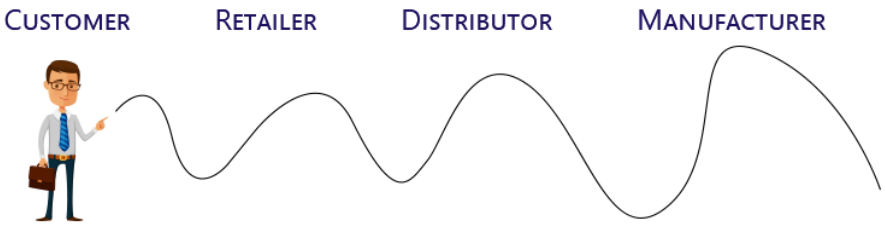
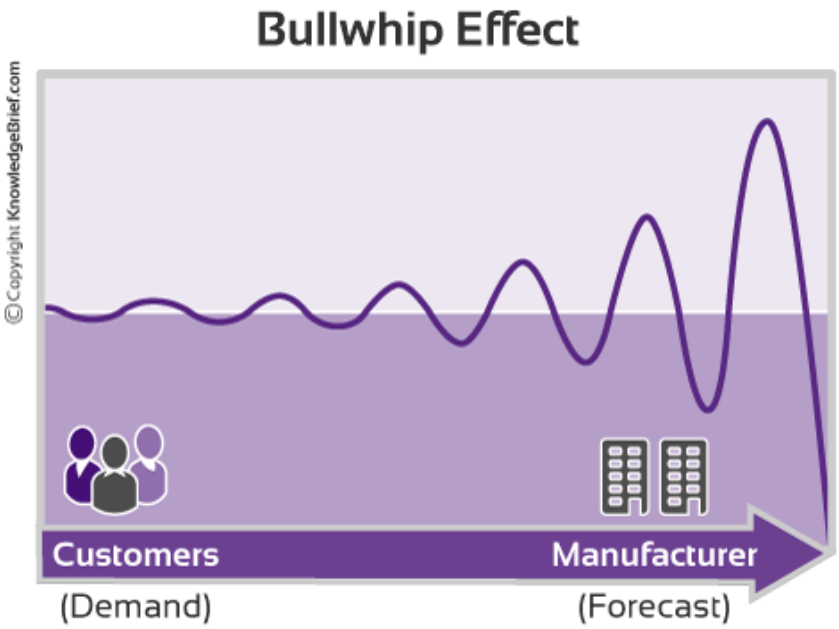
Distortion in the supply chain - beware the Bullwhip effect



https://blog.arkieva.com/what-is-bullwhip-effect/

The Bullwhip effect (or the Forrester effect) is the unexpected or unpredicted demand distortion that travels upstream in the supply chain. The customer holds the whip, gives it a crack and the ripples are felt all along the supply chain right back to the manufacturer.

Jay Forrester, of MIT, first described the "bullwhip effect" in 1961 where he identified increasingly large demand distortions along the supply chain resulting in swings in inventory levels. As the whip moves away from the source, i.e. the customer, reverberations increase and the waves grow bigger and bigger causing excess inventory, quality control issues and other inefficiencies. Forecasting accuracy decreases as we move upstream along the supply chain. Even some consumer goods that have fairly consistent consumption at the retail fall victim to this effect.



https://www.kbmanage.com/concept/bullwhip-effect

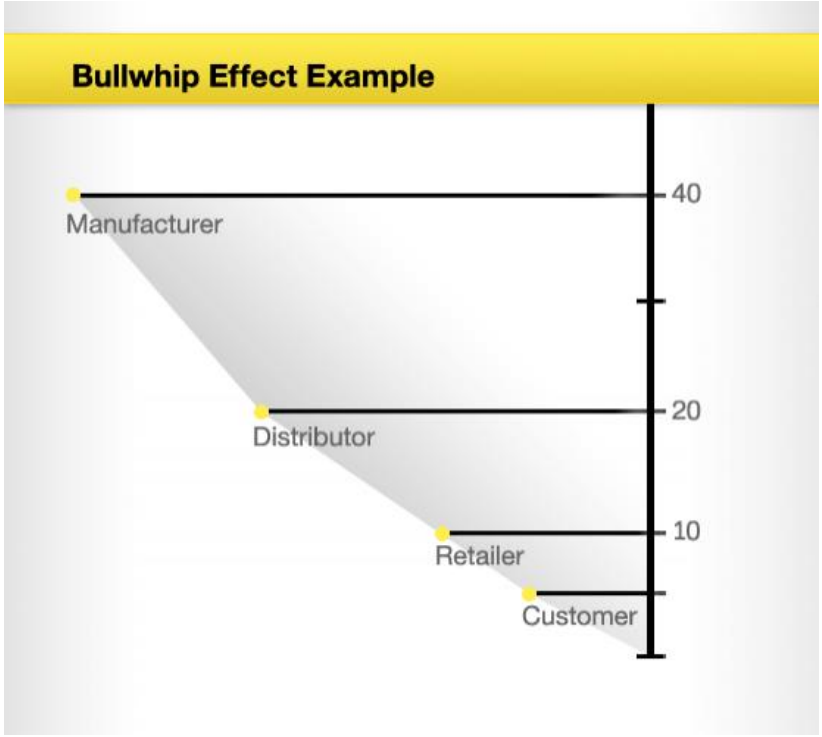
There may be six or more inventory points between the customer and the raw material supplier. All affected points in the supply chain try to prevent stock-outs so they keep buffer stock to avoid not being able to supply the customer. Forecasting is less accurate further back we go up the supply chain so the uncertainty increases. In addition to holding excess inventory, the distorted information flow causes other problems: poor customer service, lost revenue, bad production planning and transportation challenges.

Contributing factors to the bullwhip effect

- Fluctuating lead times
- Order batch requirements
- Lack of communication
- Price variations (special discounts or promotions)
- Past demand does not equal future demand

An example of the bullwhip effect

The customer requires 10 units but the retailer orders 20 units from the distributor for safety. The distributor then orders 40 units from the manufacturer allowing them to buy in bulk. Now 40 units have been produced for a demand of only 8 units!



Source http://www.aalhysterforklifts.com.au/index.php/about/blog/C42

In a recent investigation by Procter & Gamble (P&G), they found that the sales of Pampers diapers in retail stores were fluctuating slightly but the variability increased as they examined the distributors' orders. The orders placed on their raw material suppliers, 3M, included even greater swings. This was the bullwhip effect in motion.

Ways to mitigate the bullwhip effect

1. More collaboration and information sharing at each stage of the supply chain to improve the decision-making process. Problems occur when departmental goals are not aligned.
2. Understand the business cycles in your industry and allow for seasonality differences.
3. Know your inventory. Many companies fail to acknowledge that buffer inventories exist. Safety stock settings need to be reviewed and periodically adjusted. Regular stocktakes will uncover excess stock.
4. New product launches and end-of-life products can cause distortions in the supply chain in the same way as promotional offers and discounts. Stable pricing assists in predicting demand.

Other methods for limiting the bullwhip effect include reducing the sizes of orders, consistently offering firm product prices and improving customer service. Customer order cancellations and returns cause erratic ordering patterns. Ignoring the bullwhip effect can result in financial losses and resource constraints.

The human factor

Decisions made by those who oversee each stage of the supply chain can influence the bullwhip effect. Each manager is working to mitigate risk, to forecast demand and maximize profits but is often hampered by poor communication and variables beyond his control such as price fluctuations and special product promotions.

Everyone in a decision-making role in the supply chain should familiarize themselves with the bullwhip effect, its causes, and how it affects their overall costs. Understand demand patterns throughout all stages of the supply chain by sharing important data and collaborate with other managers.