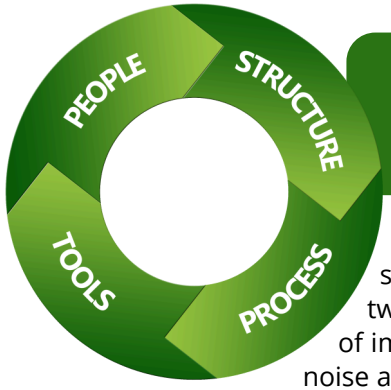
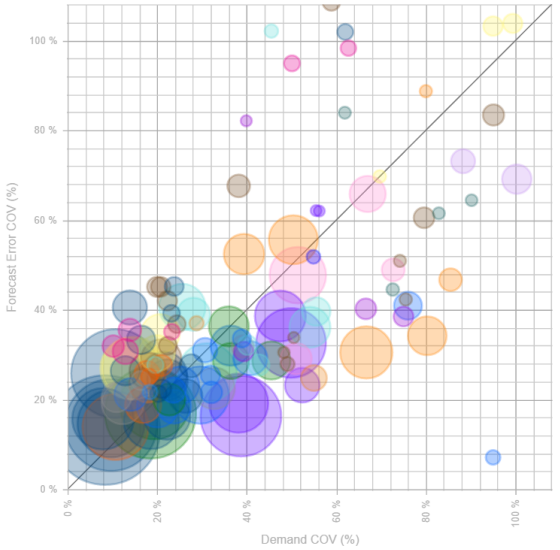


Sequoia Spotlight

The sea can be a rough and unpredictable place – which will literally batter ships into pieces given the opportunity. Lighthouses and breakwaters form two lines of defence for ships – working in very different ways; one warning of impending danger so that you can steer around it; the other buffering the noise and fury of the storm away from the sanctuary of the harbour.

Amazingly – the same thing happens in industry. Sales ramp up and down in ways that would cause unprotected supply chains enormous cost and difficulty. Two different approaches to managing this variability have evolved:

Forecasting is the first line of defence: anticipating impending changes so that factories can be steered around the traps and obstacles formed by promotions and price changes;
Safety Stock is the equivalent of the breakwater: taking the unpredictable parts of variability on the chin so that they don't crash into the supply chain and run it ragged.



Forecast Value Add (COV)®

This, admittedly somewhat strained, metaphor is offered to help this paper dispel some of the more deeply ingrained myths surrounding forecasting and offer, by way of a substitute, some truths:

✗ Forecasts are "always wrong" – **myth;**

✗ Forecast Error (or Accuracy) tells you how good your forecasting is – **myth;**

✓ Forecast Value Add (COV)™ is the critical measure of forecast performance – **true;**

✓ Often, Forecast Bias is the only thing that matters – **true.**

So, what is a good forecast?

Your sales vary (or, if they don't, your forecasting is really easy you are currently wasting your life!).

Still here! Good – so your sales vary and this variation is a combination of:

- Forecastable changes (signals); and
- Unforecastable changes (random noise).

The job of the forecast is to split these two variations – allowing the supply planners to track the forecastable changes (signals) – and buffer against unforecastable changes (noise).

Forecast Value Add (COV)®

What we call Forecast Error is the residual, unforecastable variation after the signals have been removed. This should be less than the original variation in Sales. Hence – the ONLY way to know if forecasting is doing a useful and added value job is to measure Forecast Value Add (COV)™ by comparing the variation after forecasting (forecast error) with the variation before forecasting (sales variation):

Positive Value Add - if the variability has come down then forecasting has done something useful

Negative Value Add - If (heaven forbid) it has increased then forecasting is actually making the business more difficult to run (yes, this does happen – a lot!).

Not MAPE or MAD

When we talk about forecast error variability we mean the coefficient of variability (COV) of the forecast error. Not the MAPE, nor the MAD. Both of these were historically a forecasters best means of

measuring the spread of error when all they had to help them was their trusty calculator. For a long time now we have had spreadsheets and with spreadsheets came the ability to easily calculate the standard deviations. The standard deviation of the forecast error and COV is the only statistically rigorous measurement for forecast error variability.

Forecasts are not always 'wrong'

Forecast error does not mean a wrong forecast, and forecasts are not "always wrong". An absolutely correct forecast will always have a forecast error equal to the sales variation.

It follows that where there is only noise – i.e. there is nothing in the sales variation that can be forecast – forecast error and accuracy measurements tell us nothing, and Forecast Value Add (COV) will always be, at best, zero.

Bias

Under these circumstances the only measure that matters is bias.

So – if your company is not correctly measuring Forecast Value Add (COV)™ and Forecast Bias – then it is not measuring anything that indicates how well forecasting is being performed.

Of course – even with these measurements – it is hard to know if forecasting is as good as it can be. We have some thoughts on that as well – for another paper.

Want to improve your forecast performance?

1) Measure Forecast Value Add (COV)™ and make absolutely sure that negative value add forecasts are not artificially driving up your stock levels.

You can do this by capping safety stock at the amount needed to buffer against total sales variability wherever forecast error variability is higher than this.

2) Explore forecasting approaches that maximise FVA™ and minimise bias.

The 'bullwhip' effect is caused buy poor forecasting

In high noise environments many sophisticated algorithms become confused and find imaginary patterns in the random noise. This imaginary pattern is then projected forward, compounding with the normal random variation in sales to give negative value add forecasts. This can be true of relatively simple algorithms such as linear regression – and is invariably the case when using sophisticated algorithms on limited, noisy data sets.

The so-called 'bullwhip' or Forrester Effect is caused by inappropriate use of statistical algorithms. There is a belief in the industry (encouraged by the MIT Beer Game) that variability gets amplified as it passes up the supply chain. In fact this amplification is Negative Forecast Value Add (COV)™ caused by poor forecasting processes. Jay Forrester knew this:

"[Trend extrapolation]... yields a system that is more excitable. It exhibits more vulnerability to random events."

(Industrial Dynamics page 439).

So, use the appropriate algorithms

It is essential to only use appropriate algorithms to find the kind of signals you know are present in your business where you believe those signals are statistically significant, e.g.:

- Regression for trends
- Holt-Winters for cycles

Make sure you have enough data

Plus, any forecasting algorithm must be fed with enough data for its statistics to be valid:

- Using Holt-Winters to find a seasonal cycle needs at least three years of sales history
- Finding a 5% trend in sales that have 50% noise needs a minimum of 52 weeks history – even more for smaller trends.

Poor forecasting is costing business millions in lost service and billions in unnecessary tied up capital. Making sure that your business really understands what constitutes a good forecast, and how to properly measure the value added by your forecasts is essential to begin tackling this waste.

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