**Week 1, Day 2: Supply Chain Types and Models**

**1. Supply Chain Types: Push vs. Pull**

**Push Supply Chain**

* **Definition:** Products are pushed through the supply chain based on forecasted demand.
* **How it works:**
  + The manufacturer creates products in anticipation of future demand and then pushes them through the system to wholesalers or retailers.

**Advantages:**

* Helps achieve economies of scale.
* Can take advantage of mass production.

**Disadvantages:**

* Risk of overproduction and excess inventory.
* Can lead to waste if demand doesn't meet expectations.

**Example:**  
Fast fashion brands like **Zara** use a push system, producing in bulk based on projected trends.

**Pull Supply Chain**

* **Definition:** Products are made based on actual customer demand.
* **How it works:**
  + Retailers or consumers "pull" the product from the supply chain.
  + Manufacturing occurs only when an order is placed.

**Advantages:**

* Reduces inventory and stockouts.
* More responsive to actual customer needs.

**Disadvantages:**

* Slower production times and longer lead times.
* Harder to predict demand spikes.

**Example:**  
**Dell** builds computers based on customer configurations, manufacturing only when an order is received.

**2. Make-to-Stock (MTS) vs. Make-to-Order (MTO)**

**Make-to-Stock (MTS)**

* **Definition:** Products are produced in advance and stocked in anticipation of customer demand.
* **How it works:**
  + Manufacturers produce and store goods based on forecasts.
  + When a customer orders, the product is ready for delivery.

**Advantages:**

* Quick order fulfilment.
* Lower production costs.

**Disadvantages:**

* Risk of overproduction and inventory build-up.
* May not meet specific customer needs.

**Example:**  
Consumer goods like **toothpaste, cereal, or canned food** are typically made to stock.

**Make-to-Order (MTO)**

* **Definition:** Products are manufactured only after an order is placed.
* **How it works:**
  + Customer orders are directly linked to production.
  + Products are made only when a customer places an order, reducing waste and stockouts.

**Advantages:**

* Reduces waste and excess inventory.
* Customization is possible.

**Disadvantages:**

* Longer lead time for customers.
* Higher production costs due to lower economies of scale.

**Example:**  
Custom-made furniture or personalized jewellery are often made to order.

**3. Lean vs. Agile Supply Chains**

**Lean Supply Chain**

* **Definition:** Aiming to reduce waste and optimize efficiency.
* **Key Principle:** Minimize inventory, reduce lead times, and eliminate non-value-adding activities.

**Advantages:**

* Reduced costs due to lower inventory.
* Faster production and less waste.

**Disadvantages:**

* Vulnerable to demand fluctuations (e.g., stockouts).
* Harder to respond quickly to sudden changes in demand.

**Example:**  
**Toyota’s production system** is a classic example of lean principles, reducing waste at every step.

**Agile Supply Chain**

* **Definition:** Focuses on flexibility and adaptability to meet fluctuating demand.
* **Key Principle:** Rapidly respond to market changes and customer needs.

**Advantages:**

* Highly responsive to customer demand.
* Can handle high levels of variability.

**Disadvantages:**

* Higher costs due to the need for flexibility.
* Potential inefficiency due to frequent changes.

**Example:**  
Fashion industry companies like **Zara** have an agile supply chain, quickly responding to changing customer preferences.

**Action Item:**

* Think about a product you’ve bought recently:
  + Which supply chain model (push/pull) do you think was used to get that product to you?
  + Would it make more sense to use Make-to-Stock or Make-to-Order for this product?

**4. Types of Supply Chain Models**

**1. Efficient Supply Chain Model**

* **Focus:** Low-cost production and fast delivery.
* **Best for:** Commodities, low-value products with predictable demand.

**Example:**  
**Walmart's supply chain** aims to deliver products at the lowest cost possible.

**2. Responsive Supply Chain Model**

* **Focus:** Adaptability to changing customer demand.
* **Best for:** Products with unpredictable demand or high customization (e.g., fashion or electronics).

**Example:**  
**Zara** responds quickly to changing fashion trends, adjusting production and distribution accordingly.

**3. Risk-Hedging Supply Chain Model**

* **Focus:** Managing risks and ensuring a stable supply despite potential disruptions.
* **Best for:** Products with supply risks (e.g., rare materials, volatile regions).

**Example:**  
**Apple** secures its supply chain for critical components by diversifying suppliers globally.

**4. Agile Supply Chain Model**

* **Focus:** High flexibility to meet rapidly changing customer demands.
* **Best for:** Innovative, high-value products or industries with high uncertainty.

**Example:**  
**Dell** uses a build-to-order model to provide customized computers.

**5. Role of Technology in SCM**

**Technology-Driven Supply Chains**

* **Automation:** Robotics in warehouses, automated sorting, and packaging.
* **AI & Machine Learning:** Helps in predictive analytics (e.g., demand forecasting) and route optimization.
* **IoT (Internet of Things):** Real-time tracking of goods and improved supply chain visibility.

**Example:**  
**Amazon's use of automated warehouses** and drones for delivery.

**6. Supply Chain Risk Management**

**Types of Supply Chain Risks**

* **Disruption Risks:** Natural disasters, pandemics, geopolitical events.
* **Operational Risks:** System failures, breakdowns in communication or logistics.
* **Financial Risks:** Currency fluctuations, price changes of raw materials.

**Risk Mitigation Strategies**

* Diversifying suppliers to avoid over-reliance on a single vendor.
* Building buffer stocks to manage sudden demand spikes or supply disruptions.
* Flexible contracts with suppliers that allow for changes in the delivery schedule.

**7. Inventory Management**

**Types of Inventory Management Systems**

* **Economic Order Quantity (EOQ):** Helps determine the optimal order size to minimize both ordering and holding costs.
* **ABC Analysis:** Classifies inventory into three categories based on value:
  + **A:** High-value, low-quantity items.
  + **B:** Moderate-value, moderate-quantity items.
  + **C:** Low-value, high-quantity items.

**Example of Successful SCM:**

**Amazon** has one of the most efficient and agile supply chains, with:

* Sophisticated warehouses.
* Quick inventory turnover.
* Ability to deliver products within hours using AI, robotics, and a vast distribution network.