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SUPPLY CHAIN ANALYTICS

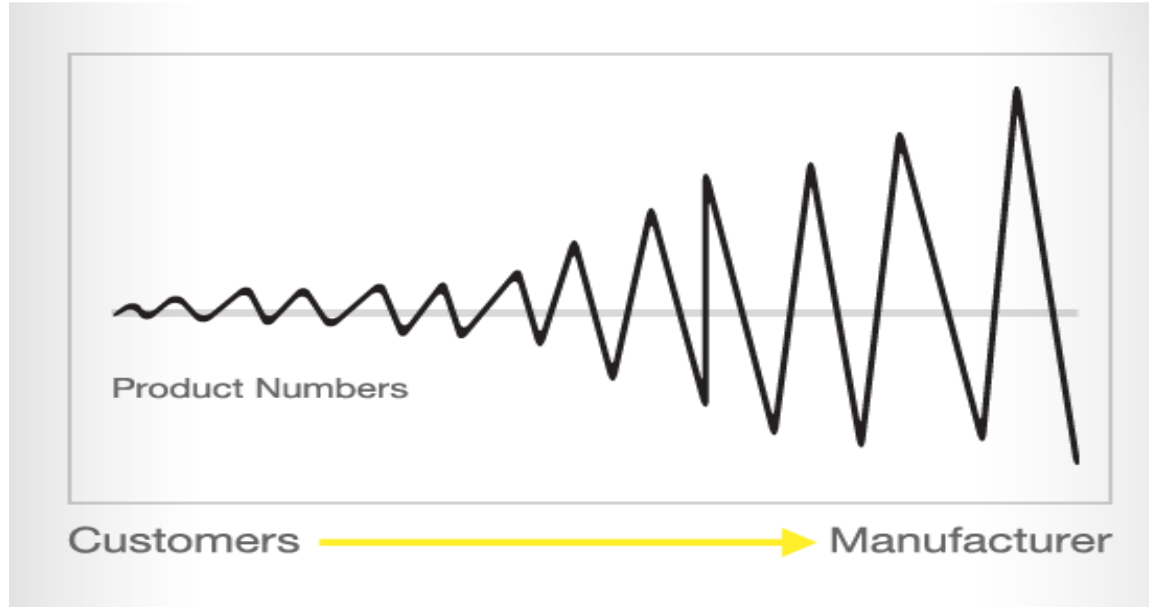
Bullwhip effect and Time Series Analysis

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Bullwhip Effect



↑
Variance
between
demand
and
supply
↓

Bullwhip Effect

- Variance between demand and supply increases in a supply chain as we move from customer to the manufacturer and to further left to him.

Example of Bullwhip Effect

- Accumulation of inventory at each stage of supply chain due to lack of forecasting resulting into huge inventory piles towards manufacturer/ raw material suppliers.



Demand Forecasting

- Better and coordinated forecasting helps in reducing the problems of Bullwhip effect .
- It also helps in planning various supply chain activities more efficiently and effectively.



Demand Forecasting

- Qualitative
 - Market Survey
 - Delphi
- Quantitative
 - Time Series
 - Causal



Time Series Analysis

- Time series forecasting models try to predict the future based on past data
- You can pick models based on:
 1. Time horizon to forecast
 2. Data availability
 3. Accuracy required
 4. Size of forecasting budget
 5. Availability of qualified personnel

Time Series Analysis

Characteristics of Past Data

Horizontal

Trend- Positive/ Negative, Additive or Multiplicative

Seasonal- Additive or Multiplicative

Cyclic fluctuations



Time Series Analysis

- Demand Data is made of level and random component.
- Level component can be determined.
- Random component cannot be determined.

Simple Moving Average

- The simple moving average model assumes an average is a good estimator of future behavior
- The formula for the simple moving average is:

$$F_t = \frac{A_{t-1} + A_{t-2} + A_{t-3} + \dots + A_{t-n}}{n}$$

F_t = Forecast for the coming period

N = Number of periods to be averaged

A_{t-1} = Actual occurrence in the past period for up to “ n ” periods

Weighted Moving Average

While the moving average formula implies an equal weight being placed on each value that is being averaged, the weighted moving average permits an unequal weighting on prior time periods

The formula for the moving average is:

$$F_t = w_1 A_{t-1} + w_2 A_{t-2} + w_3 A_{t-3} + \dots + w_n A_{t-n}$$

w_t = weight given to time period “t” occurrence (weights must add to one)

$$\sum_{i=1}^n w_i = 1$$

THANK YOU

