

Good Morning



this is  
**Ben**





# **The Bullwhip Effect**

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# What's covered?

- Bullwhip effect defined
- Results of the bullwhip effect
- Causes of the bullwhip effect
- An example
- Reducing the bullwhip effect
- Your firm and the bullwhip effect
- Summary

# Bullwhip Effect Defined

The bullwhip effect is the uncertainty caused from distorted information flowing up and down the supply chain.

# Who is affected?

- Nearly all industries are affected!
- Firms that experience large variations in demand are at risk.
- Firms that depend on suppliers upstream or distributors and retailers downstream may be at risk.

# Results of the bullwhip effect

- Excess inventories
- Problems with quality
- Increased raw material costs
- Overtime expenses
- Increased shipping costs



## Results of the bullwhip effect - continued.

- Lost customer service
- Lengthened lead time
- Lost sales
- Unnecessary adjusted capacity

# Causes of the bullwhip effect

- Un-forecasted sales promotions
- Sales incentives
- Lack of customer confidence
- Customers turning back sales orders
- Freight incentives

# Bullwhip effect - an example

Chronology of company “X’s” supply chain problem.

- Company X produces widgets for sale on the open market.
- Customer demand for Company X’s widgets become stagnant
- Retailers offer a sales promotion to boost sales of Company X widgets

## Example – continued

- Retailers fail to notify manufacturers of sales promotion
- Company X recognizes that demand for widgets has increased.
- Company X increases inventory to allow for increased manufacturing of widgets.

## Example - continued

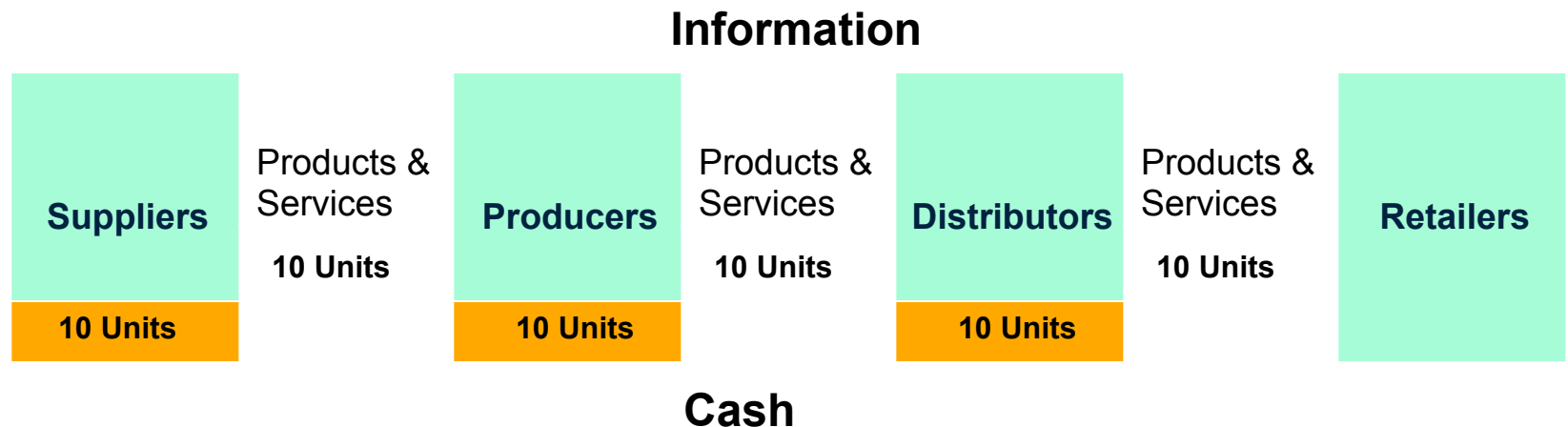
- Company X notifies part suppliers of increased demand.
- Suppliers increase inventory to meet demand.

# Moral of the story

Distorted information along the supply chain caused inventory levels to increase along the supply chain which may result in increased inventory costs, poor customer service, adjusted capacity and many other problems associated with the bullwhip effect.

# Supply Chain in Equilibrium

Customer demand forecast = 10 units



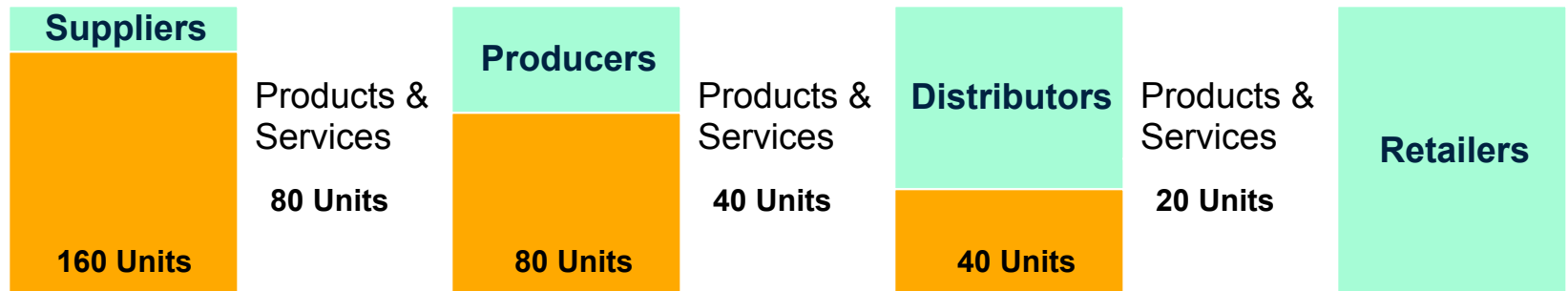
Retailers are selling product at a constant rate and price. Firms along the supply chain are able to set their inventory to meet demand.

Key:  = Inventory Levels

# Supply Chain Disrupted

Customer Demand forecast = 20 units

## Information Flow



## Cash Flow

As demand increases, the distributor decides to accommodate the forecasted demand and increase inventory to buffer against unforeseen problems in demand. Each step along the supply chain increases their inventory (double in this example) to accommodate demand fluctuations. The top of the supply chain receives the harshest impact of the whip effect.

Key:  = Inventory Levels



# Solving the Bullwhip dilemma

- Improve communication along the supply chain.
  - ❖ Retailers notifying firms upstream of sales promotions will help clarify demand signals from consumers
  - ❖ Improved information will improve demand forecasts upstream in the supply chain.

# Solving the Bullwhip dilemma - continued

- Improve sources of forecast data
  - ❖ Firms can use data from Point of Sale computer systems to derive data from forecasting
  - ❖ Firms along the supply chain can use EDI systems to retrieve data on items that are legitimately being purchased by customers

# Solving the Bullwhip dilemma - continued

- Work with firms upstream and downstream in the supply chain
  - ❖ Create smaller order increments to decrease time between orders. Order processing will become closer to real-time.
  - ❖ Work to develop consistent pricing of products to avoid demand fluctuations from the sale of inexpensive products.

# Reducing the bullwhip effect in your firm

- Are prices in your supply chain stable?
- Is information between firms along the supply chain accurate and timely?

# Reducing the bullwhip effect in your firm

- Is sales being forecasted on projected data?
- Are you forecasting sales using data from EDI or Point of Sale computer systems.
- Are incentives for sales representatives along the supply chain at minimum?

# Reducing the bullwhip effect in your firm

- Are orders being placed in small increments?
- Are batch orders reduced to minimum levels?

# Reducing the bullwhip effect in your firm

If you answered no to any of the previous questions regarding your firm and the bullwhip effect, then you may have an opportunity to reduce costs to your individual firm.

# Summary

- Bullwhip effect is caused from distortions in information along the supply chain
- Results of the bullwhip effect can include: excess inventories, problems with quality, increased costs, overtime expenditures, lost customer service, lost sales and more.



# Summary - Continued

- Causes of the bullwhip effect may include: poor forecasting of sales, incorrect information along the supply chain, sales incentives, sales promotions and lack of customer confidence.

# Summary - Continued

- Solutions to the bullwhip effect include: improved information flow between firms along the supply chain, stable pricing, small order increments, focused demand on EDI or POS systems and removal of sales incentives.