



Question

How should your company manage its inventory?

Inventory Management 101

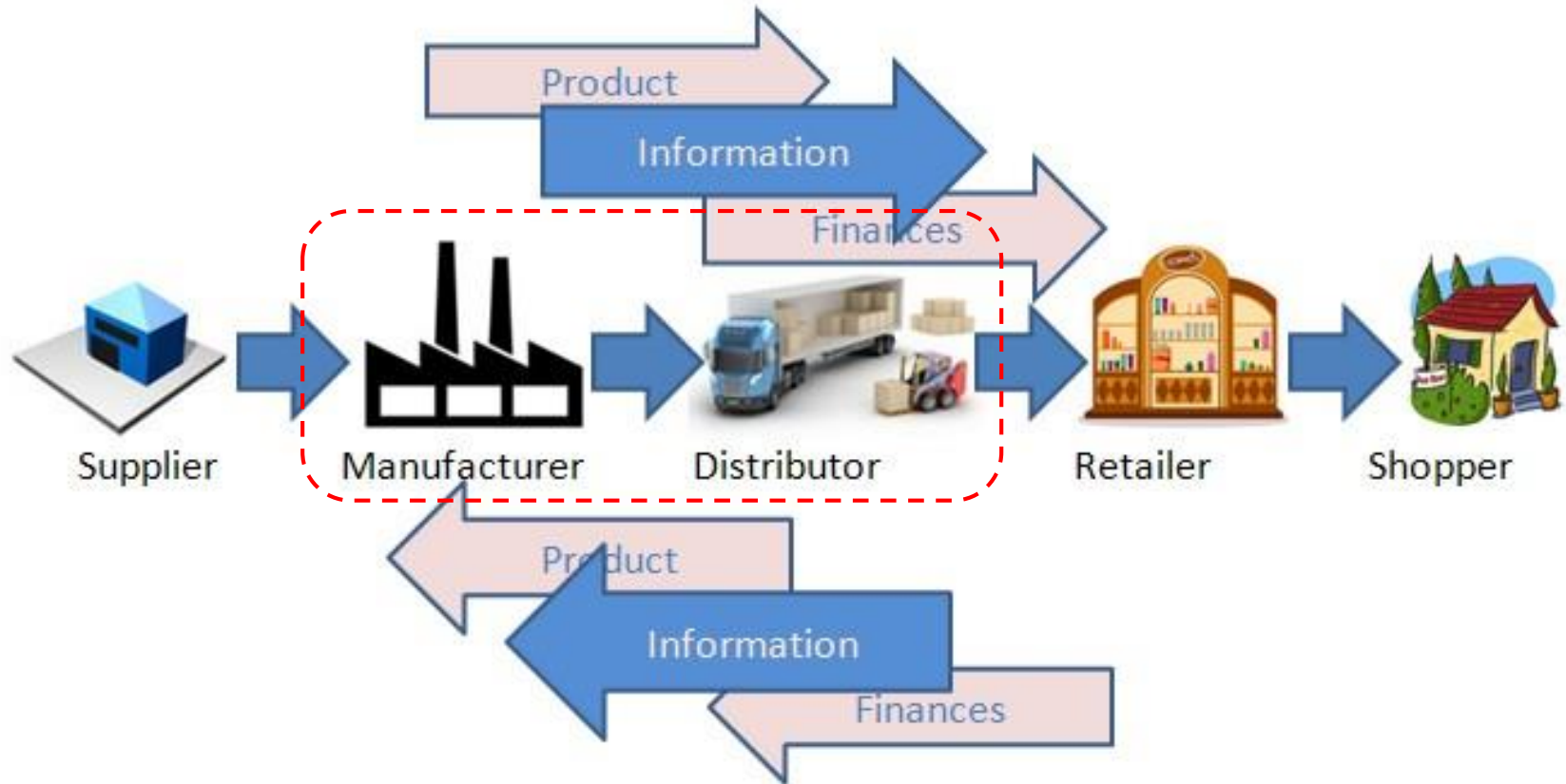
Distribution Strategies

Newsvendor Model

What is inventory management?

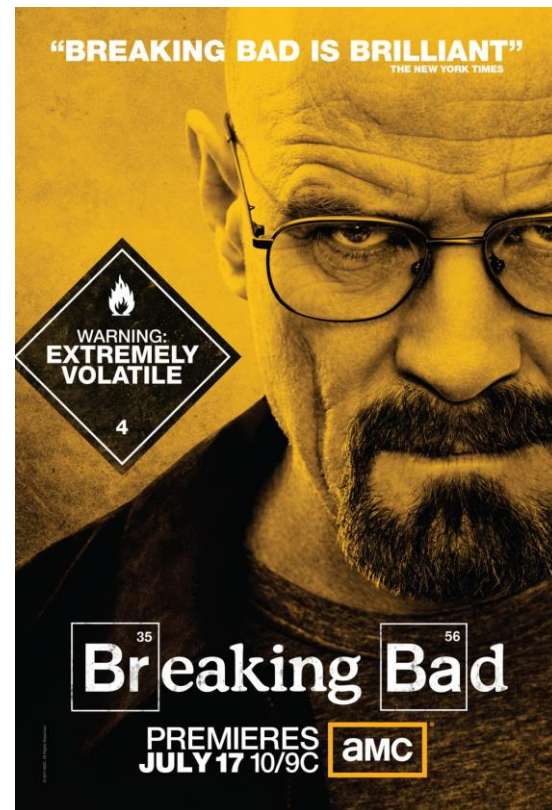
- AKA **supply chain management** or **logistics**
- Definition – The **sourcing** and **flow** of **products**, **information** and **finances**
- Informally – How to get supplies, produce, transport, store and deliver stuff/orders/money

What is inventory management?



An interesting inventory management case study

- Walter White, formerly a meek high school science teacher, becomes a ruthless player in the local methamphetamine drug trade
- How to get raw materials?
- How to transport finished goods?
- How to safely store goods and cash?
- How to communicate orders with suppliers and customers?
- How to receive and make payments?



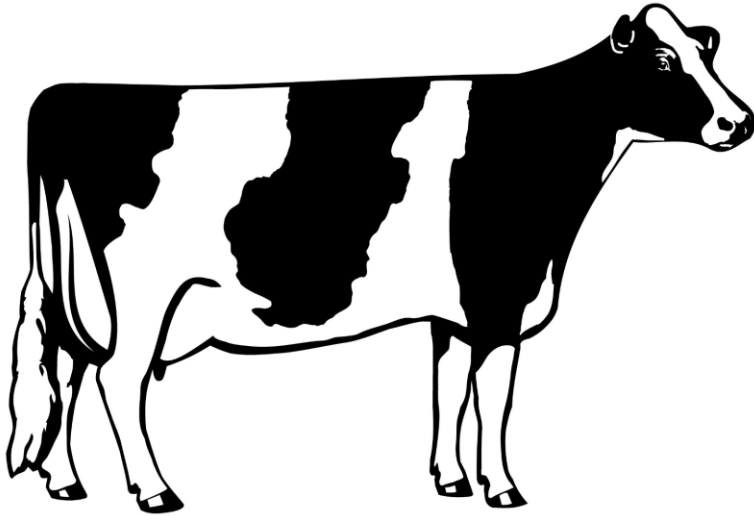
What is inventory?

- AKA **consumables** or **stock** (British English)
- Definition: Materials that are **consumed** (used up) by a company in the process of producing products and/or serving customers
- Inventory needs to **reordered frequently**

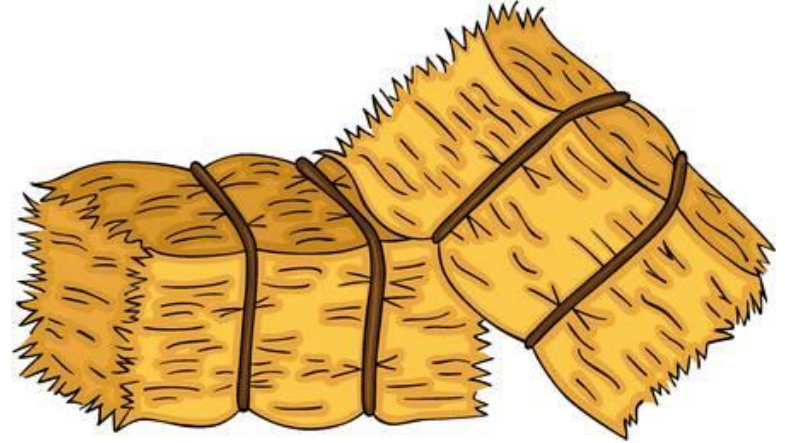
What is inventory?

What is the difference between **inventory** and **equipment/assets**?

Example A dairy farmer (someone who produces and sells milk)



Equipment or Assets



Inventory

The right level of inventory

Too
Much

Overstocking / too much inventory



Just
Right



Too
Little

A stockout or out-of-stock event



Example: [A cha chaan teng runs out of fishballs and noodles](#)

The right level of inventory

Stockouts



Empty supermarket shelves before
Hurricane Sandy

Overstocking



Example: Snap had to write down US\$ 40M
because of unsold Spectacles

Types of inventory

Raw materials and component parts Bought from suppliers to produce products

Work in process inventory Inventory that is in the production process

Finished goods inventory Products that are ready to be purchased and consumed by customers

MRO inventory Maintenance, repair and operating supplies; inventory that is not required for producing the company's primary products but is nevertheless required indirectly

Raw materials vs work in process vs finished goods



Raw materials



Work in process



Finished goods

Why do companies hold inventory?

1. Balancing supply and demand
2. Economies of scale in production, purchasing and transportation
3. Lead time in supply
4. Uncertainty in supply or demand
5. Appreciation of value



What are the costs related to inventory?

1. Carrying/holding cost
2. Transportation cost
3. Order cost
4. Setup cost
5. Shortage/stockout cost



How do we measure supply chain performance?

The **service level** is the proportion of the time that the product is in stock

One way to define the service level is

$$\text{service level} = \frac{\text{duration when product was in stock}}{\text{selling duration}}$$

Example In 2014, Taste supermarket was stocked out of Pampers size 2 diapers for 90 hours, out of a total selling duration of 4500 hours; therefore its service level is

$$\text{service level} = \frac{4500 \text{ hours} - 90 \text{ hours}}{4500 \text{ hours}} = 98\%$$

How do we measure supply chain performance?

The **inventory turnover** is a measure of the number of times inventory is sold or used in a time period such as a year (from Wikipedia)

We define the inventory turnover as

$$\text{inventory turnover} = \frac{\text{number of units sold in a year}}{\text{average number of units in inventory}}$$

Example In 2014, Taste supermarket sold 3600 packs of Pampers size 2 diapers, with an average inventory level of 100 units; therefore its inventory turnover is

$$\text{inventory turnover} = \frac{3600 \text{ units}}{100 \text{ units}} = 36 \text{ turns}$$

- 
- Mountains of inventory → 100% service level

But... inventory levels would be very high → inventory turnover is very low

- High service level → most of your demand is satisfied

With a reasonable inventory level → high inventory turnover

Key takeaways