Co-ordination in a Supply Chain

IT 229: IT Entrepreneurship and Supply Chain Management

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Outline..

- Lack of Supply Chain co-ordination and the Bullwhip effect
- Effect of lack of co-ordination on performance
- Obstacles to co-ordination in a Supply chain
- Managerial Levers to achieve coordination.
- Role of IT in coordination, forecasting and Replenishment

Co-ordination in a Supply Chain

- A Supply chain is assumed to have a good coordination if:
  - *All stages of the chain take actions that together* increase total supply chain profits.

- Supply chain coordination requires each stage of the supply chain to take into account the impact its actions have on other

Lack of Coordination

- **Reasons**:
  - Different stages of the supply chain have conflicting objectives
  - Information moving between stages is delayed and distorted
- *Overall Supply chain profit enables overall welfare of all stages but marginalized objectives of profit distorts the overall profit*

Bullwhip Effect

- A major consequence faced by business due to lack of supply chain coordination
- **Bullwhip Effect**
  - Increased fluctuations in orders as they move up the supply chain stages (*from retailers to wholesalers to manufacturers to suppliers)*
  - *Small change in **demand** causing a major change in **Production/ Warehousing***
- Distort demand information within the supply chain

Bullwhip effect

Demand at Different Stages

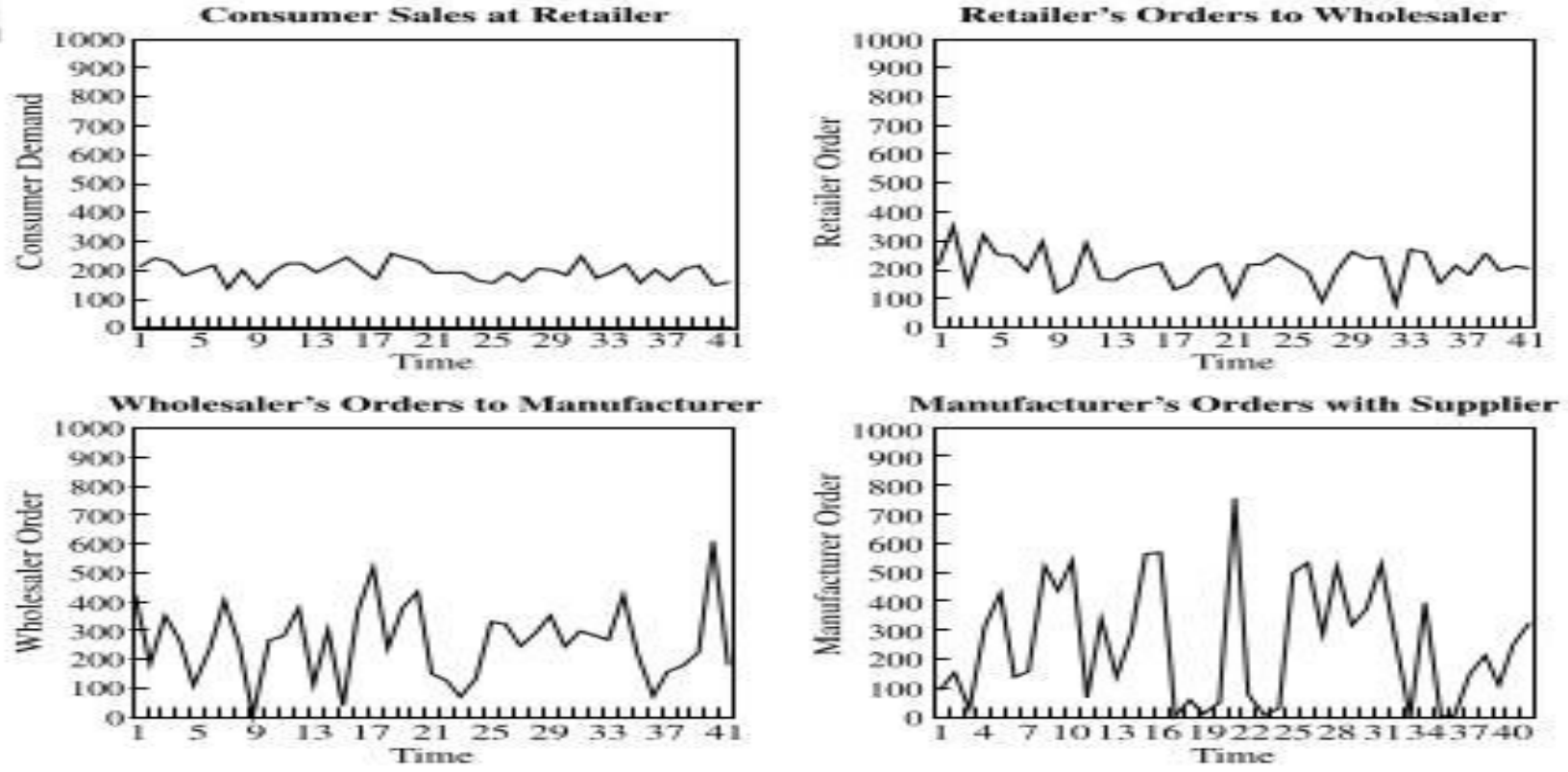
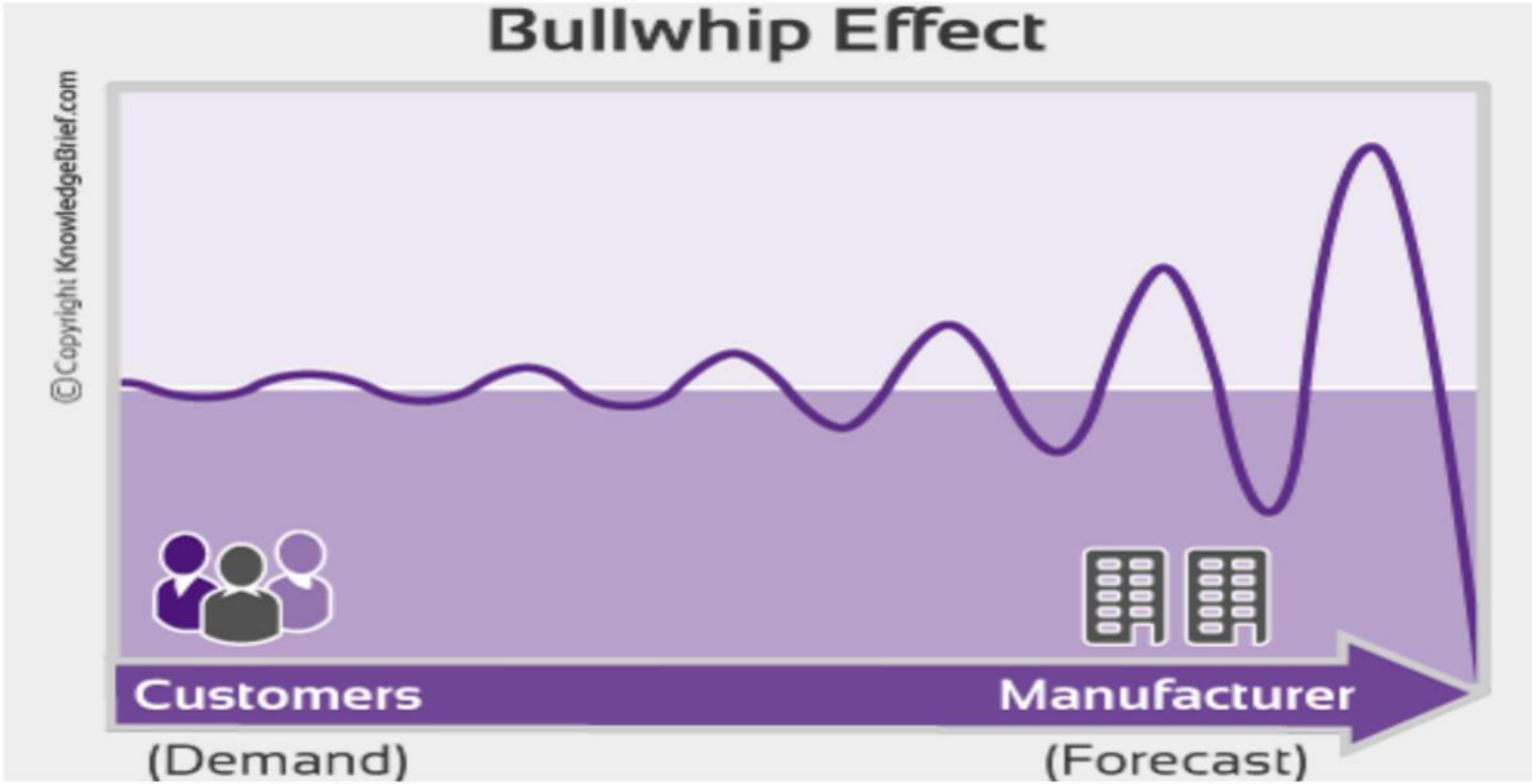


Figure 10-1


Bullwhip Effect
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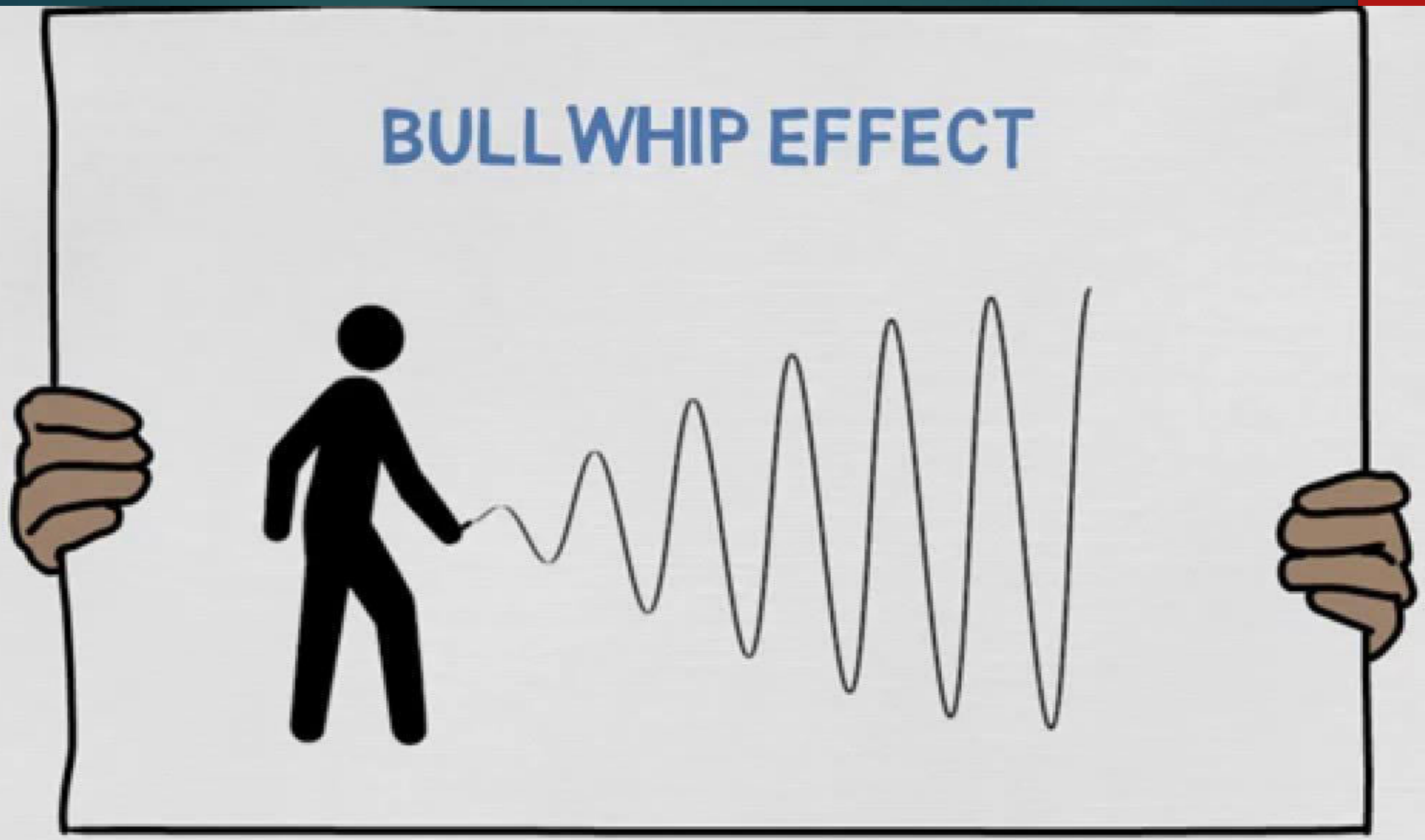
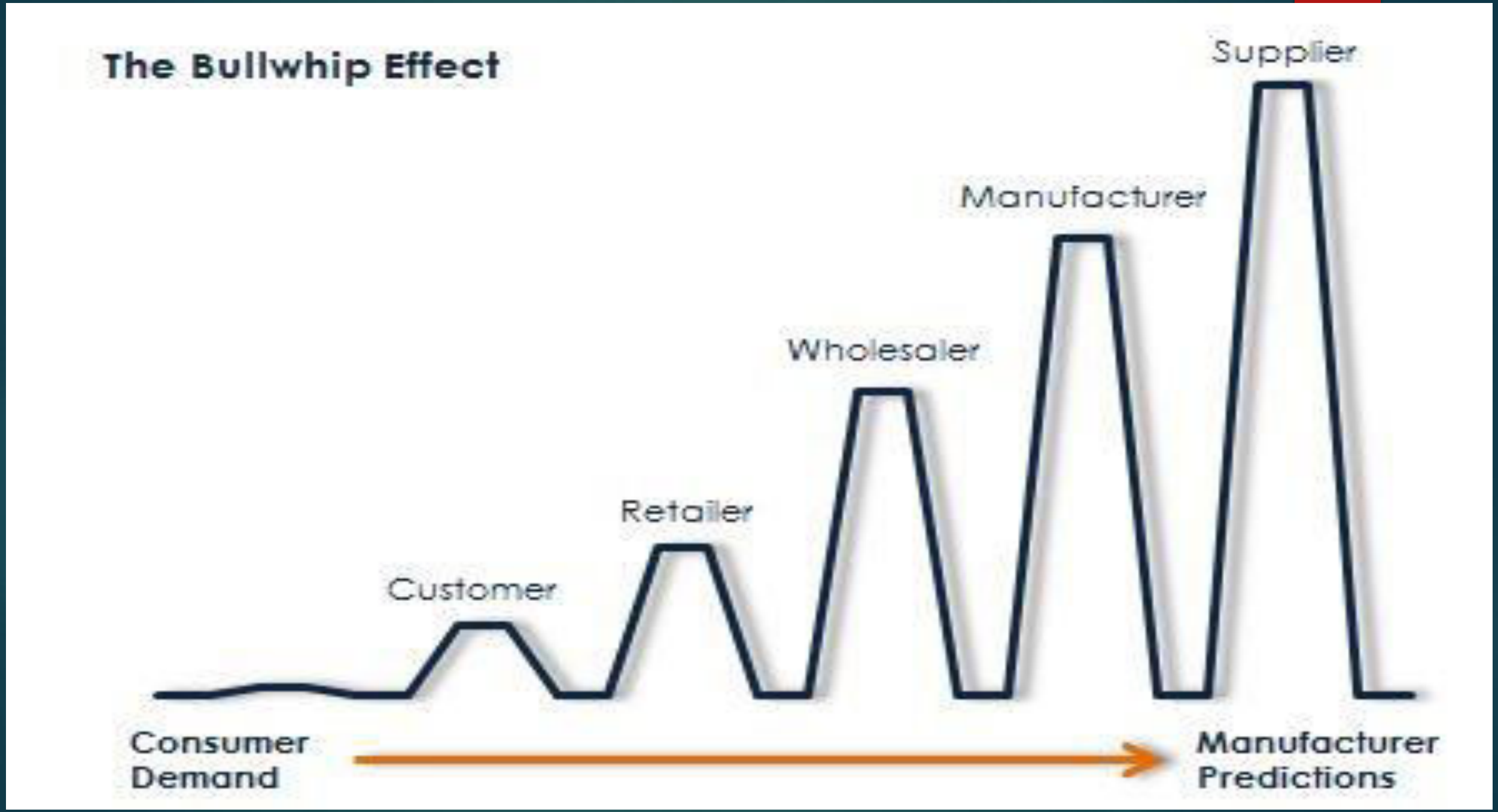
Customers
Manufacturer
(Demand)
(Forecast)


BULLWHIP EFFECT


The Bullwhip Effect
Supplier
Manufacturer
Wholesaler
Retailer
Customer
Consumer Demand
Manufacturer Predictions

Bull Whip effect

- Distorts demand information within the supply chain
- Each stage having a different estimate of what demand looks like
- Forecast accuracy decreases the higher we move to the SC stages
- Result
  - Loss of supply chain coordination

Causes for the Bullwhip Effect

- **Forecasting updating** –
  - Multiple forecast updates by each entity in the chain leads to significant distortions. Each member of the chain updates forecast based on orders received at his end and not based on the demand raised by the end customer.
- **Order batching** –
  - Each member of the chain has his own economies of scale in production and transportation resulting in planning practices leading to order batching.
- **Price fluctuations** –
  - Discounts or price promotions result in forward buying, causing much distortion. Further frequent price changes affect the ordering pattern of the buyer.

Cont…

- **Shortage gaming** –
  - In a situation of shortages the suppliers usually resort to rationing, which in turn provides incentives to buyers to inflate orders.
- **Long lead time** –
  - Long lead times increase the planning horizon of other partners in the chain. Further, *each partner is forced to keep large amounts of safety stock*, resulting in an overall distortion increase in the chain.

The Effect of Lack of Coordination on Performance

- **Manufacturing cost**
  - ***Increase***; as a result of the Bullwhip effect
- **Inventory cost**
  - ***Increases:*** Bullwhip effect increases inventory cost. To handle the increased variability in demand, manufacturer has to carry a higher level of inventory, than would be required in the absence of the Bullwhip effect
- **Replenishment lead time**
  - ***Increase***

conti…

The Effect of Lack of Coordination on Performance

- **Transportation cost**
  - ***Increase***
- **Labor cost for shipping and receiving**

  -*Increase*
- **Level of product availability**

  -Low

The Effect of Lack of Coordination on Performance

- **Relationship across the supply chains:**

  -hurts: *Tendency to blame each other, distorted relationship*

- **Total profit:**

  -decrease

The Effect on Performance

Performance Measure	Impact of the Lack of Coordination
Manufacturing cost	Increases
Inventory cost	Increases
Replenishment lead time	Increases
Transportation cost	Increases
Shipping and receiving cost	Increases
Level of product availability	Decreases
Profitability	Decreases

Table 10-1

Obstacles to Co-ordination in a Supply Chain:

any factors that leads to either local optimization by different stages of supply chain or an increase in information delay, distortion, and variability within the supply chain, is an obstacle to coordination

Major obstacles;

- Incentive obstacles
- Information processing obstacles
- Operational obstacles
- Pricing obstacles
- Behavioral obstacles

Incentive obstacles

- Occur when incentives offered to different stages or participants in a supply chain lead to actions that increase variability and reduce total supply chain profits
- Local optimization within functions or stages of a supply chain
  - *focus only on the local impact of an action result in decisions that do not maximize total supply chain profits*
  - E.g. next slide……

conti…..

- For example, if the compensation of a transaction manager at a firm linked to

  -the average transaction cost per unit,

  - the manager is liked to take actions that lower transportation costs even if they hurt customer service or inventory cost

- Sales force incentives (to **sell -in** not to **sell-through**)

Information processing obstacles

- A supply chain poorly organized or managed information channel leads to deterioration in information quality
  - Example: information on customer demand cannot reach members in a supply chain in a timely manner, or information is not available to some members who might need it.
- **Forecasting based on Orders and not Customer Demand**

Con..

- **Lack of Information sharing**
  - Lack of information sharing between stages of the supply chain magnifies the bullwhip effect.
  - If the manufacturer is not aware of the planned promotion it may interpret the larger order as a permanent increase in demand and thus manufacturers and suppliers will have a lot of inventory right after **Bhat-bhateni** finishes its promotion

Operational obstacles

- Occur when actions taken in the **course of placing and filling orders** lead to an increase in variability.
- **Ordering in large lots**
  - Typically done to reduce total costs due to fixed cost on each lot
  - Also due to discount on larger lots

Con…

- **Large replenishment lead times**
  - that expose the company to higher levels of variability, and raise the need for higher levels of safety stock.
- **Rationing and shortage gaming**

Pricing obstacles

- Arise when the pricing policies for a product lead to an increase in variability of orders placed.
- Lot size-based quantity discounts
  - Increase the lot size of orders placed within the supply chain
  - The resulting large lots magnify the bullwhip effect
- Trade promotions and short-term discounts offered by a manufacturer result in
  - Forward buying, by which a wholesaler or retailer purchases large lots during the discounting period to cover demand during future periods

Behavioral obstacles

- Each stage of the supply chain views its actions locally
  - unable to see the impact of its actions on other stages
- supply chain blame each other for the fluctuations
- stages in the supply chain becoming enemies rather than partners
- A lack of trust among supply chain partners causes them to be opportunistic at the expense of overall supply chain performance

Managerial Levers to Achieve Coordination

Managerial Levers to Achieve Coordination

- Aligning of goals and incentives
- Improving Information Accuracy
- Improving operational performance
- Designing pricing strategies to stabilize orders
- Building partnerships and trust

1. Aligning of goals and incentives

- Align goals and incentives so that every participant in supply chain activities works to maximize total supply chain profits
  - **Align incentives across functions**: All facility, transportation and inventory decisions should be evaluated based on their effect on profitability and not total costs.

Cont…

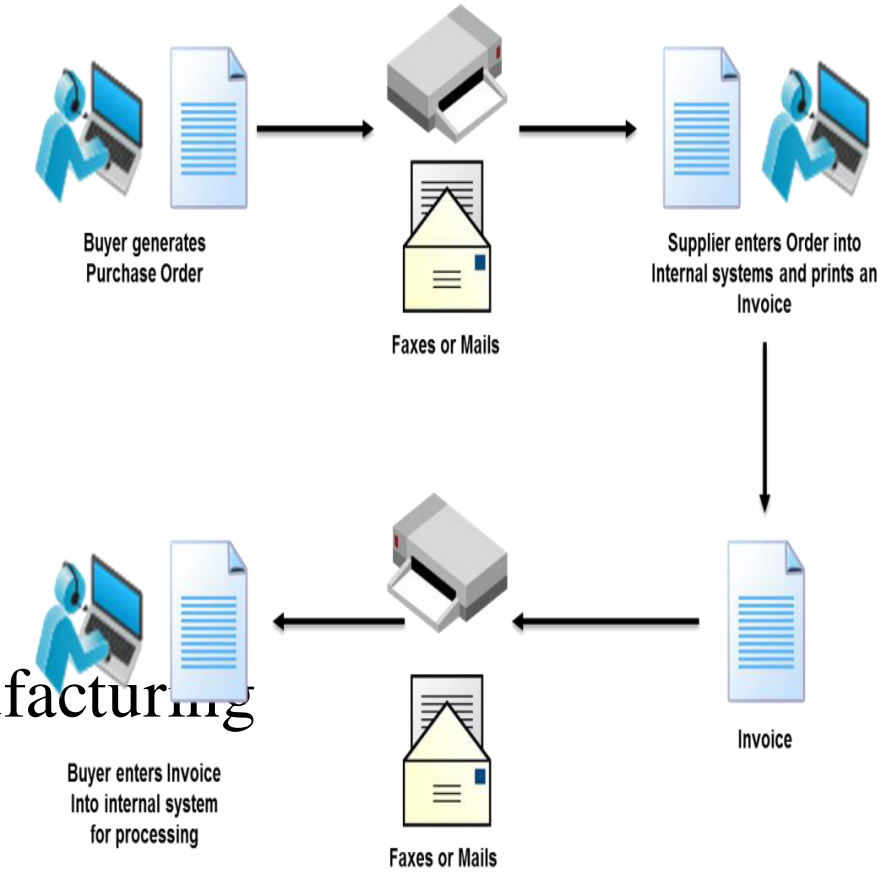
- **Pricing for coordination:**
  - A manufacturer can use lot-size based quantity discounts to achieve coordination for ***commodity products*** if the manufacturer has large fixed costs associated with each lot.
  - But under demand uncertainty
    - *manufacturer can use buy-back, revenue-sharing, quantity-flexibility contract*
- **Alter sales force incentives from sell-in to sell-through**

2. Improving Information Accuracy

- **Sharing point of sale data**
  - E.g. Sales record at bhat-bhateni
- **Implementing collaborative forecasting and planning**
  - Once point-of-sale data are shared, different stages of the supply chain must forecast and plan jointly if complete coordination is to be achieved.
- **Designing single-stage control of replenishment**
  - Designing a supply chain in which a single stage controls replenishment decisions for the entire supply chain can help diminish the bullwhip

3. Improving Operational Performance

- **Reducing replenishment lead time :**
  - leads to decrease in demand uncertainty
  - Ordering electronically
    - (online or EDI, Electric Data Interchange)
  - Increased flexible manufacturing and cellular manufacturing
  - Cross-docking



Cont….

- **Reducing lot sizes**:
  - decreases the amount of fluctuation that can accumulate between any pair of stages of a supply chain, thus decreasing the bullwhip effect.

- **Rationing based on past sales** and sharing information to limit gaming

  -based on past sales rather than current retailer orders

4. Designing Pricing Strategies to Stabilize Orders

- Encouraging retailers to order in smaller lots and reduce forward buying
- Moving from lot size-based to volume-based quantity discounts
- Stabilizing pricing
  - by eliminating promotions and charging an EDLP(Every Day Low Pricing).

5. Building Strategic Partnerships and Trust

- Sharing of accurate information that is trusted by every stage results in a better matching of supply and demand throughout a supply chain and a lower cost.

- A better relationship also tends to lower the transaction cost between supply chain stages

- There are two views regarding how cooperation and trust can be built into any supply chain relationship:
  a. Deterrence based view – In this view the parties involved use a variety of formal contracts to ensure cooperation.
  b. Process-based view – With this view, trust and cooperation are built over time as a result of a series of interactions between the parties involved.

- Coordination and trust within the supply chain help improve performance for the following reasons:
  - When stages trust each other, they are more likely to take the other party's objectives into consideration when making decisions.
  - Action oriented managerial levers to achieve coordination become easier to implement. Sharing of information is natural between parties that trust each other.

Role of IT in Coordination and Replenishment

INFORMATION TECHNOLOGY is the study, design, implementation and management of computer based information system

Role of IT in Coordination and Replenishment

- ***Making inventory visible to customers***
  - Online inventory visible and order procession
  - E.g online retailing; updating current information
- ***Locating in-store & warehouse inventory***
  - Make clear through RFID systems
  - Use of RFID
  - E.g. of RFID; The government is all set to introduce electronic cargo tracking system (ECTS) from January for reliable delivery of Nepal-bound cargoes via Indian transit..

Contin….

- ***Better integration of many stages***
  - CRP (Continuous Replenishment program)
  - P & G and Walmart
  - P & G can access Walmart system data and inventory for diapers
- ***Enables collaborative forecast, planning, and replenishment***
  - Between stages

ASSIGNMENT

- Foundation for next class;
- ***What is competitive strategy?***
- ***What is supply chain strategy?***

Role of IT in Supply Chain

- Information is crucial to supply chain performance.
  - *(Information about customer needs, inventory in stock, when more product should be produced* and shipped, etc.)
  - Information makes the supply chain visible to manager. Information is the most important driver.
- (Four Supply Chain Drivers: Facilities, Inventory, Transportation and Information) Information serves as the connection between the supply chain's various stages, allowing them to
- coordinate and bring about many of the benefits of maximizing total supply chain profitability.

Role of IT

- Information is crucial to the performance of a supply chain because it provides the basis on which supply chain managers make decisions.
- Information technology consists of the tools used to gain awareness of information, analyze this information, and execute on it to increase the performance of the supply chains.
- EAS software is used in information flow system.

ROLE OF IT

- Makes supply chain visible to a manager
- Support in decision making to improve supply chain performance
- Real time information
- Wide collaboration with supply chain partners

Makes supply chain visible to a manager

- Quick and effective information system helps manager to understand the customer response, their demands, inventory in the stock, how much to be produced and where to deliver and when? Here comes the role of internet, which is considered as a cheapest inter-organizational information system, which helps in aligning the interdependent strategies to achieve cooperative rather than competitive role of SCM partners.

Thank you