

## Best practice forecasting

*Julian Mosquera, Director at LCP Consulting, discusses the role and approaches to best practice forecasting*

### Introduction

Is best practice forecasting solely about techniques and the implementation of these through best-of-breed software packages, or are these merely a step towards best practice? Does best practice itself involve the wider adoption of a forecast process within a business together with the associated cross-functional interfaces and their wide and varied relationships . a forecast culture? To answer these questions we need to consider the role of and approaches to forecasting.

### Why and what do we forecast?

In essence a business needs to forecast in order to provide an estimate of demand on which it can base its plans for the future. A good forecast allows the business to anticipate change and reduce the uncertainty concerning when the change will occur and its magnitude. However, there is no system available that can anticipate a future change in demand, they only detect such changes once in evidence. So there is a need to blend other external input and knowledge, most typically from sales and marketing.

Best practice forecasting is therefore not just concerned with systems and techniques, rather these are pre-requisites, and best practice concerns the **process** of how the forecast is prepared, applied, managed and propagated throughout the business. Many businesses boast they have best practice forecasting, but this often refers only to the means by which they generate their forecasts.

Regarding what to forecast, this is simply anything that exhibits independent demand - typically finished goods, sub-assemblies, raw materials, service parts and maintenance parts. **However, it is increasingly imperative to segment business by time, geography and product hierarchy (stock keeping unit - SKU, line, family) in order to leverage the wider benefits of forecasting and achieve the illusive improvement in forecast accuracy.** So for instance, a company may forecast a product at SKU level for a few markets / key accounts, and aggregate for the balance of the region / market.

Finally, forecasts are no substitute for known or calculated demand (dependent demand should never be forecast), for example, sub-assemblies and raw materials in a make to stock policy. Less obviously, we may forecast 6 months ahead, but there comes a point where firm customer orders dominate, if they are within our planning period (i.e. before we freeze the plan) we stop forecasting and use the known firm orders. This is distinct from the process of forecast consumption. You will also see later that there are reasons for forecasting at multiple levels, but the basic principle holds.

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## What is a Forecast and Forecasting?

Before considering the facets of a forecast process it is important to first explore forecasting and the essence of a forecast. To answer this question lets compare a forecast with a budget - aren't these the same?

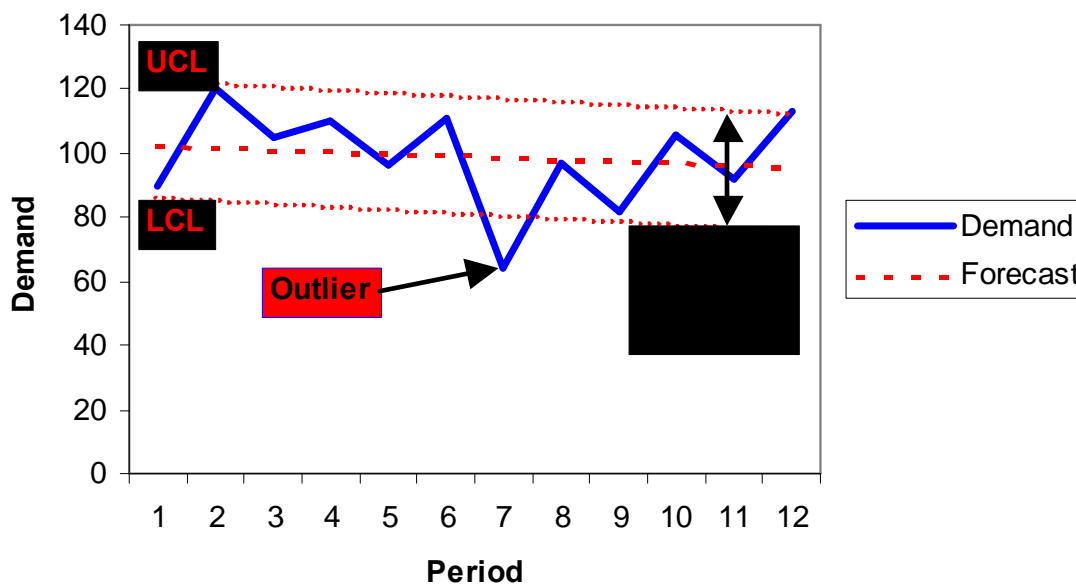
### Forecast versus budget

A typical sales budget is usually a top down number that represents the aspirations and targets for a company for a period of time ahead, usually fixed for the financial year and reviewed in the last quarter for the next year. This is sometimes based on supporting facts such as new product launches due during the budget period. It does however remain an aspiration, a wish, or possibly a reflection of the business need to remain profitable.

This is where a forecast is fundamentally different. For example, the Met Office does not generate the Bank Holiday weather forecast based on what they know everyone would like, instead they generate it based on known meteorological facts. This translates in business to data history, knowledge and experience that can be documented and explained, including known external factors. Based on these known facts a forecast is created, which may not be palatable, but reflects a current understanding and reality.

Herein lies the difference. A forecast is not and must never be an aspiration, it is the best estimate available, based on a projection of the past and a prediction of future changes, but is always capable of being explained through fact and market rationale.

### Forecast as a number



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The chart above highlights some important points:

- 1 The forecast is always wrong (if its right its by chance!)
- 2 The forecast is an average
- 3 We can measure the error between the actual demand and the forecast . depicted as variability of demand around the forecast (average); we can also conceptualise that the variability may range between an upper (UCL) and lower (LCL) control limit, outside of which demand is considered abnormal, outliers for instance.

Based on these points we should define the forecast as two numbers, the forecast itself (an average) and a measure of the error (or variation). All too often the latter is forgotten, however, it is a key means of determining the level of safety stock or contingency resource a business requires, in order to cope with the inevitable surprises that emerge over time.

## Forecasting

We have seen that a forecast is just a number (or two in fact). However, forecasting is the process of generating and managing that number. It delivers the knowledge and understanding surrounding the derivation of the forecast number, and is the means of subsequently challenging the inputs to the process and of improving forecast accuracy.

But perhaps most important of all, **it is the process by which a business should generate and agree a single number per SKU, which becomes the agreed input to all planning processes. We term this the 'One-Plan' process.** We term this the One-Plan process.

Once the business is clear on its expectations and commitments to supply / manufacture, the process of review can be **managed by exception**, simply by tracking forecasts that are behaving anomalously or have a particularly poor error, and as such should be reviewed.

In this way it is argued that forecasting, and in particular the pursuit of improved forecast accuracy, is less about the generation of a number and more about the **management of error**, and the subsequent actions that inform the business and its planners, in order to improve on the forecast in subsequent periods.

## The Forecast Process

It is a given that forecast techniques and the systems that implement them are a pre-requisite to best practice and as such we shall not dwell on these here. What we will consider and explore is the use of the forecast system functionality in facilitating the management of the forecast process. Our definition of best practice encompasses the forecast culture within an organisation, in addition to a systemic process that is followed.

Many can relate to the following:

Production Manager      You know what those sales guys are like, always over optimistic. Our market is basically flat so we always tone down their forecasts and go with our own number+

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Sales Manager	%know production has some capacity issues so I'll inflate my forecast to ensure my market gets a larger allocation of product+
Sales Rep1	%think realistically we'll only sell two thirds of the budget but I can't put that in the forecast, it's like admitting failure+
Sales Rep2	% I forecast below what I think we'll sell, when I oversell, salesman of the year is mine+

Businesses with a best practice forecast culture have the following common elements:

- An understanding by all players in the supply chain of the fundamentals of forecasting and its relation to other businesses processes such as inventory management
- Challenging but achievable forecast targets
- A process discipline and professionalism that creates a supportive planning environment
- The concept within the organisation of a One-Plan process, all players are responsible for process success.

## Demand history

The forecast process involves the capture of the businesses demand data into a database. At this point it is important to understand the data that is being captured and used for the purpose of forecasting - is it truly demand?

Is it a true representation of what the customer required during the period? More often than not the database reflects a whole series of constraints that ultimately result in the actual order placed. This gets even more complicated where businesses are required to quote for orders and have difficulty in assessing the likelihood of winning orders. However, failure to address this issue means that a business will never know the capacity it could put in place to capture additional orders.

In most cases business cannot track true demand and settle for sales history. However, customer changes to due date, delayed shipments, financial accounting rather than unit sales history, returns and re-credits etc. may distort the base data. Significant attention should be paid to preparing the data prior to the forecast process, termed **data conditioning**. At the very least you should understand what it is that is being captured in your database

One example of maintaining data integrity concerns the accounting of backorders, where:

$$\text{Sales} = \text{Sales this period} + \text{backorders this period} - \text{backorders previous period}$$

A different issue is treating the data such that any forecast algorithm chosen has the best chance of success. Demand history can be modified to correct for **outliers**, caused by data errors or abnormal demand. This does not mean that the actual sales is changed, but simply modified, to allow the data used for forecasting purposes to be as smooth as possible. Best-of-breed systems will detect these outliers and highlight them to the user for review and action; most will automatically compensate for such occurrences if no data conditioning occurs.

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## System forecast and management adjustment

The result of decomposing demand data history into its component parts (level, trend, seasonality), then applying the most appropriate algorithm, is the **baseline or system forecast**. Software today will test for these patterns and automatically select the most appropriate algorithm, in essence running a series of trials and identifying the algorithm that generates the least error.

Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May										
Sales History																									
91	74	124	102	119	70																				
Demand History											System Forecast					Statistical Forecast									
91	74	124	102	144	95					102	104	107	109	112	114										
											Known Future Demand														
											0	0	0	500	0	0									
											Market Intelligence														
											40	50	-20	0	0	0									
											Total Forecast														
											142	154	87	609	112	114									

**Forecast Management is a blend of Marketing Intelligence & Statistical Analysis**

There is often much debate regarding the value of sales and marketing, or senior management, adjusting either previous forecasts or those generated by the system for the current period; the **management forecast**. Evidence suggests that in most cases adjustments do not improve accuracy. It is usually a failure of management to recognise, that rather than adjust all SKUs they should only focus on SKUs where there is an appreciable change occurring, say a greater than 5% shift in the underlying pattern of demand.

However, the simplest approach is to monitor the performance of both the system and management forecast and report accordingly. Software systems facilitate this by recording both actual and adjusted demand and providing an assessment of their relative performance.

## Forecast error

As a process, forecasting is primarily managed using **forecast error** and a series of **filters** from which to generate exception reports. For instance cumulative forecast error is a simple means of reviewing the relative performance of the system versus management forecast.

Forecast error analysis facilitates the forecasting process in the following ways:

- Knowledge gained over time regarding product behaviour is used to improve accuracy, anticipate similar situations in the future and gain efficiencies in handling these exceptions

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- Review resulting in the re-selection or tuning of the forecasting algorithm will result in less exceptions being reported. Care must be taken not to make too many adjustments, as this can result in system nervousness. As a rule of thumb a new forecast should be allowed to run for three periods before major adjustments are undertaken.

Whilst a monthly review and feedback process will lead to improved accuracy, there is a limit due to the intrinsic variability of demand. Best practice will tend to yield results, for the aggregate period-by-period SKU accuracy (individual SKUs will vary widely), as follows:

Performance	Observation
+/- 30%	Acceptable . better than most businesses today
+/- 17-20%	Very good . the real benchmark
+/- 10%	Exceptional . usually a generic product set and / or forecast at line level
<+/- 10%	Lucky! . typically a very narrow data set / stable product base, often forecast at line or family level

So the management of forecast error is important for the following reasons:

- It drives continuous improvement through an exception reporting process
- To track the success of adjustments, control the extent of user intervention and report on problem areas needing to be prioritised (e.g. a top 10 SKU report by product family or market)
- Forecast error should be used to feed directly into other planning and policy areas, for example using the standard deviation of the forecast error within inventory planning to calculate appropriate safety stocks.

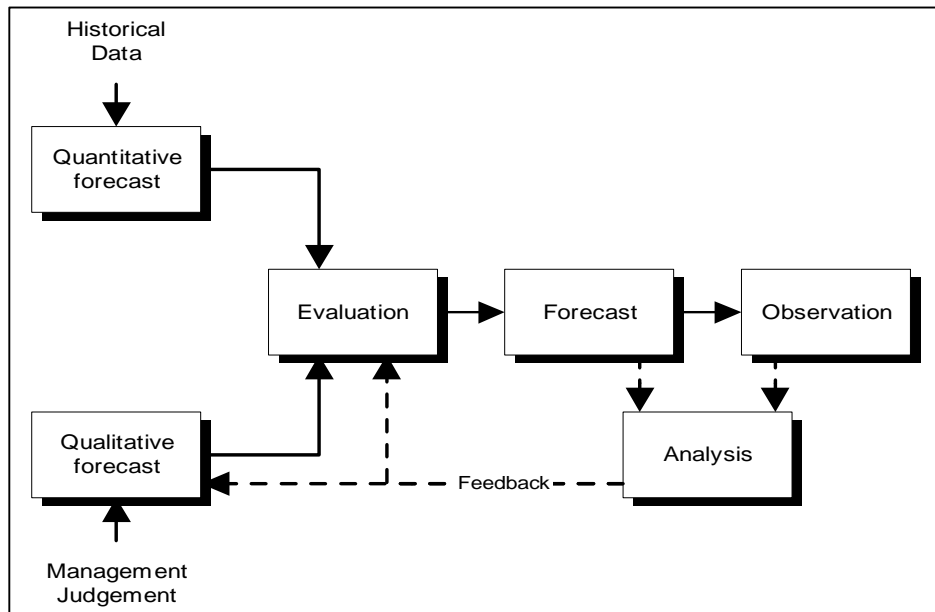
## One-Plan Process

Far too often procurement, production, warehousing and logistics attribute their failure to perform to the level of forecast error, whilst the forecast error itself is used as a stick with which to beat sales and marketing. A feature of best practice is the recognition that forecast error will always exist, and that targets for forecast accuracy should be realistic. Demand variation and the supply chain impact must therefore be managed accordingly.

An enabler is the adoption of a **One-Plan** process, facilitated by management sign-off, whereby all stakeholders in the forecast, review and accept the forecast before transmission into corporate systems. This requires discipline and commitment to attend the review meetings each period. The sign-off itself is not just concerned with agreeing a number but instead reviewing the supporting evidence that leads to the generation of the forecasts.

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More significantly, as a result, all subsequent planning systems manipulate a single, agreed and understood input. As such all functions are planning on the same basis and seeking to support the same campaign. This review process naturally supports the more general Sales and Operations Planning (S&OP) process and acts as a forum to periodically review how well the business is meeting its corporate goals. Such a forecast process can be described diagrammatically as shown below:



## Summary

A forecast is a prediction, not an aspiration, that is based on the analysis of historical data, preferably demand and not sales. Changes in demand or forecast should be reviewed, explained and documented.

A forecast is an average and as such is always wrong and therefore should be represented by two numbers, the forecast and a measure of the error (variation).

Forecasting is a process and not just a system or series of algorithms; it is about the management of error and as such is a blend of market intelligence and statistics . the art and the science. Forecast tracking becomes the norm, looking for unusual performance and managing by exception. The business must respect the process and thereby develop confidence in its output; a process that has rigour and integrity, and is not abused.

To achieve best practice a culture must develop in businesses where all, boardroom down, buy into the process and where there is a realistic expectation around accuracy, and where one number per SKU drives the entire planning activity.

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## About LCP Consulting

LCP Consulting is a leading specialist in customer-driven supply chain management. With over 20 years experience in the field, we identify where supply chains make major contributions to how businesses operate profitably and compete effectively. We support businesses review, re-design and implement changes to their end-to-end operations. Our fact-based diagnostics pin point exactly where & how to cut costs, enhance operational efficiency and invest for the future.

LCP Consulting is a member of the Green Logistics Consultants Group, which is an international collaborative network of supply chain consultants who focus on improving the environmental performance of supply chains.

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