

6.6: The Bullwhip Effect

Fluctuations and The Bullwhip Effect

The bullwhip effect gets its name from the fluctuations evident in the movement of a bullwhip. You may have seen this type of whip used in some of the old cowboy movies. Basically, a bullwhip is about eight to ten feet long, made from braided strips of leather with a short (about 8-12 inches) wooden handle (think Indiana Jones). A small movement at the handle causes huge fluctuations in the end of the whip.

An example of a bullwhip can be seen in the following figure:



This analogy is applied to the supply chain where small movements in customer demand at one end of the supply chain leads to huge fluctuations at the other end of the supply chain. The better the flow of information in the supply chain, the less distortion or fluctuations in the information flow results in less inventory in the system to cover the huge fluctuations previously seen in the supply chain.

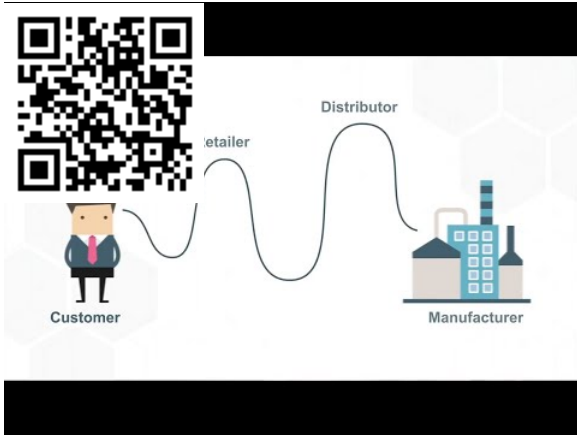
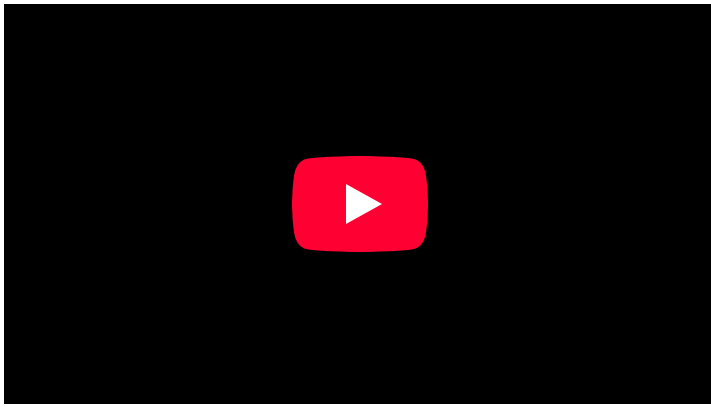
Causes of the Bullwhip Effect

The bullwhip effect relates to supply chain inefficiencies and changes in inventory levels as they relate to changes in consumer demand. Factors include demand forecasting, order batching, price fluctuations, rationing, and gaming.

The bullwhip effect is caused by demand forecast updating, order batching, price fluctuation, and rationing and gaming.

- **Demand forecast updating** is done individually by all members of a supply chain. Each member updates its own demand forecast based on orders received from its “downstream” customer. The more members in the chain, the less these forecast updates reflect actual end-customer demand.
- **Order batching** occurs when each member takes order quantities it receives from its downstream customer and rounds up or down to suit production constraints such as equipment setup times or truckload quantities. The more members who conduct such rounding of order quantities, the more distortion occurs of the original quantities that were demanded.
- **Price fluctuations** due to inflationary factors, quantity discounts, or sales tend to encourage customers to buy larger quantities than they require. This behavior tends to add variability to quantities ordered and uncertainty to forecasts.
- **Rationing and gaming** is when a seller attempts to limit order quantities by delivering only a percentage of the order placed by the buyer. The buyer, knowing that the seller is delivering only a fraction of the order placed, attempts to “game” the system by making an upward adjustment to the order quantity. Rationing and gaming create distortions in the ordering information that is being received by the supply chain.

Watch the 1:51 video that illustrates "the bullwhip effect":



Sources:

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Saylor Academy, *Operations Management* <http://www.opentextbooks.org.hk/ditatopic/7043>

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