing customer demands*
  - *Results in high production cost, high inventory cost and high transportation cost because companies would like to have buffer at every stage of the supply chain (higher risk of product obsolescence)*
- Example: Diet Coke, Rice, Tissue Paper, etc.



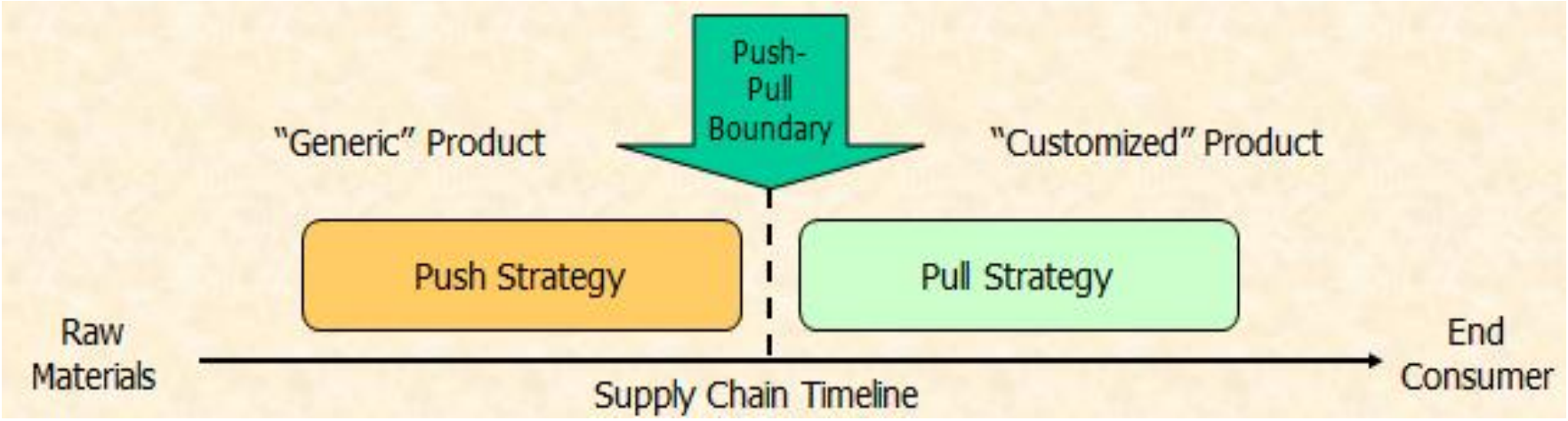
Pull-based Supply Chain

- **"Pull"** implies that items are only manufactured after an actual customer order is placed
- Suitable if there is high demand uncertainty
- In a **pull-based** supply chain, the production and distribution decisions are demand driven
  - *Significant reduction in lead time, inventory levels and costs.*
  - *Better response to changing customer demands*
  - *However, it is difficult to implement the pull system especially when lead-times are long (too slow to react to changing customer demands).*
- Example: Dentures, Build-To-Order (BTO) flats, etc.



Push-Pull Supply Chain

- This has led to companies to use the push-pull strategy (to take advantage of the best of both worlds).
- Typically the initial stages of a supply chain are designed to be pushed-based (replenishment is based on long-term forecasts) while the remaining stages are pull-based (based on actual customer demand).
- The interface between the push and pull stages is known as the push-pull boundary.



Conventional Inventory Management

Customer

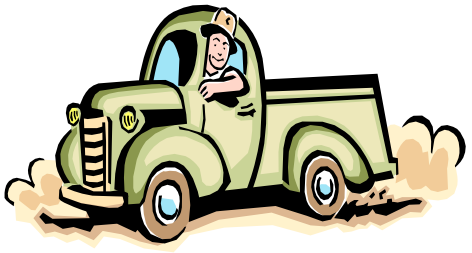
- monitors inventory levels and places orders

Vendor

- manufactures/purchases products
- assembles order
- loads vehicles and makes deliveries

Problems with Conventional Inventory Management:

- Large variation in demands on production and transportation workload balancing
- utilization of resources
- unnecessary transportation costs
- urgent V.S. non-urgent orders
- setting priorities



You order – We haul!

History of Vendor Managed Inventory (VMI)

- In 1987, P&G and Wal-Mart pioneered in Continuous Replenishment Process (CRP). With CRP, P&G makes the main inventory replenishment decisions for Wal-Mart.

- P&G monitors Wal-Mart's inventory levels (physically or via electronic messaging) and makes periodic resupply decisions regarding order quantities, shipping, and timing. Transactions customarily initiated by Wal-Mart (like purchase orders) are initiated by P&G instead.

- CRP between Wal-Mart and P&G is best-known as the vendor-managed inventory program.

Vendor Managed Inventory (VMI)

Customer

- trusts the vendor to manage the inventory

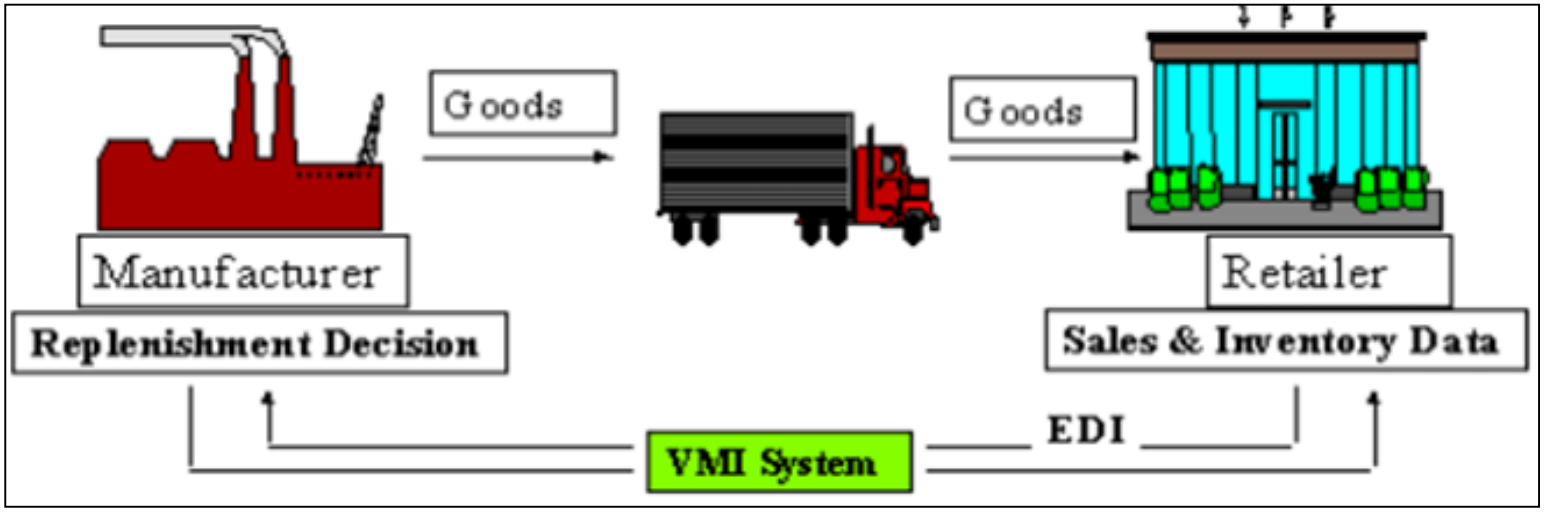
Vendor

- monitors customers' inventory
- controls inventory replenishment & decides
  - when to deliver
  - how much to deliver
  - how to deliver

You rely – We supply!

Vendor Managed Inventory (VMI)

- An approach to inventory and order fulfillment in the way that supplier, not the customer, is responsible for managing and replenishing inventory.
- The supplier creates the purchase orders based on the demand information exchanged by the customer.
- The supplier is responsible for maintaining the customer inventory management



Vendor Managed Inventory (VMI)

- VMI provides visibility across the supply chain
  - Enables both parties to reduce inventory significantly
  - Improve production planning
  - Improve inventory turnover
  - Improve stock availability.
  - Lower operations cost

- VMI does not simply stand for:
  the passing of the customer's consumption history for a specific item to the supplier, who will follow-up the customer's stock level and generates a purchasing order to replenish the stock.

- VMI in fact stands for:
  Granting inspection of the sales profile of a specific item to the supplier, who will optimize the replenishment policy and ensure the pre-defined service level towards his customer.

How Does VMI Work? (1)

VMI may cover a single task or any combination of tasks as below:

- Vendor shows up at customer's facility and physically reviews inventory levels, immediately replenishes with inventory he has with him (physically stocks the inventory on the customer's shelves).
- Vendor shows up at customer's facility and physically reviews inventory levels, places an order for replenishment inventory that will be delivered at a later date
- Customer periodically (e.g. weekly) provides vendor with current inventory levels. Vendor reviews inventory levels and creates replenishment orders. Replenishment orders are shipped to customer.

How Does VMI Work? (2)

- Vendor has direct access to customer's inventory system and can get real-time information related to on-hand levels, open orders, forecasts, production schedules, etc. Vendor makes replenishment decisions based on this data and ships orders to customer.
- Vendor provides on-site inventory planner that works full-time at the customer's facility managing the inventory supplied by that vendor.
- Vendor leases space within the customer's facility and runs their own warehouse and inventory planning operation with their own employees within the customer's facility.

Example of VMI On-Site

Source: https://youtu.be/GSt7u2SQg5c

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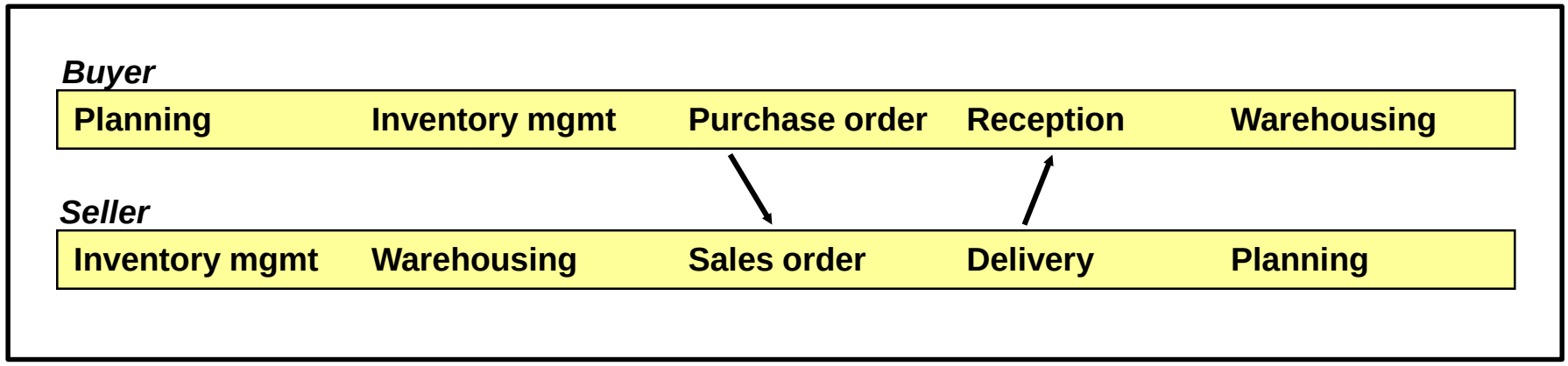
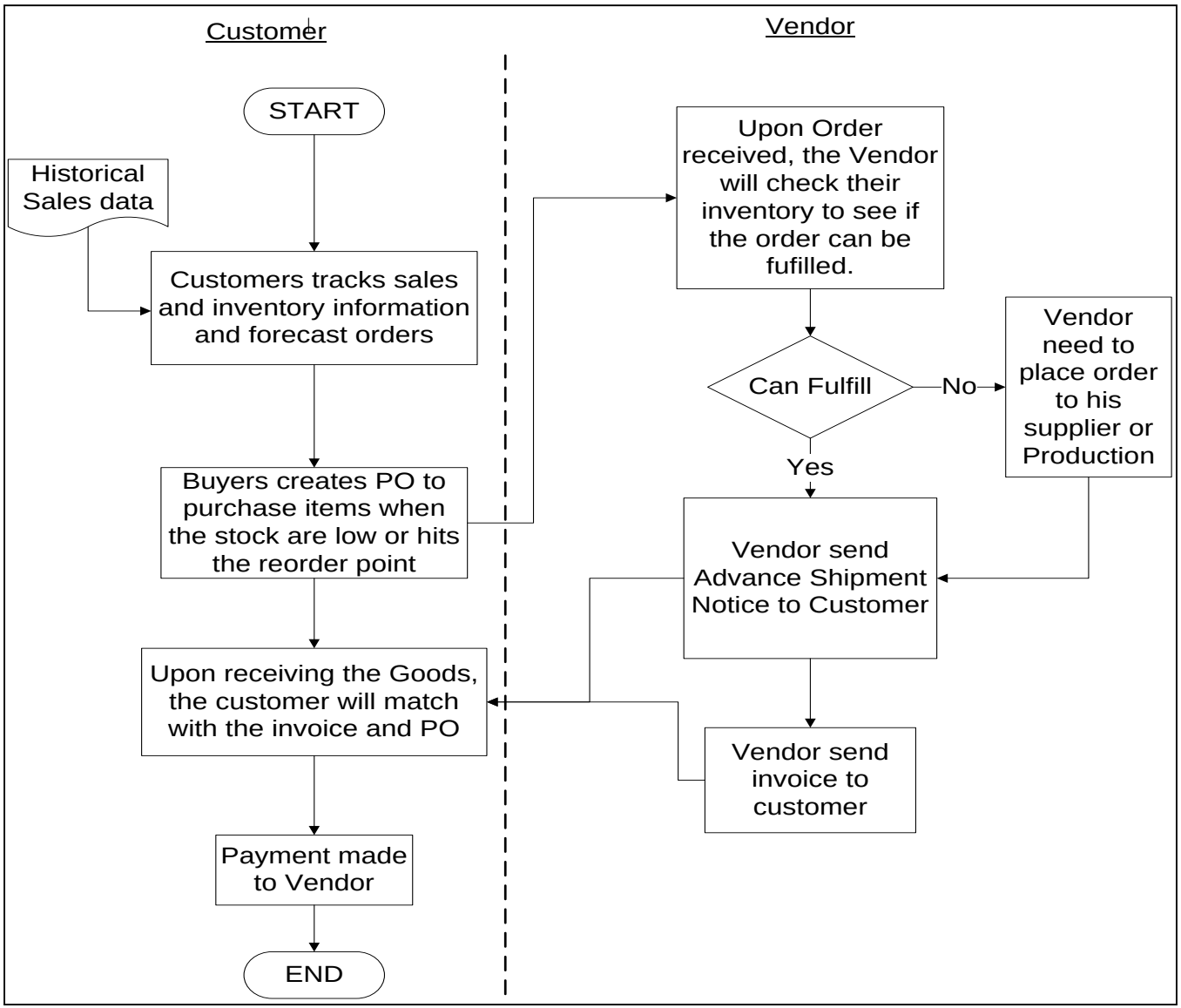
Conventional Fulfillment Process



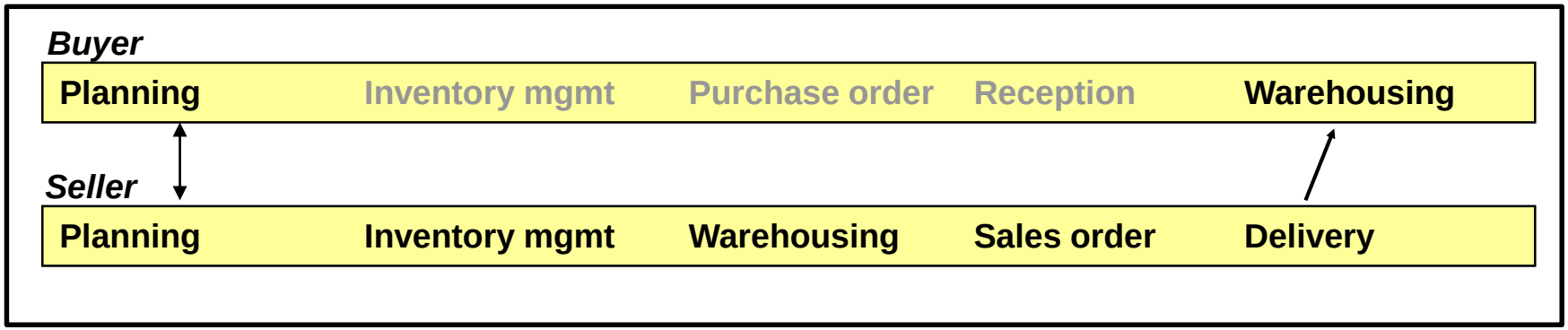
Under the typical business model:

- When a retailer needs product, they place an order against a manufacturer.
- The retailer is in total control of the timing and size of the order being placed. The retailer maintains the inventory plan.

A Typical Conventional Fulfillment Process

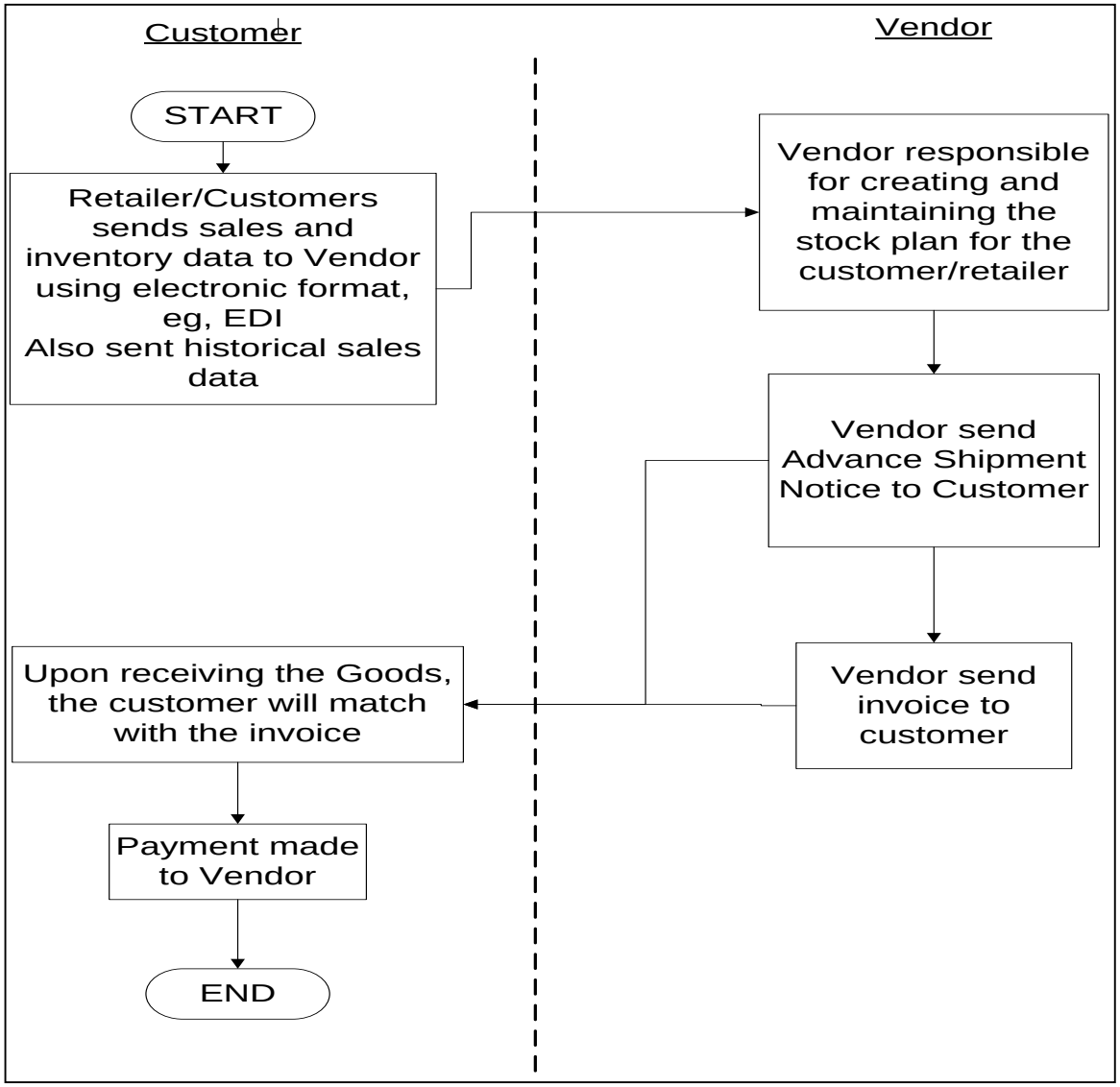


VMI Fulfillment Process (Example)



- The manufacturer receives electronic data (usually EDI or via internet) that tells him the retailers sales and stock levels.
- The manufacturer can view every item that the retailer carries as well as true point of sale data.
- The manufacturer is responsible for creating and maintaining the inventory plan.
- Under VMI, the manufacturer generates the order, not the retailer. VMI does not change the “ownership” of inventory.

A Typical VMI Fulfillment Process (Example)



What's Needed to Make VMI Work

- **Management and Staff Commitment**
  - Strategic initiative (top down)
  - Communicated to the organisation especially the inventory and replenishment planners.
  - Management must understand the concept of VMI and ready to let 3rd party handle the inventory.
  - The support of inventory analysts, e-business analysts and replenishment planners are very essential for the success

What's Needed to Make VMI Work

- **Setting up Information Management systems, e.g. EDI, ERP system, etc.**

  - Information system is the enabler for VMI (Technology)
  - Product data, code and other catalog information must match between customer and vendor.
  - Prior to start up, all product data must be audited and difference must be resolve.
  - Vendor must be in the information system
  - The information system must be tested to ensure correct and accurate data are able to be transmitted to the Vendor.

What's Needed to Make VMI Work

- **Agreement**
  - On Inventory Turnover
  - Fill rates
  - Frequency of replenishment
  - Payment terms
  - Quality

- **Data Exchange**
  - One time exchange of sales history (Retailer/customer)
  - On-going product activity data (on-hand inventory, sales volume, backorders, returns, etc)

What's Needed to Make VMI Work

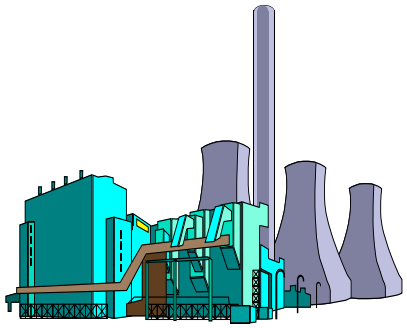
Ordering and Invoicing

- Vendor does the ordering on behalf of the customer.
- The PO will be acknowledged electronically by the customer.
- Reorder point, order quantity, frequency will be determined by the vendor depending on the agreement.
- Advance shipping order needs to be sent to the customer via electronic means (EDI or internet).
- Customer upon receiving the invoice and goods, will need to do a matching before processing payment to vendors

What's Needed to Make VMI Work

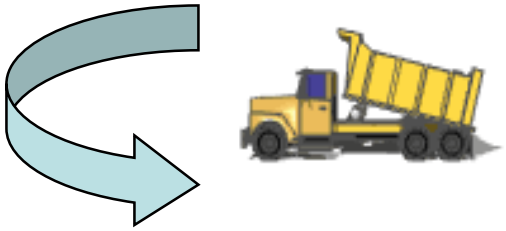
- **Performance Measurement**
  - KPIs must be established during the agreement stage
  - Vendors will be subjected to audit based on these KPIs
  - A formal measuring process should be in place for effective measurement of the vendor using the agreed KPIs.

Benefits of Implementing VMI



Vendor

- Better forecasts (POS)
- Lower inventory
- Less errors in orders placed
- Leveling of production capacity



- Full truck load
- Efficient route planning

Customer

- Less stock-out
- Lower inventory
- Better service level
- Lower planning & ordering costs

Benefits of VMI to Vendor

- Better coordination of inventory levels at different customers
- Better coordination of deliveries to decrease transportation cost (reduce the rush-order and related high cost)
- Reduce Bullwhip Effect with increased supply chain visibility (real-time availability of customers' demand information and stock level)
- Improve production scheduling and forecast with better information, reducing WIP and inventory levels
- Lock in customers with deeper partnership and collaborations
- Reduce errors in orders as now the orders are done by the vendor, thus reducing returns.

Benefits of VMI to Customer

- Customers only have to supervise the stocks, instead of drawing up a detailed analysis for the placing of orders.
- Reduce the time interval between receiving goods and making them available for consumption or sales.
- Stocks with customer will be reduced, because the uncertainty due to variability in the supplier's periods of delivery will drop.
- Reduce risk and cost of stock-outs, Vendor is responsible to track inventory movement, level and replenishment to meet agreed service level.
- Increase in sales due to less stock-outs and giving customer the confidence to come back.

Limitations & Challenges of VMI

- High resource commitment during implementation and startup
- Overall level of collaboration will be limited if companies view it as ‘inventory outsourcing’ where the responsibility to generate orders and meet inventory targets belongs to the vendor
- Insufficient or poor system integration will result in poor visibility and poor data sharing.
- Lack of commitment from staff will hinder the progress and successfulness of the VMI program. E.g., resistance from sales force because of commission earned from high volume sales.
- Most manufacturers fail to leverage customer-specific data effectively for planning production. Instead, they continue to make to stock. In some cases, reserving finished goods inventory in the manufacturer’s distribution centers actually causes shortages to other customers.

Limitations & Challenges of VMI

- There are many advantages of going for VMI, but the journey is not simple. Much effort is required:
  - *Commitment*
  - *High level of Trust*
  - *Sharing of data*
  - *Performance measures*
  - *Agreement in place*

- A successful VMI requires a high level of trust and is a form of joint business development requiring active communication, information sharing and joint problem solving. Most companies are not committed to that level of partnership.
- VMI may not always be the best solution. If the customer wants to do a better job in forecasting the demand and achieving high service level without the high cost, then VMI may not be the way to go.

VMI in Practice (Examples)

Retail store – Visual & POS

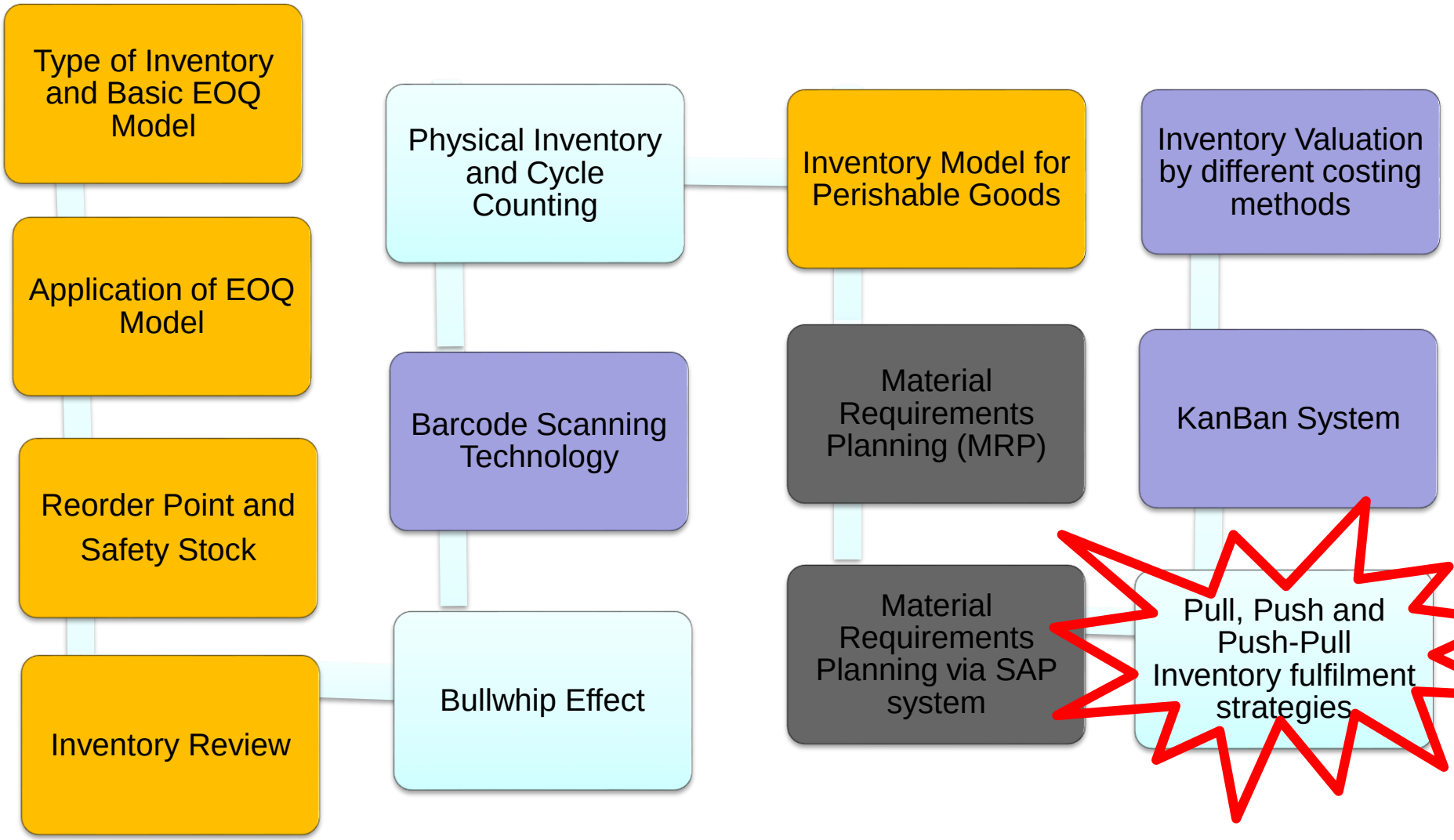
Parts vending machine typically with IOT

Digital weighing scale with visual or IOT

Variations From VMI

1. Consignment Inventory is in the possession of the customer, but is still owned by the supplier. In other words, the supplier places some of his inventory in his customer's possession (in their store or warehouse) and allows them to sell or consume directly from his stock. The customer purchases the inventory only after he has sold or consumed it.
2. You can have VMI that is not consignment inventory, or consignment inventory that is not VMI, and you can have inventory that is both consignment and VMI.
3. VMI + Consignment – Vendor Owned Inventory where goods ownership belongs to supplier, until buyer sells the goods or draw the goods form warehouse.
4. VMI + Buy back – VMI where ownership of goods belongs to buyer, but supplier agrees to buy back stock, if the inventory is not moved for an agreed period of time (E.g. Walmart)
5. VMI + shared wastage cost – Shared risk between buyer and supplier where ownership belongs to buyer, but when goods become obsolete or spoilt after an agreed period of time, to share the burden of goods wastage cost

E217 Inventory Management Topic Flow



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Learning Objectives

- Describe the push, pull and push-pull strategies
- Describe the conventional fulfilment process
- Describe the Vendor Managed Inventory (VMI) fulfilment process
  - ✓ History of VMI
  - ✓ VMI Process Requirement
  - ✓ Benefits of Implementing VMI (for Customer)
  - ✓ Benefits of Implementing VMI (for Vendor)
  - ✓ Limitations & Challenges of VMI