HUM4167- Supply Chain Management

Unit-2

PRICING AND REVENUE MANAGEMENT IN A SUPPLY CHAIN

Prepared By:
Dr. Vineetha E Jathanna,
Visiting Faculty,
Department of Humanities & Management

Revenue Management

- Revenue management is the practice of applying data and analytics to predict demand and adjust pricing — and, in some cases, other terms of sale — to maximize revenue from the business's underlying inventory/supply.
- Revenue management is the use of pricing to increase the profit generated from a limited supply of supply chain assets.
- Supply assets exist in two forms: capacity and inventory.
- Revenue management may also be defined as the use of differential pricing based on customer segment, time of use, and product or capacity availability to increase supply chain profits.
- Most common example is probably in airline pricing

Concept	Definition	Calculation Formula	Purpose
Revenue	Total income generated from sales of goods or services before expenses.	Revenue = Price x Quantity Sold	Measure total income before expenses
Income	The money received or earned during a specific period, including salaries, investments, and other	Income may include various sources (e.g., salary, investments, sales).	A broad measure of earnings and financial gains.
Cost	Expenses incurred in producing or delivering goods or services.	Cost = Expenses to produce/deliver goods or services.	Measure expenses
Price	Amount charged to customers for goods or services.	Price = Amount charged for a product or service.	Amount charged to customers for goods or services.
Profit	Income remaining after subtracting expenses from revenue.	Profit = Revenue - Cost	Income after expenses

How does inventory management work?

Inventory is the goods or materials a business intends to sell to customers for profit. Inventory management, a critical element of the supply chain, is the tracking of inventory from manufacturers to warehouses and from these facilities to a point of sale.

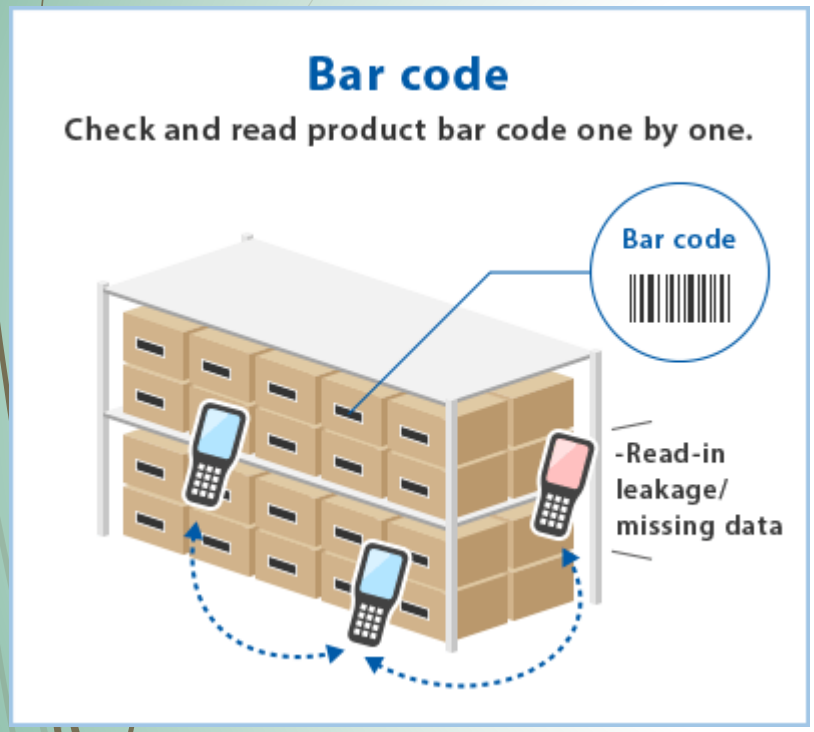
The goal of inventory management is to have the right products in the right place at the right time. This requires inventory visibility — knowing when to order, how much to order and where to store stock. The basic steps of inventory management include:

- Purchasing inventory: Ready-to-sell goods are purchased and delivered to the warehouse or directly to the point of sale.
- Storing inventory: Inventory is stored until needed. Goods or materials are transferred across your fulfillment network until ready for shipment.
- Profiting from inventory: The amount of product for sale is controlled. Finished goods are pulled to fulfill orders. Products are shipped to customers.

Term	Description	Key Characteristics
Godown	A storage facility typically used in Indian English to describe a warehouse or storage area.	- Provides storage for goods or materials. - May not have advanced inventory management systems.
Store	A general term for a place where items are kept, which can refer to various types of facilities.	- Can be a retail store or a storage facility. - May or may not be part of a formal supply chain network.
Inventory	Refers to the entire stock of items or goods a company holds, including what's in storage.	- Encompasses all goods, whether in storage or in transit. - Can include raw materials, work-in-progress, etc.
Warehouse	A facility designed for the systematic storage and management of goods.	- Often equipped with advanced inventory systems. - Used for long-term storage and order fulfillment.
Distribution Center	A specialized warehouse used for the rapid receipt and distribution of goods to customers.	- Focused on efficient order picking and shipping. - Serves as a hub in the supply chain for quick deliveries.

Types of Inventory Management

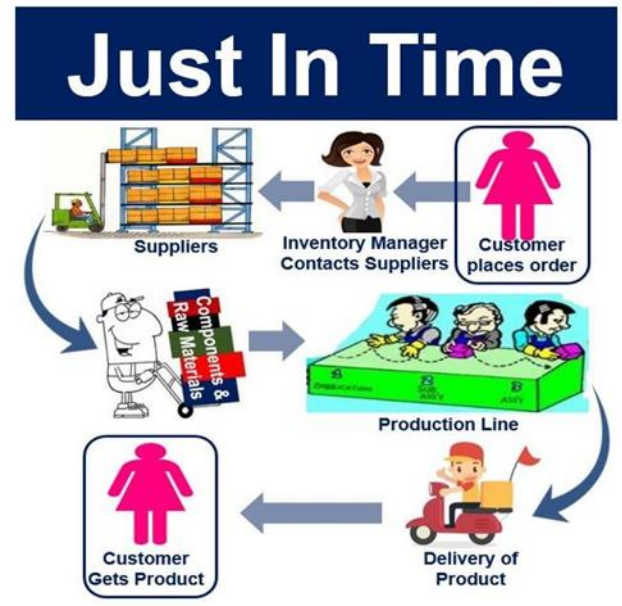
1. Barcode Tracking



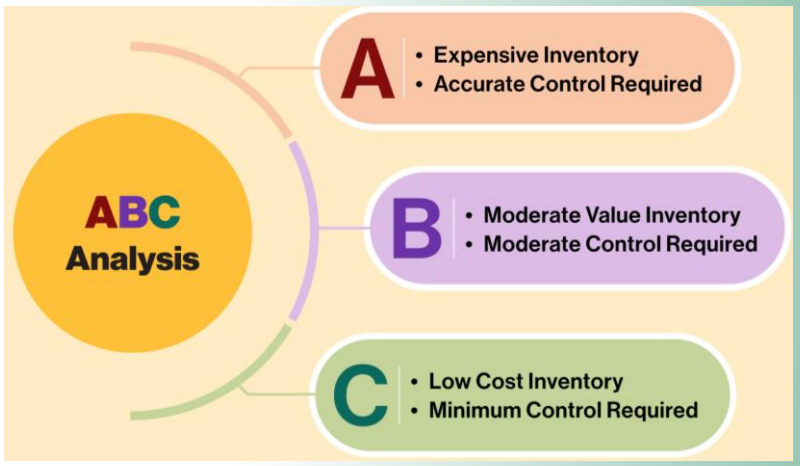
1.UPC
2.Code 128
3.QR Code
4.Data Matrix

2. Radio Frequency Identification (RFID)

3. Just-in-Time Inventory Management

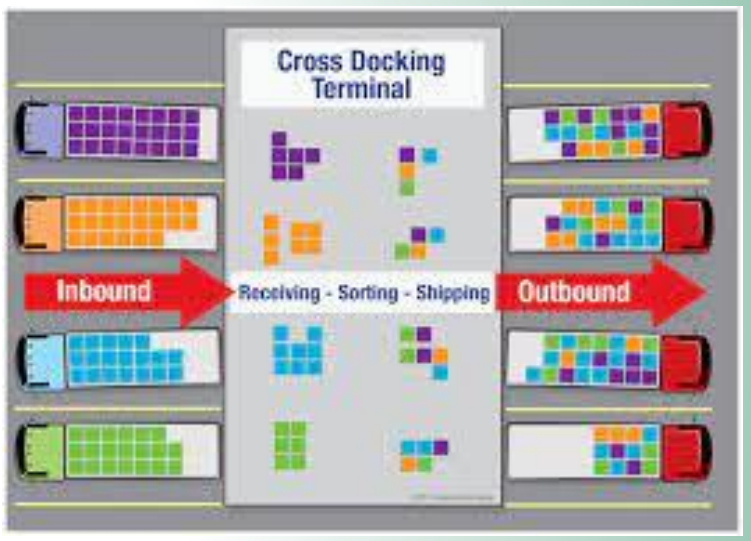


4. ABC Analysis



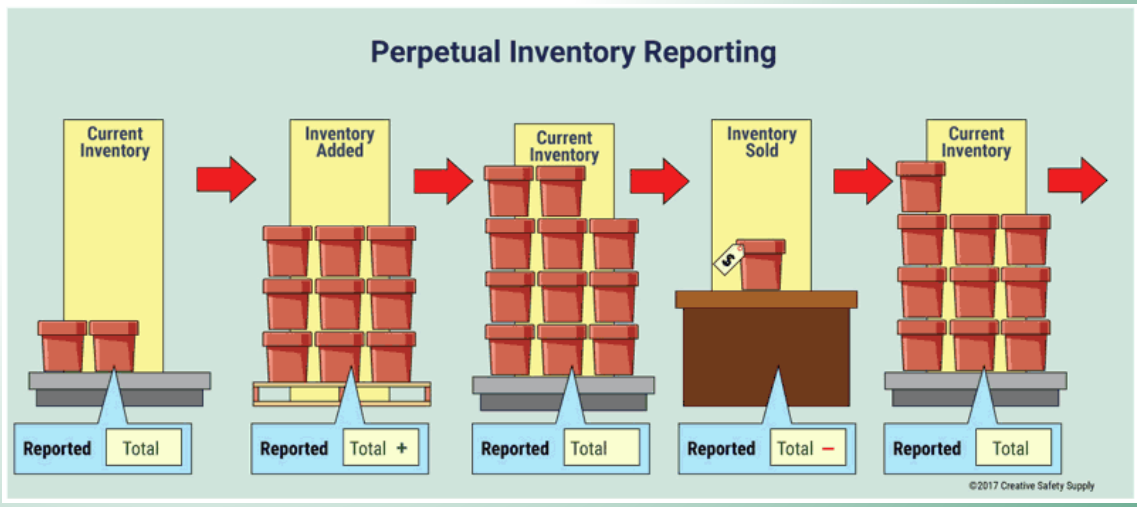
5. Drop-shipping

6. Cross-Docking

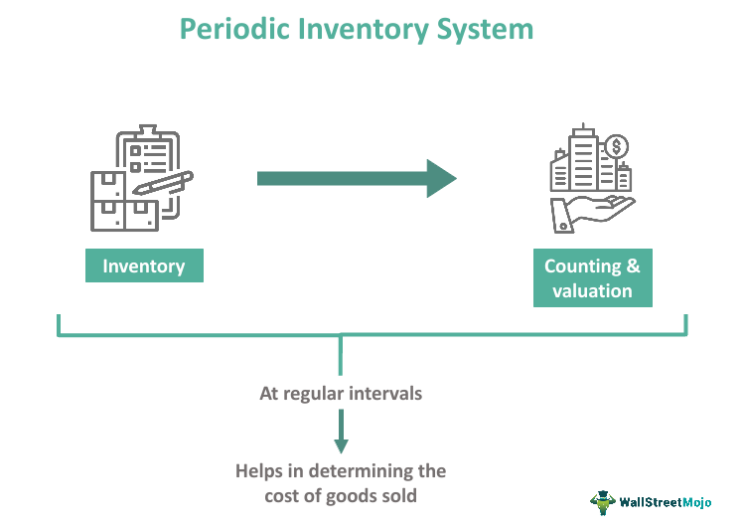


7. Bulk Shipment

8. Perpetual Inventory System



9. Periodic Inventory System



10. Material Requirements Planning System

How to Choose an Inventory Management System?

- Business Size and Industry
- Existing Inventory Management Software and Systems
- Costs
- Features and Functionality
- Ease-of-Use

Why is inventory management important?

1.Cost Control:

Effective inventory management helps control carrying costs associated with storage, insurance, and obsolescence. By optimizing inventory levels, businesses can reduce holding costs and improve profitability.

2.Working Capital Management:

Proper inventory management ensures that capital is not tied up in excess inventory. This capital can be used for other critical business needs, such as investment in growth, debt reduction, or funding operational expenses.

3.Customer Satisfaction:

Maintaining the right level of inventory ensures that products are readily available to meet customer demand. This leads to improved customer satisfaction as customers can get what they need when they need it.

4.Avoiding Stockouts:

Inventory management helps prevent stockouts, where products are out of stock, which can lead to lost sales, dissatisfied customers, and damage to the company's reputation.

5. Demand Forecasting:

Inventory management requires businesses to forecast demand accurately. This process improves the understanding of customer preferences and market trends, leading to better decision-making and product development.

6. Supplier Relationships:

Effective inventory management enables businesses to negotiate better terms with suppliers, such as lower prices or faster delivery times, as they can demonstrate reliability and consistent demand.

7. Seasonal Demand Management:

Many businesses experience seasonal fluctuations in demand. Inventory management allows companies to prepare for peak seasons by stocking up in advance and minimizing excess inventory during slow periods.

8. Reduction in Holding Costs:

Excessive inventory levels result in higher holding costs, including storage, insurance, and maintenance. Proper inventory management reduces these costs by keeping inventory at optimal levels.

9. Risk Mitigation:

Inventory management helps mitigate risks associated with market uncertainties, such as sudden demand changes, supply disruptions, or economic downturns. By having the right inventory levels, businesses are better prepared to navigate these challenges

.

10. Efficient Production:

For manufacturing businesses, inventory management ensures that raw materials and components are available when needed, preventing production delays and minimizing production costs.

11. Financial Reporting:

Accurate inventory management is essential for financial reporting, as inventory is a significant asset on a company's balance sheet. Proper valuation and tracking of inventory are crucial for compliance with accounting standards.

12. Space Optimization:

Efficient inventory management optimizes warehouse space utilization. This allows for better organization, reduced storage costs, and the ability to expand without additional infrastructure investments

13. Sustainability:

Reducing excess inventory helps reduce waste and environmental impact. Sustainable inventory practices can align with corporate social responsibility goals.

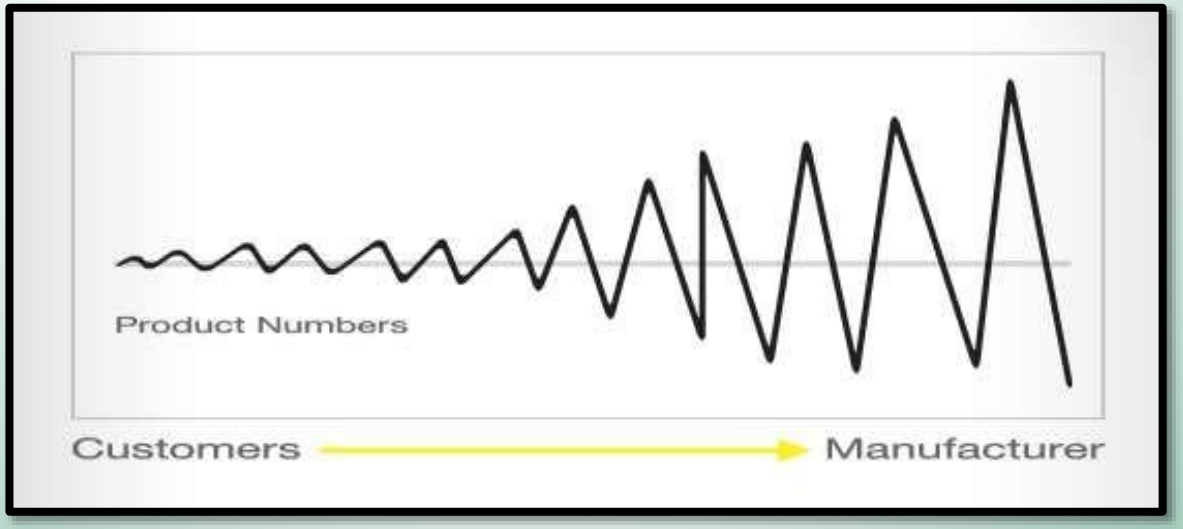
14. Competitive Advantage:

Effective inventory management can give businesses a competitive edge by allowing them to respond quickly to market changes, offer better customer service, and adapt to industry trends.

THE BULL WHIP EFFECT IN SUPPLY CHAINS

What is Bullwhip !!

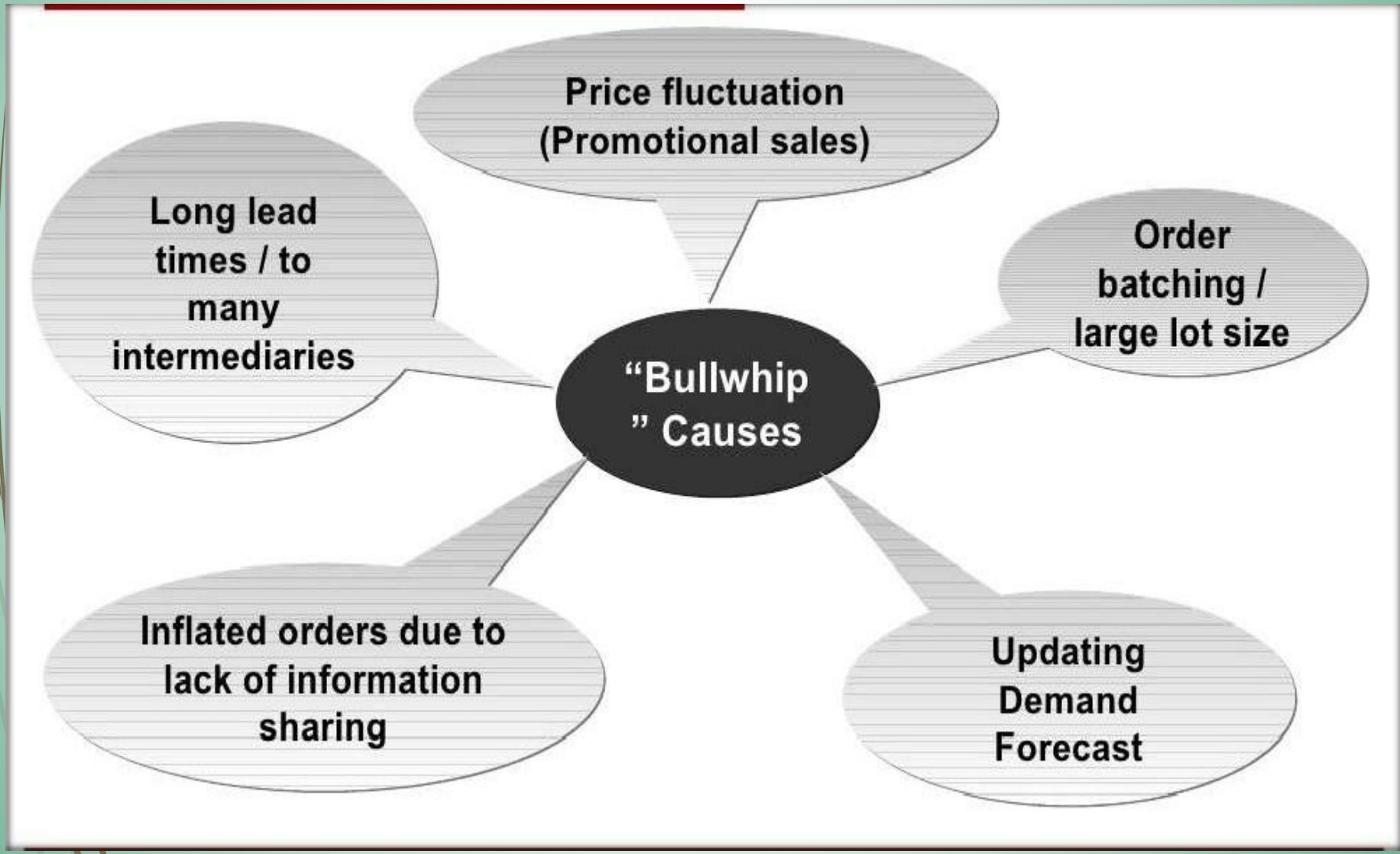
Bullwhip effect is a phenomenon in forecast driven distribution channels detected by supply chain.

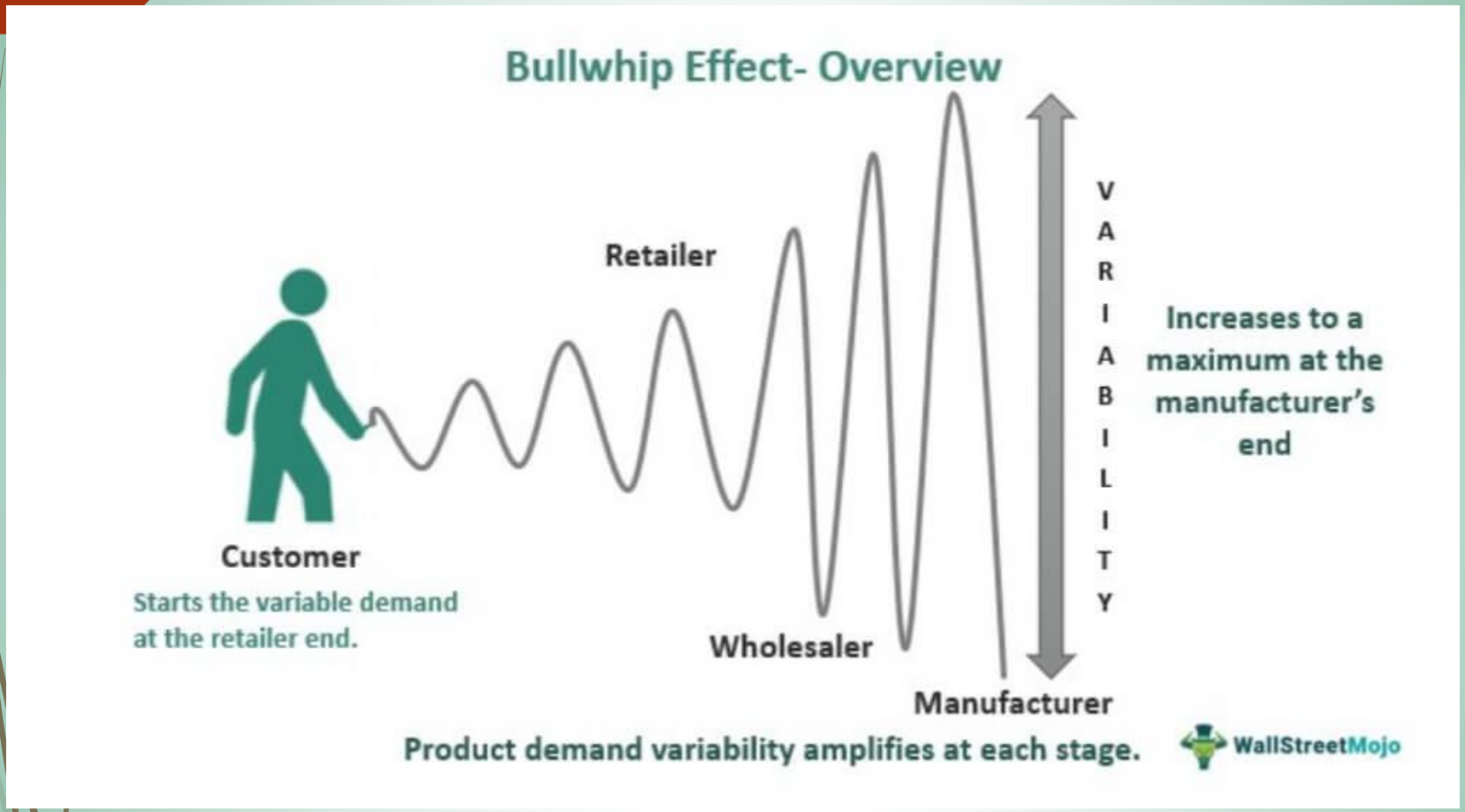


Effects Of Bullwhip

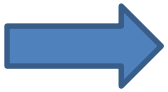
- In a supply chain plagued with Bullwhip effect, the distortion in information is escalated as it moves up in the chain.
- This variance can interrupt the smoothness of the supply chain process as each link in the supply chain will over or underestimate the product demand i.e. exaggerated fluctuations.

CAUSES OF BULLWHIP EFFECT




Bullwhip Effect- Overview
Retailer
VARIABILITY
Increases to a maximum at the manufacturer's end
Customer
Starts the variable demand at the retailer end.
Wholesaler
Manufacturer
Product demand variability amplifies at each stage.
WallStreetMojo

DEMAND FORECASTING

- Based on the order history
- Amount of safety stock contributes bullwhip effect
- Lead time longer  fluctuation more significant

ORDER BATCHING

Two types:-

- Periodic Ordering:-

❖ Inventory systems based on order cycles

❖ Reduces order, billing and shipment cost

❖ amplifies variability and contributes bullwhip

- Push:–

➢ Company experiences regular surges in demand

➢ All customers orders should be spread out evenly throughout a week or month

PRICE FLUCTUATION

Price fluctuations are upward or downward swings in the prices of products in an economy.

- Forward buy – items were bought in advance of requirements.
- Forward buying has a negative effect
- Forward buy is a good idea–If cost of holding inventory is less than the price differential.

LONG LEAD TIMES

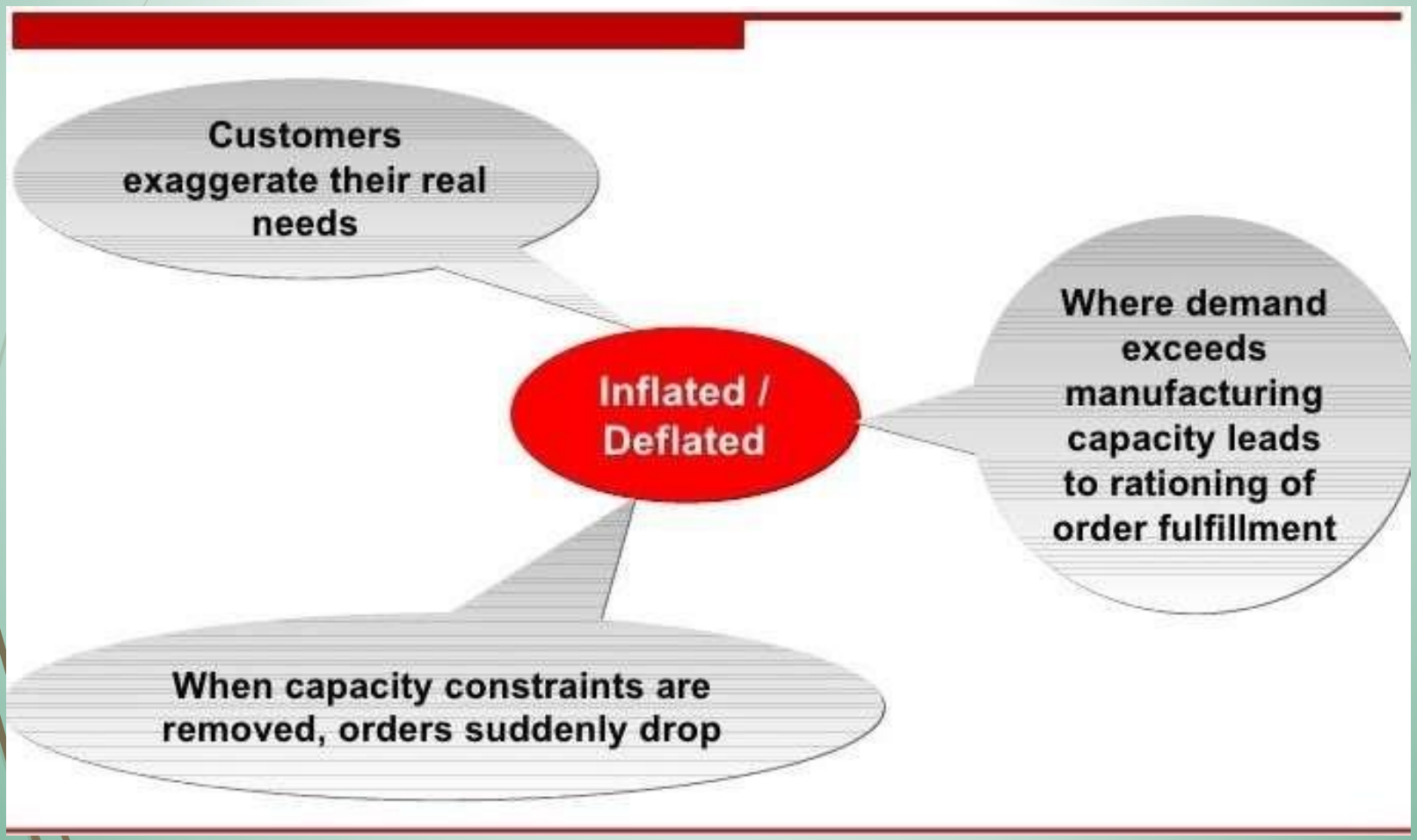
- A **lead time is** the latency between the initiation and execution of a process.

Total lead time= internal lead time + external lead time

- Internal lead time is the time required for the buying organisation's internal processes to progress from identification of a need to the issue of a purchase order.

- External lead time is the time required for the supplying organisation's processes, including any development required, manufacture, despatch and delivery.

Inflated/ deflated orders due to Lack of information sharing

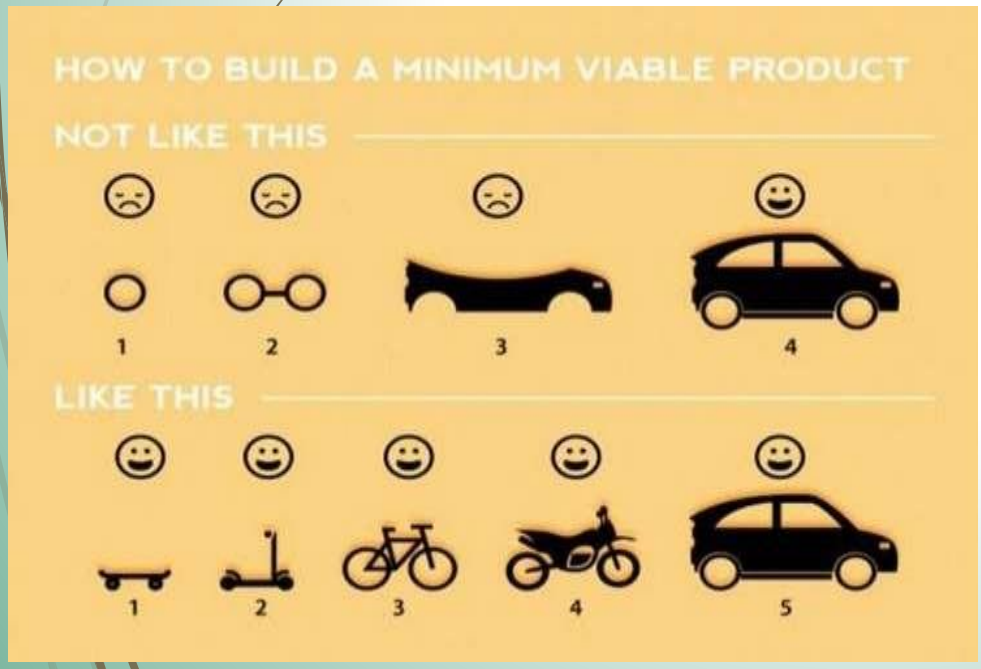


Some symptoms of Bullwhip are:

- Excessive inventory
- Poor product quality
- Insufficient capacities
- Long backlogs
- Uncertain Product planning

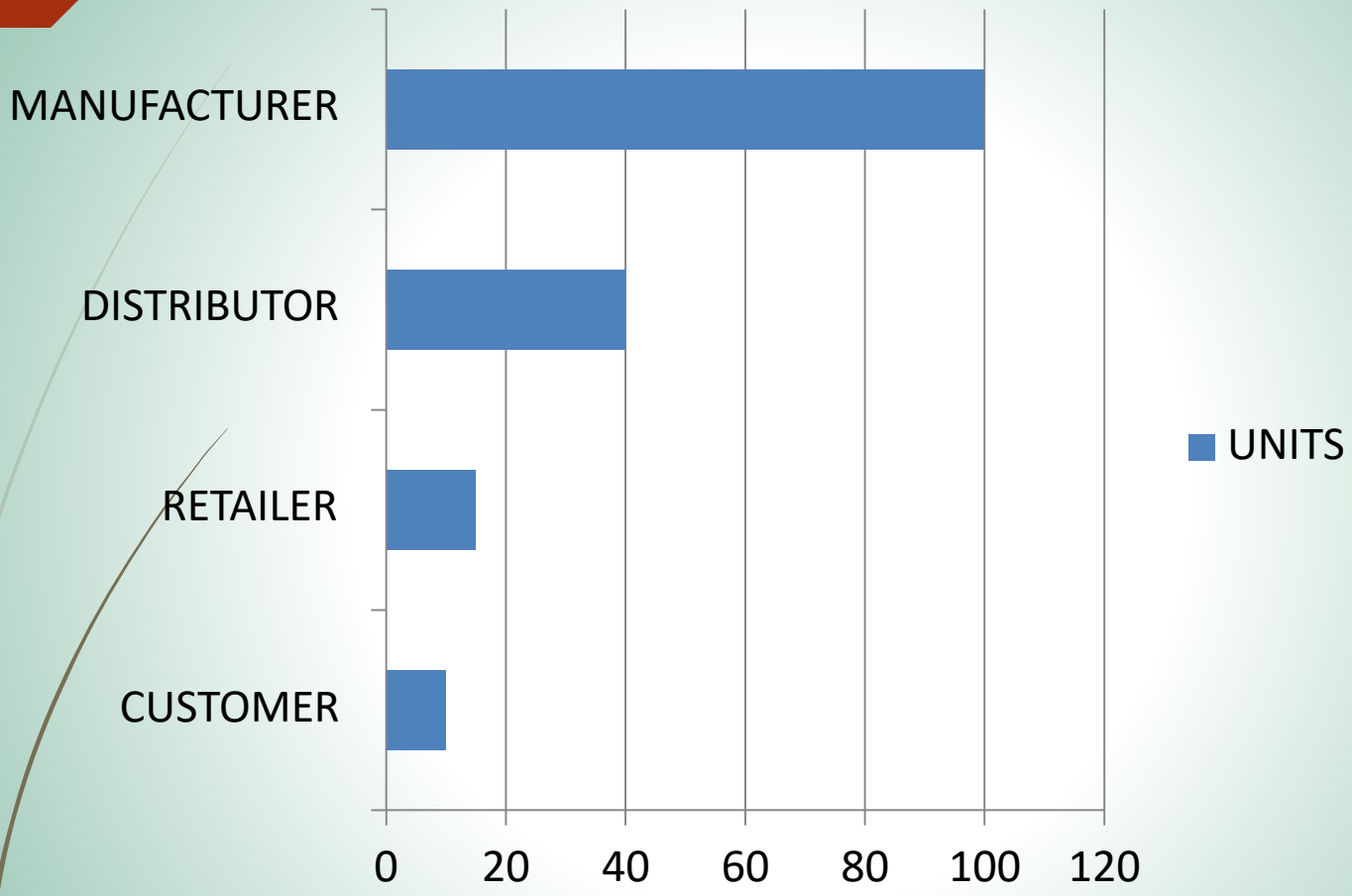
Excessive inventory

LONG BACKLOGS



UNCERTAIN PRODUCT PLANNING

BULLWHIP EFFECT EXAMPLE



BULLWHIP EFFECT EXAMPLE

In the above example, the actual demand for customer is 10 units, the retailer then orders 15 units from the distributor , an extra 5 units in order to ensure they don't run out of stock.

Then the supplier orders 40 units from manufacturer so that to buy in bulk to ensure enough stock to provide timely shipment of goods to retailer

The manufacturer then receives the order and it orders from their supplier in bulk i.e. 100 units to ensure economy of sale in production to meet demand.

Now 100 units have produced to meet demand of 10 units which means the retailer has to increase demand by dropping prices or finding more customers that causes bullwhip effect.

How to counteract Bullwhip effect

- ✓ Avoid multiple demand forecast updates
- ✓ Break order batches
- ✓ Stabilize prices.
- ✓ Information sharing between firms along the supply chain to be accurate and timely.
- ✓ Small order increments.
- ✓ Focus demand and removal of sale incentives.

How effective costing impacts supply chain efficiency?

1. Cost Visibility and Analysis:

•Effective costing provides clear visibility into the costs associated with different stages of the supply chain, from procurement to distribution.

•This visibility enables businesses to identify cost drivers, inefficiencies, and areas for improvement.

2. Decision Making:

•Accurate cost data empowers supply chain managers to make informed decisions about sourcing, production, transportation, and inventory management.

•It helps in selecting the most cost-effective options and avoiding decisions that could lead to unnecessary expenses.

3. Performance Measurement:

•Proper costing allows for benchmarking and comparing the costs and performance of different suppliers, transportation routes, and distribution channels.

•Metrics such as cost per unit, cost per mile, and total landed cost enable effective performance measurement and analysis.

4. Process Optimization:

•Costing analysis highlights processes that are costly or inefficient. This insight drives the optimization of these processes to reduce expenses and improve productivity.

•For instance, eliminating bottlenecks, reducing lead times, and optimizing order quantities can lead to cost savings.

5. Inventory Management:

•Effective costing aids in optimizing inventory levels. Overstocking ties up capital, while understocking can lead to missed sales opportunities.

•By considering holding costs, ordering costs, and stockout costs, businesses can find the right balance between inventory levels and costs.

6. Supplier Relationships:

•Understanding the total cost of ownership (TCO) helps in evaluating supplier relationships beyond just the purchase price.

•Businesses can select suppliers based on factors like quality, lead times, and reliability, which contribute to overall cost savings.

7. Risk Management:

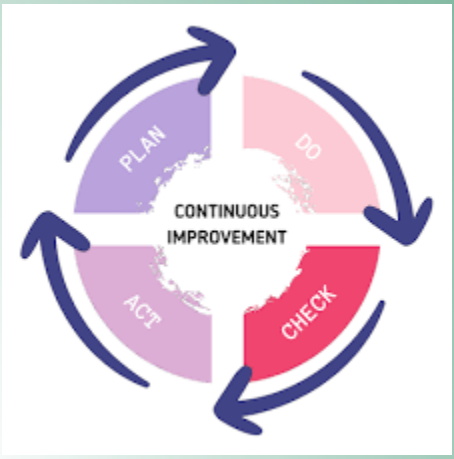
•Proper costing includes evaluating risks associated with supply chain disruptions and their potential financial impact.

•By factoring in risk mitigation strategies in costing decisions, businesses can enhance supply chain resilience.

8. Continuous Improvement:

•Regular costing analysis encourages a culture of continuous improvement within the supply chain.

•As new cost-saving opportunities arise, the supply chain can adapt to changing market conditions and customer demands.



9. Adaptation to Market Changes:

•Effective costing allows supply chains to respond quickly to market fluctuations and changes in demand.

•Businesses can adjust their strategies to minimize costs and maximize profitability based on current market conditions.

Key Cost Components

Identification of major cost elements in supply chain management:

- Procurement Costs
- Transportation Costs
- Inventory Holding Costs
- Manufacturing Costs
- Distribution Costs

1. Procurement Costs :

Procurement costs refer to the expenses associated with acquiring goods and services from external suppliers to support a company's operations, production, and customer demand.

- **Purchase Price:**
  - ✓ The direct cost of acquiring products or materials from suppliers.
  - ✓ Negotiating favorable purchase prices can lead to significant cost savings.
- **Supplier Relationship Costs:**
  - ✓ Costs related to managing relationships with suppliers, including communication, collaboration, and maintaining a strong partnership.
  - ✓ Strong supplier relationships can lead to better terms, discounts, and improved collaboration.
- **Sourcing and Supplier Selection Costs:**
  - ✓ Costs associated with the process of identifying, evaluating, and selecting suppliers.
  - ✓ Includes activities such as supplier research, due diligence, and conducting supplier audits.

- **Transaction Costs:**
  - ✓ Expenses tied to processing orders, invoices, and payments.
  - ✓ Efficient order processing systems can help reduce transaction costs.

- **Quality Control Costs:**
  - ✓ Costs incurred to ensure that the procured goods meet the required quality standards.
  - ✓ Includes inspections, testing, and monitoring of supplier quality performance.

- **Logistics and Transportation Costs:**
  - ✓ Expenses related to transporting goods from suppliers to the company's facilities.
  - ✓ Factors such as shipping, freight, and customs duties contribute to these costs.

- **Inventory Holding Costs:**
  - ✓ Expenses associated with storing and managing inventory until it is needed in the production process or for customer orders.
  - ✓ Includes storage, handling, insurance, and depreciation costs.

- **Lead Time Costs:**
  - ✓ Costs arising from longer lead times, including holding extra inventory to account for longer delivery times.
  - ✓ Reducing lead times can lead to inventory cost reductions.

- **Risk Mitigation Costs:**
  - ✓ Costs incurred to manage and mitigate supply chain risks, such as the costs of establishing backup suppliers or implementing contingency plans.

Strategies for Managing Procurement Costs:

- **Strategic Sourcing:** Identifying and selecting suppliers based on factors beyond just purchase price, such as quality, reliability, and long-term benefits.
- **Negotiation:** Skillful negotiation can lead to favorable terms, volume discounts, and reduced purchase prices.
- **Supplier Collaboration:** Close collaboration with suppliers can lead to process improvements and cost-saving opportunities.
- **Technology Adoption:** Implementing procurement software and tools can streamline processes and reduce transaction costs.
- **Supply Chain Transparency:** Transparency in the supply chain can help identify inefficiencies and areas for cost reduction.
- **Total Cost of Ownership (TCO) Analysis:** Considering all costs associated with a procurement decision, including hidden costs, helps in making informed choices.

2. Transportation costs:

It refer to the expenses associated with moving goods and products from one location to another within the supply chain. It is a critical component of supply chain management that directly impacts overall logistics efficiency and cost structure.

Key Components of Transportation Costs:

- **Freight Charges:**
  - ✓ The direct cost charged by carriers (trucking companies, airlines, shipping lines, etc.) for transporting goods from one point to another.
  - ✓ Rates are influenced by factors like distance, weight, mode of transportation, and shipping volume.
- **Fuel Costs:**
  - ✓ The cost of fuel required to power transportation vehicles, such as trucks, ships, airplanes, and trains.
  - ✓ Fuel prices can significantly impact transportation costs and are subject to market fluctuations.

- **Maintenance and Repairs:**
  - ✓ Expenses related to maintaining and repairing transportation vehicles, including routine maintenance, repairs, and vehicle upgrades.

- **Labor Costs:**
  - ✓ Expenses associated with the wages, salaries, benefits, and training of transportation personnel, such as drivers, pilots, and crew members.

- **Insurance Costs:**
  - ✓ Premiums paid for insurance coverage on transported goods and transportation vehicles to mitigate the risks of loss or damage.

- **Packaging and Handling Costs:**
  - ✓ Costs associated with packaging, labeling, and handling goods to ensure safe and secure transportation.

- **Customs Duties and Taxes:**
  - ✓ Expenses related to import and export duties, tariffs, and taxes imposed by governments when goods cross international borders.

- **Storage Costs:**
  - ✓ Costs incurred when goods are held at transit points, such as warehouses or distribution centers, before reaching their final destination.

- **Route Planning and Optimization:**
  - ✓ Costs associated with planning efficient transportation routes to minimize distance traveled and fuel consumption.

Strategies for Managing Transportation Costs:

- **Mode Selection:** Choose the most suitable mode of transportation (road, air, rail, sea) based on factors such as distance, urgency, and cost-effectiveness.
- **Consolidation:** Combine smaller shipments into larger ones to benefit from economies of scale and reduced per-unit transportation costs.
- **Route Optimization:** Utilize technology and software to plan optimal routes, reducing mileage and fuel consumption.
- **Carrier Negotiations:** Negotiate favorable terms with transportation carriers to secure competitive rates and service levels.
- **Intermodal Transportation:** Combine multiple modes of transportation (e.g., truck and rail) for cost-effective and efficient long-distance shipments.
- **Supply Chain Visibility:** Real-time tracking and visibility tools help monitor shipments, identify bottlenecks, and respond to unexpected delays.
- **Lean Inventory:** Efficient transportation allows for reduced safety stock levels, resulting in lower carrying costs.

3. Inventory Holding Costs :

Inventory holding costs, also known as carrying costs, are the expenses associated with storing and maintaining inventory in a supply chain. These costs are incurred from the moment goods are produced or received until they are sold or used in the production process.

Key Components of Inventory Holding Costs:

- **Storage Costs:**
  - ✓ Expenses related to renting or owning warehouse space, including rent, utilities, property taxes, and facility maintenance.
- **Handling Costs:**
  - ✓ Costs associated with loading, unloading, and moving inventory within the warehouse.
  - ✓ Includes labor, equipment, and material costs.
- **Insurance Costs:** protects against damages/calamities.
  - ✓ Premiums paid for insurance coverage to potential loss, theft, damage, or deterioration of inventory.

- **Obsolescence and Spoilage Costs:**
  - ✓ Expenses resulting from inventory becoming obsolete or unusable due to changes in demand, product updates, or deterioration.
- **Opportunity Costs:**
  - ✓ The potential revenue or return on investment that could have been earned if the funds tied up in inventory were invested elsewhere.
- **Capital Costs:**
  - ✓ The cost of financing inventory, including interest payments on loans used to acquire or maintain inventory.
- **Depreciation Costs:**
  - ✓ Reduction in the value of inventory due to factors like wear and tear, changes in technology, or market trends.
- **Taxes:**
  - ✓ Taxes levied on inventory, such as property taxes on stored goods or inventory valuation taxes.

Strategies for Managing Inventory Holding Costs:

- **Demand Forecasting:** Accurate forecasting helps prevent overstocking or understocking, optimizing inventory levels.
- **Safety Stock Optimization:** Establish safety stock levels that balance the risk of stockouts with the costs of holding extra inventory.
- **Just-In-Time (JIT) Inventory:** Implement JIT principles to minimize inventory levels by receiving goods just in time for production or customer orders.
- **ABC Analysis:** Prioritize inventory items based on their value and usage, focusing on high-value items and optimizing their management.
- **Supplier Collaboration:** Work closely with suppliers to ensure timely deliveries, reducing the need for excessive safety stock.
- **Regular Audits:** Conduct routine audits to identify slow-moving or obsolete inventory and take necessary actions.
- **Technology Utilization:** Implement inventory management software and systems for real-time tracking, accurate demand forecasting, and efficient order processing.
- **Economic Order Quantity (EOQ):** Use EOQ principles to determine optimal order quantities that minimize both ordering and holding costs.

4. Manufacturing Costs :

Manufacturing costs, also known as production costs, are the expenses incurred during the process of transforming raw materials or components into finished goods within the supply chain. These costs encompass various aspects of production and are crucial for determining the overall cost structure of a product.

Key Components of Manufacturing Costs:

- **Direct Materials Costs:**
  - ✓ The cost of raw materials and components that are directly used in the production process.
  - ✓ These costs can vary based on material prices and the quantity of materials used.
- **Direct Labor Costs:**
  - ✓ The wages, salaries, and benefits paid to workers directly involved in the production process.
  - ✓ Labor costs can vary depending on labor efficiency, skill levels, and wage rates.

- **Factory Overhead Costs:**
  - ✓ Indirect costs associated with manufacturing that cannot be directly attributed to specific products or processes.
  - ✓ Includes expenses like facility maintenance, utilities, equipment depreciation, and indirect labor.

- **Energy and Utilities Costs:**
  - ✓ Expenses related to energy consumption, such as electricity, water, and fuel, used in the manufacturing process.

- **Equipment Maintenance and Repairs:**
  - ✓ Costs associated with maintaining and repairing manufacturing equipment to ensure smooth production operations.

- **Quality Control Costs:**
  - ✓ Expenses incurred for testing, inspection, and quality assurance to ensure that products meet required quality standards.

- **Research and Development Costs:**
  - ✓ Costs associated with developing and refining new products, processes, or technologies.

- **Environmental Compliance Costs:**
  - ✓ Expenses incurred to comply with environmental regulations and standards during the manufacturing process.

- **Waste and Scrap Costs:**
  - ✓ Costs associated with waste disposal, recycling, and managing production scrap or defective products.

Strategies for Managing Manufacturing Costs:

- **Lean Manufacturing:** Implement lean principles to eliminate waste, reduce inefficiencies, and optimize production processes.
- **Process Improvement:** Continuously analyze and improve manufacturing processes to enhance efficiency and reduce costs.
- **Automation and Technology:** Invest in automation and advanced technologies to improve productivity and reduce labor costs.
- **Supplier Collaboration:** Collaborate closely with suppliers to optimize the supply of raw materials and components.
- **Efficient Equipment Use:** Maintain equipment properly to prevent breakdowns and ensure optimal performance.
- **Value Engineering:** Reevaluate product design and materials to find cost-effective alternatives without compromising quality.
- **Energy Efficiency:** Implement energy-efficient practices to reduce energy consumption and associated costs.
- **Standardization:** Standardize processes and materials where feasible to simplify production and reduce variation.

Distribution Costs:

Distribution costs, also referred to as logistics costs, encompass the expenses incurred during the movement of finished products from manufacturing facilities to end customers or retail locations within the supply chain. These costs are critical for ensuring timely and efficient delivery of products to their intended destinations.

Key Components of Distribution Costs:

- **Transportation Costs:**
  - ✓ Expenses related to transporting finished goods from manufacturing facilities to distribution centers, retailers, or directly to customers.
  - ✓ Includes freight charges, fuel costs, transportation equipment, and carrier fees.
- **Warehousing Costs:**
  - ✓ Expenses associated with storing and managing inventory in distribution centers or warehouses.
  - ✓ Covers rent, utilities, labor, equipment, and maintenance.

- **Inventory Carrying Costs:**
  - ✓ Costs related to holding inventory in distribution centers, including storage, handling, insurance, and depreciation.
- **Order Fulfillment Costs:**
  - ✓ Expenses incurred during the process of picking, packing, and shipping products to customers. Includes labor, packaging materials, order processing systems, and order accuracy checks.
- **Technology and Software Costs:**
  - ✓ Expenses related to implementing and maintaining software systems for inventory management, order processing, and tracking.
- **Returns and Reverse Logistics Costs:**
  - ✓ Expenses associated with handling product returns, restocking, and managing reverse logistics processes.
- **Packaging Costs:**
  - ✓ Expenses related to designing, producing, and using packaging materials for protecting products during transit.

Strategies for Managing Distribution Costs:

- **Network Optimization:** Design an efficient distribution network that minimizes transportation distances and costs.
- **Route Planning:** Utilize technology to plan optimal transportation routes, reducing mileage and fuel consumption.
- **Collaborative Planning:** Collaborate with suppliers, carriers, and retailers to optimize transportation schedules and routes.
- **Warehouse Efficiency:** Implement best practices in warehouse operations to minimize handling costs and improve order fulfillment.
- **Cross-Docking:** Implement cross-docking strategies to streamline the movement of products from inbound to outbound trucks without storage.
- **Last-Mile Delivery Optimization:** Optimize last-mile delivery through strategies like route optimization, local hubs, and alternative delivery options.
- **Automation and Technology:** Implement automation in warehousing and transportation processes to improve efficiency and reduce labor costs.
- **Reverse Logistics Management:** Develop effective processes for handling returns and managing reverse logistics to minimize costs.

Costing Methods

Explanation of various costing methods in supply chain management:

- Activity-Based Costing (ABC)
- Total Cost of Ownership (TCO)
- Just-In-Time (JIT) Costing
- Cost-Volume-Profit (CVP) Analysis

Cost Drivers

- Demand Variability
- Lead Times
- Order Quantity
- Supplier Performance
- Production Efficiency

Cost Reduction Strategies:

- Supplier Consolidation
- Inventory Optimization
- Transportation Optimization
- Process Efficiency Improvement

BREAK EVEN ANALYSIS

- A **breakeven analysis** is used to determine how much sales volume your business needs to start making a profit.
- The breakeven analysis is especially useful when you're developing a pricing strategy, either as part of a marketing plan or a business plan.
- In economics & business, specifically cost accounting, the **break-even point** (BEP) is the point at which cost or expenses and revenue are equal: there is no net loss or gain, and one has "broken even".
- Total cost = Total revenue = B.E.P.

In order to calculate how profitable a product will be, we must firstly look at the Costs Price and Revenue involved.

- There are two basic types of costs a company incurs.
  - Variable Costs
  - Fixed Costs

- Variable costs are costs that change with changes in production levels or sales. Examples include: Costs of materials used in the production of the goods.

- Fixed costs remain roughly the same regardless of sales/output levels. Examples include: Rent, Insurance and Wages

- **Unit Price:**

  The amount of money charged to the customer for each unit of a product or service.

- **Total Cost:**

  The sum of the fixed cost and total variable cost for any given level of production.
  (Fixed Cost + Total Variable Cost)

- **Total Variable Cost:**

  The product of expected unit sales and variable unit cost.
  (Expected Unit Sales * Variable Unit Cost)

- **Total Revenue:**
  The product of expected unit sales and unit price.
  (Expected Unit Sales * Unit Price)

- **Profit/ loss**
  The monetary gain or loss resulting from revenues after subtracting all associated costs. ***(Total Revenue - Total Costs)***

ASSUMPTIONS

- All elements of cost i.e. production, administration and selling distribution can be divided into fixed and variable components.
- Variable costs remain constant per unit of output.
- Fixed cost remain constant at all volume of output.
- Selling price per unit remains unchanged or constant at all levels of output.
- Volume of production is the only factor that influences cost.
- There will be no change in the general price level.
- There is one product and in case of multi product, the sales remain constant.

COMPUTATION

- The break-even point (in terms of Unit Sales (X)) can be directly computed in terms of Total Revenue (TR) and Total Costs (TC) as:

$$TR = TC$$
$$P \times X = TFC + V \times X$$
$$P \times X - V \times X = TFC$$
$$(P - V) \times X = TFC$$
$$X = \frac{TFC}{P - V}$$

where:
TFC is Total Fixed Costs,
P is Unit Sale Price, and
V is Unit Variable Cost

The quantity (P – V) is of interest in its own right, and is called the Unit Contribution Margin (C): it is the marginal profit per unit, or alternatively the portion of each sale that contributes to Fixed Costs

EXAMPLES

- For example, suppose that your fixed costs for producing 100,000 product were 30,000 Rs a year.
- Your variable costs are 2.20 R.s materials, 4.00 R.s labor, and 0.80 Rs overhead, for a total of 7.00 R.s per unit.
- If you choose a selling price of 12.00 Rs for each product, then:
- BEP= TFC/P-V
- 30,000(TFC) divided by [12.00(P) - 7.00(V)] equals 6000 units.
- This is the number of products that have to be sold at a selling price of 12.00 Rs before your business will start to make a profit.

EXAMPLE

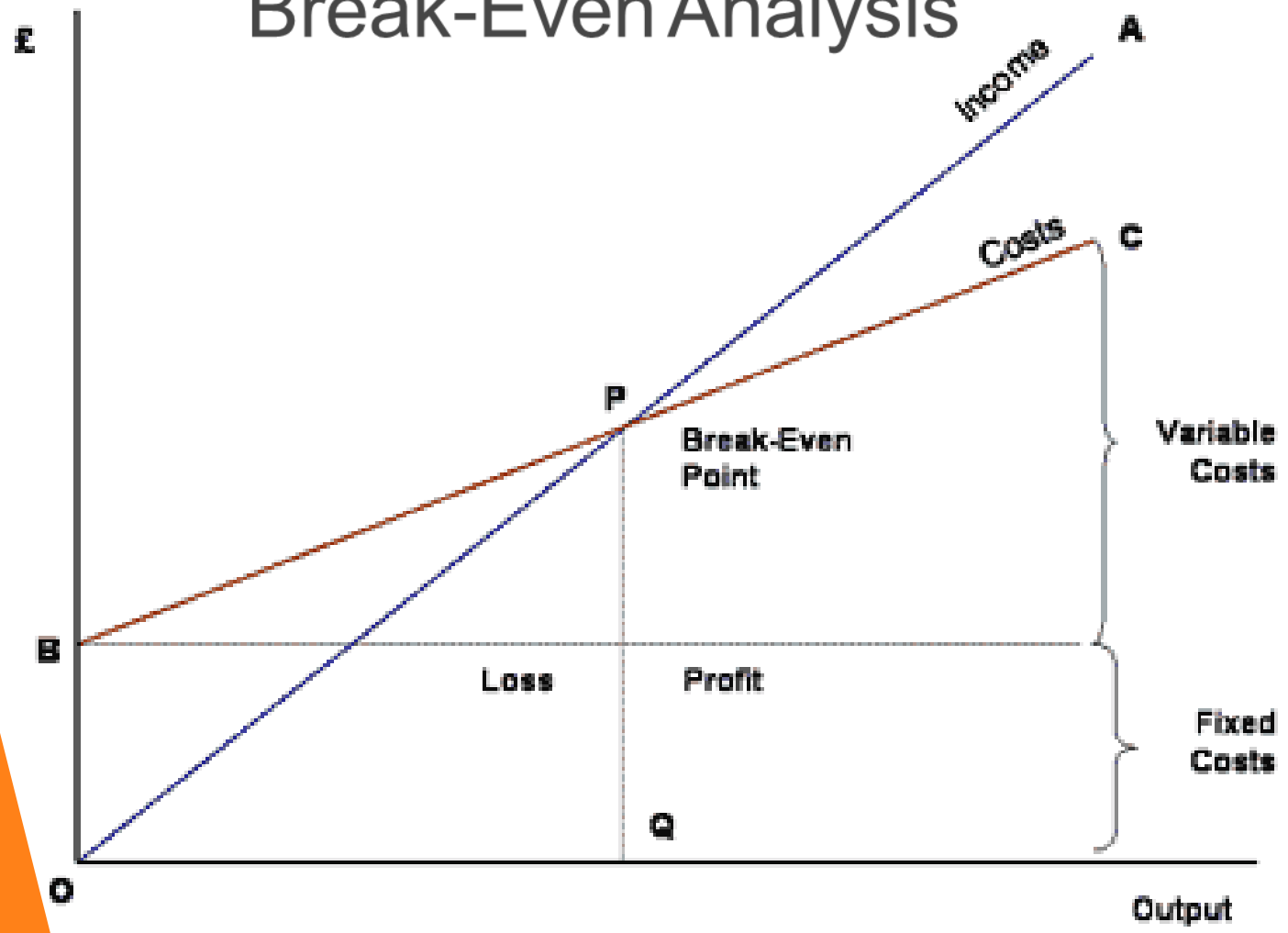
- For example, if it costs R.s. 50 to produce a pen, and there are fixed costs of R.s.1,000, the break-even point for selling the widgets would be:

  If selling for R.s. 100: 20 Widgets
  (Calculated as 1000/(100-50)=20)

  If selling for $200: 20 Widgets
  (Calculated as 1000/(200-50)=6.7)

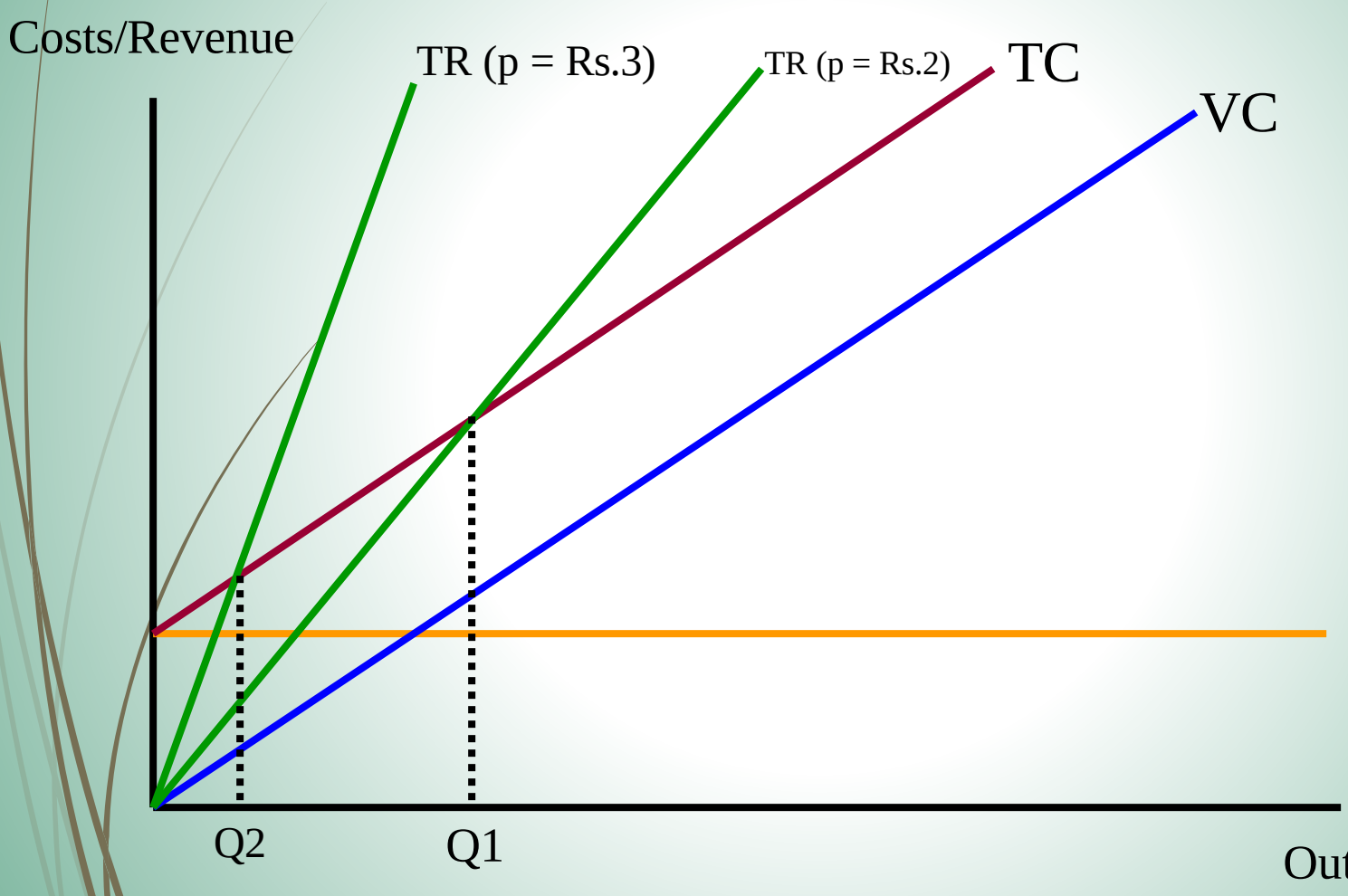
  From this we can make out that the company should sell products at higher price to reach BEP faster.

Break-Even Analysis



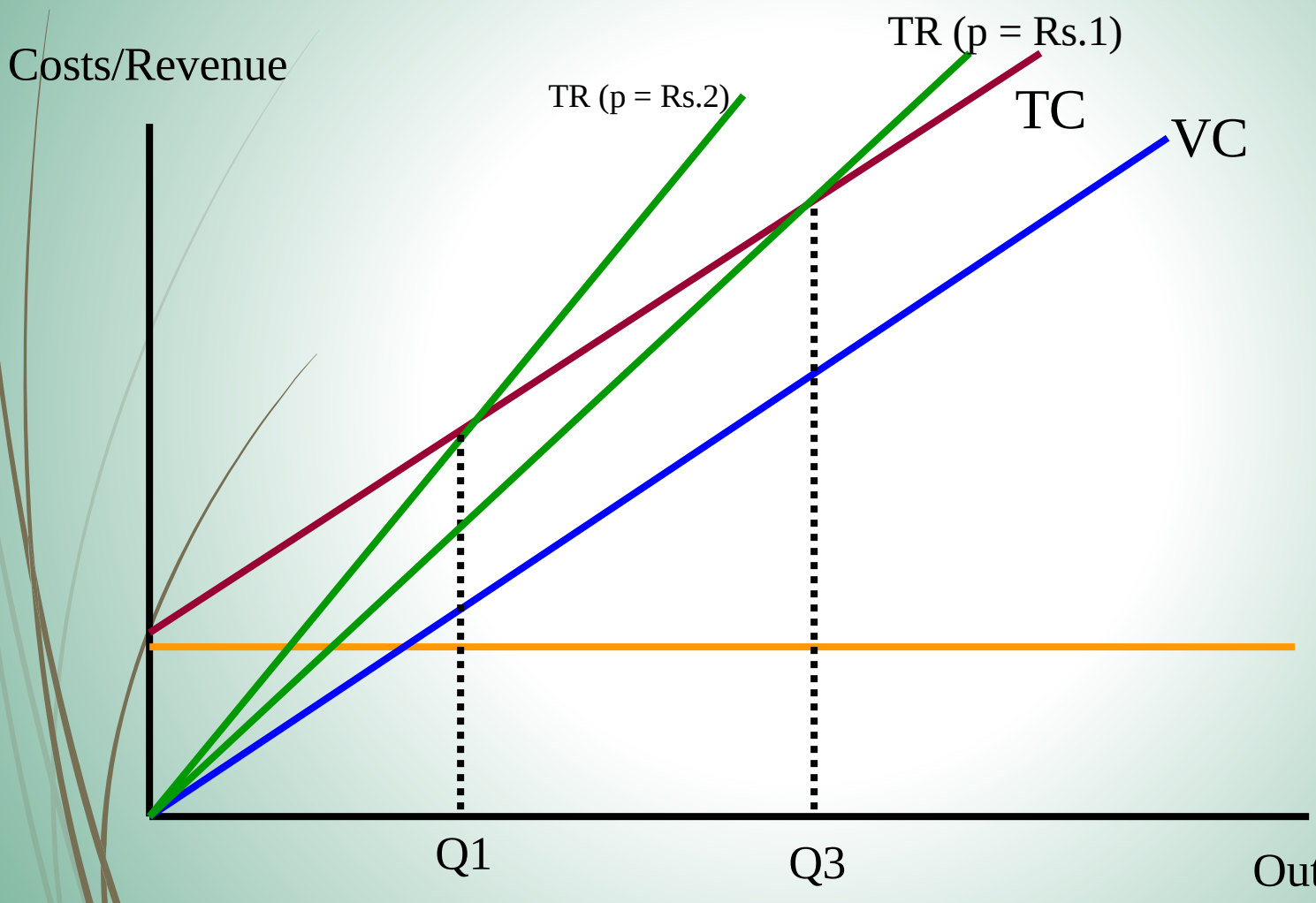
The Break-even point occurs where total revenue equals total costs – the firm, in this example would have to sell Q to generate sufficient revenue to cover its costs.

Break-Even Analysis



If the firm chose to set price higher than Rs.2 (say Rs.3) the TR curve would be steeper – they would not have to sell as many units to break even

Break-Even Analysis

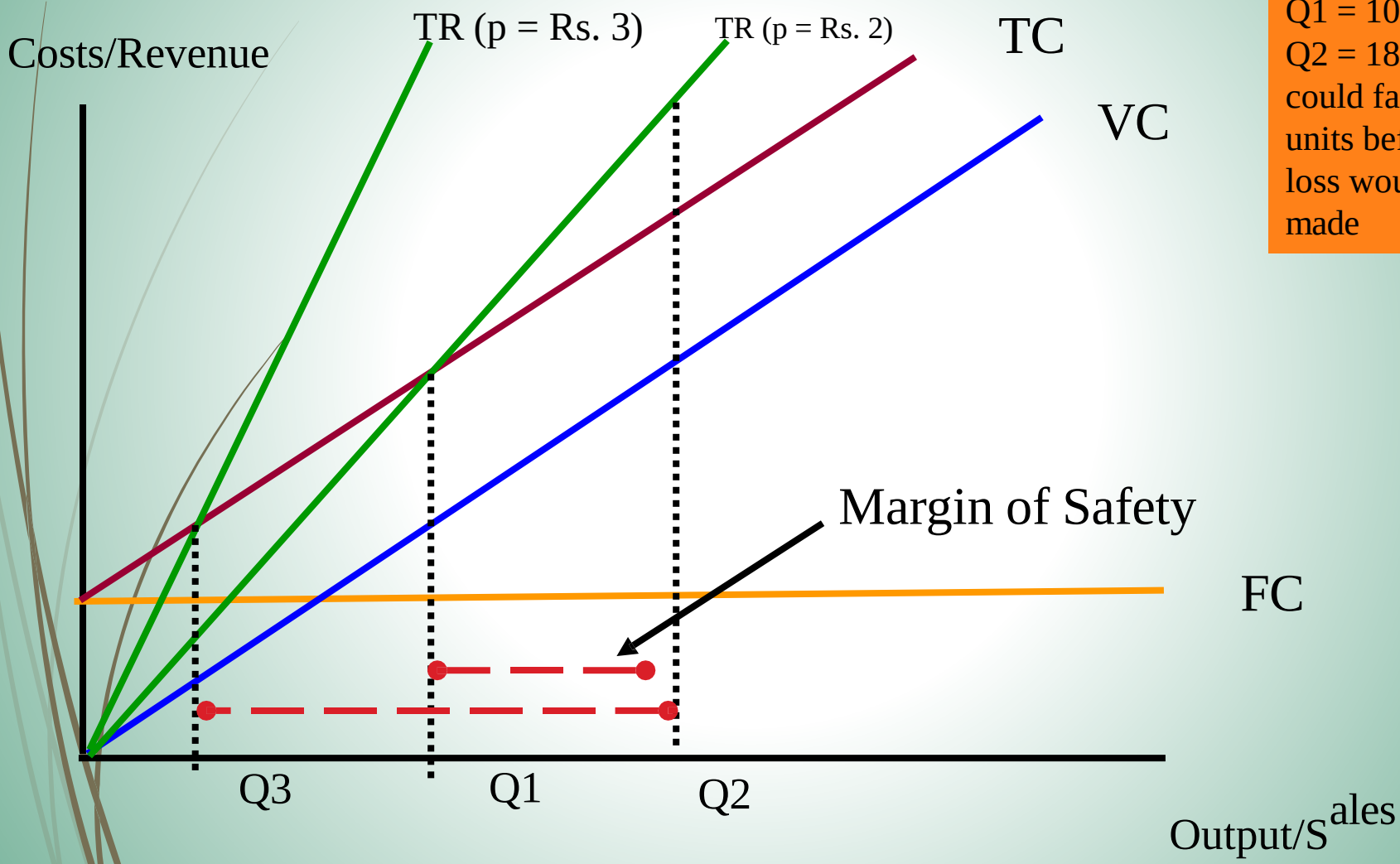


If the firm chose to set prices lower (say Rs.1) it would need to sell more units before covering its costs

MARGIN OF SAFETY

- Margin of safety represents the strength of the business. It enables a business to know what is the exact amount it has gained or lost and whether they are over or below the break even point.
- margin of safety = (current output – breakeven output) OR
- Margin o safety = actual sales – BEP sales
- margin of safety% = (current output – breakeven output)/current output × 100

Break-Even Analysis



Margin of safety shows how far sales can fall before losses made. If Q1 = 1000 and Q2 = 1800, sales could fall by 800 units before a loss would be made

USES OF BREAK EVEN POINT

- Helpful in deciding the minimum quantity of sales
- Helpful in the determination of tender price.
- Helpful in examining effects upon organization's profitability.
- Helpful in deciding about the substitution of new plants.
- Helpful in sales price and quantity.
- Helpful in determining marginal cost.

LIMITATIONS

- Break-even analysis is only a supply side (costs only) analysis, as it tells you nothing about what sales are actually likely to be for the product at these various prices.
- It assumes that fixed costs (FC) are constant
- It assumes average variable costs are constant per unit of output, at least in the range of likely quantities of sales.
- It assumes that the quantity of goods produced is equal to the quantity of goods sold (i.e., there is no change in the quantity of goods held in inventory at the beginning of the period and the quantity of goods held in inventory at the end of the period.
- In multi-product companies, it assumes that the relative proportions of each product sold and produced are constant.

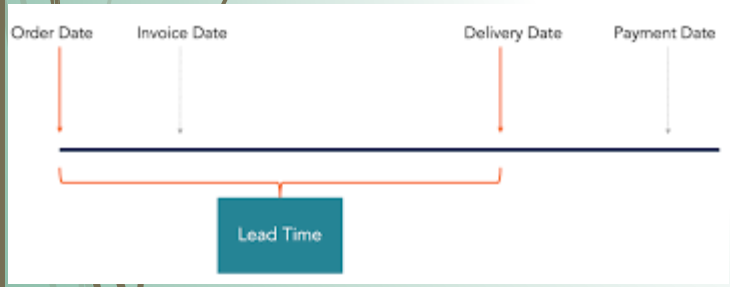
Inventory control Techniques

- ABC Technique;
- HML Technique;
- VED Technique;
- SED Technique;
- FSN Technique; &
- **EOQ Technique.**

KEY INVENTORY TERMS

Safety Stock:

- Safety stock or the buffer stock is an ideal quantity of material that has to be always maintained and it is drawn only in the emergency situation.
- Safety stock is an extra quantity of a product which is stored in the warehouse to prevent an out-of-stock situation. It serves as insurance against fluctuations in demand.

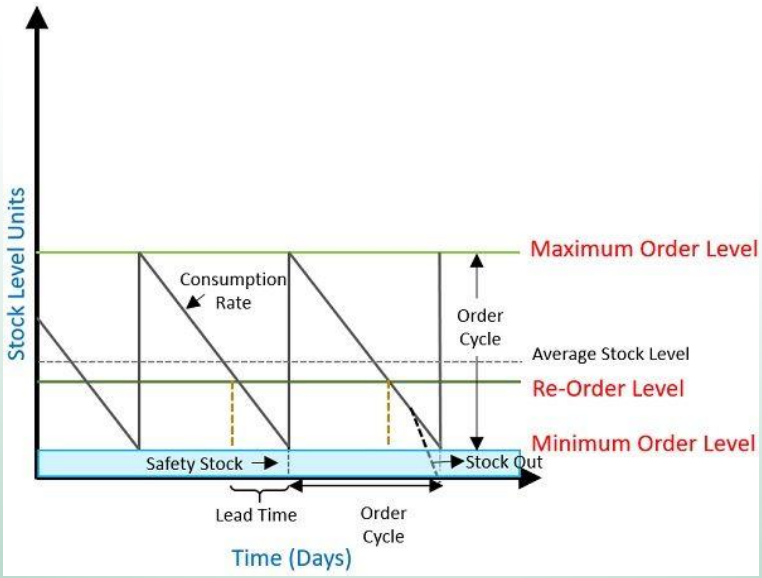


Lead Time:

- It is the time lapse between placement of an order and receipt of items including their approval by quality control department.
- This is counted on past experiences.
- Procurement of material has a long lead time

Reorder Level:

- It indicates that level of material stock at which it is necessary to take the steps for the procurement of further lots of material.
- The reorder level is slightly more than minimum stock level to guard against abnormal use of item and abnormal delay in supply.
- Reorder level= Maximum lead time × Maximum uses



REORDER QUANTITY METHOD

The quantity of items is to be ordered so as to continue production without any interruption in future.

Fixed order quantity method:-

When the stock level drops to a pre-determined point, i.e. re-order level, then the order of fixed quantity of material is placed.

Fixed order quantity is calculated using Economic Order Quantity (EOQ) formula.

Reorder level quantity= Safety stock +(usage rate x lead time)

Fixed order quantity method has following advantages:

1. Each material can be procured in the most economical quantity.
2. Purchasing and inventory control personnel automatically devote attention to the items that are needed only when required.
3. Positive control can easily be exerted to maintain total inventory investment at the desired level simply by manipulating the planned maximum and minimum value.

Disadvantages: The orders are raised at irregular intervals which may not be convenient to the suppliers.

REORDER QUANTITY SYSTEMS

1. Open access bin system:-

- The bin is filled with items to the maximum level as and when required.
- Open bins with items are kept at places nearer to the production line.
- The operators use items without making a record.
- The system is usually restricted to C-items, i.e. 70% of all items with small inventory value.

E.g. Postal department where a fixed quantity of stamps is kept. At the end of each week, the quantities are examined and brought back to the maximum level

2. Two –bin system:-

- Two bins are filled with items at different levels, when the first one is exhausted, it indicates the time for reorder.
- The 2nd one is a reserve stock during lead-time period.
- This is normally applicable to hospital & community pharmacies.

Definition of EOQ

“ EOQ is essentially an accounting formula that determines at which the combination of order, costs and inventory carrying cost are the least. The result is the most cost effective quality to order. In purchasing this is known as order quantity, in manufacturing it is known as the production lot size.”

- Dave Piasecki

- It is the quantity of the material to be ordered at one time.
- This quantity is fixed in such a manner as to minimize the cost of ordering and carrying the stock so that only correct quantity of the material is to be purchased .
- There should be no over stock or under stock and balance should be made between the cost of carrying and the cost of carry out .
- EOQ formula is widely used for computing the minimum annual cost for ordering and stocking each item.

EOQ depends upon the two type of costs:

A. Procurement cost -

- Receiving quotations.
- Processing purchase requisition.
- Follow up and expending the purchase order .
- Receiving the items and inspecting the items .
- Processing vendors invoice .

B. Carrying cost -

- Interest on the capital investment .
- Cost of the storage facility.
- Cost involved in deterioration .
- Cost of insurance property tax .

EOQ = Square Root of 2AP/S

Where as ,

- Q denotes order quantity;
- A denotes demand per time period (e.g.-annual demand);
- S denotes carrying / holding cost of 1 unit of stock for one period; and
- P denotes order cost.

QUANTITY DISCOUNT

Quantity discount is a reduction in price offered by seller on orders of large quantities. Quantity discounts exist in different forms and in certain scenarios they may not be obvious. The well-known *buy-1-get-1-free* sale is actually a 50% quantity discount since you effectively purchase a unit at half the normal price.