

Predictive Purchasing

The Application of Predictive Analytics to Reduce Excess Inventory

Summary

A problem vexes manufactures, distributors and retailers; that of excess inventory and particularly of 2nd and 3rd Tier products. Excess inventory increases carrying costs that are commonly 25% - 35% of inventory value due to the cost of storage, depreciation, insurance, borrowing and moving products.

Despite the wide spread use of demand planning, business intelligence and ERP software excess inventory problems have not been solved because these software systems lack critically capabilities in sophisticated predictive forecasting and systematic incorporation of external data. These systems have five key weaknesses that preclude them from solving excess inventory, namely:

- Simplistic forecasting formula that does not accommodate the high volatility and inconsistent lifecycles that accompany low volume products
- Forecasting a point value at a future point in time rather than the most probable range of values
- No systematic capture of field sales knowledge regarding events that can affect sales demand
- No systematic correlation with past events that can affect sales demand
- No incorporation of external data that can affect sales demand

Typical demand planning, business intelligence and ERP software accommodates inventory planning for 1st Tier products or materials with characteristic high volume and low volatility, as any over estimation is largely masked by the rapid consumption of these products. However, for 2nd and 3rd Tier products the weaknesses in these software systems combine to often yield purchasing forecasts that result in excess inventory. Inaccurate forecasting reduces asset utilization that results in higher operating costs, lower return-on-assets and lower net income.

The problem of excessive inventory has been solved by **ISIS Discovery & Predictive Analytics™** deployment of **Predictive Purchasing**. ISIS software transforms the “gut feel” art of purchasing into a science through its sophisticated forecasting mathematics, statistical predictive formula and systematic incorporation of external data to yield a more precise purchasing forecast.

Reasons for Excess Inventory by Current Software

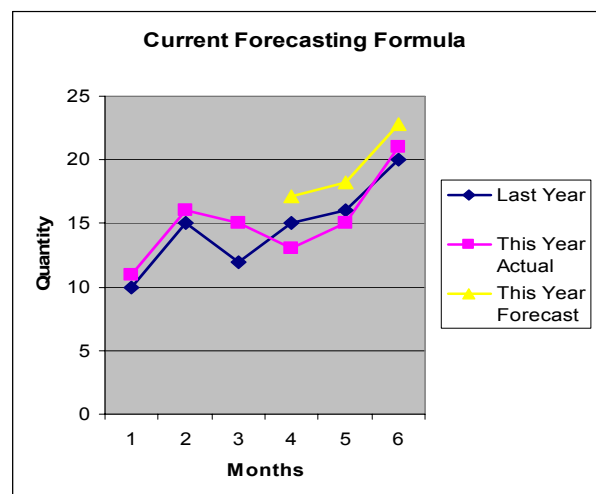
The best method for controlling inventory starts with directly forecasting and predicting demand. To be clear forecasting and predicting are different though hand-and-glove related. A forecast is a calculated future value (from historical data) at a future point in time. A prediction is the probability of the forecast. A weather forecast is a perfect example of this relationship. The forecast of a “60% chance of rain tomorrow in Los Angeles” contains a forecast (a future value at a future point in time) of “rain tomorrow in Los Angeles” and a prediction (the probability of the forecast) of “60%.”

Companies suffer as a result of inaccurate forecasting and prediction. Precious capital is consumed in excess inventory that reduces asset utilization, increases operating costs and lowers net income. This capital can be better deployed in activities that can grow the business.

Presented below is a brief discussion of the key weaknesses of demand planning, business intelligence and ERP software that conspire to create the problem of excess inventory.

- **Simplistic Forecasting Formula**

Often time forecasting of demand is based on simplistic formula, as presented on the graph below:



The graph above is from a large beverage distributor. The **Blue** line represents last year’s sales, the **Red** line is the current year’s sales and the **Yellow** line is the forecast. In this example, the forecast was

calculated by a simple arithmetic average of the sales last year vs. this year for months 1, 2 and 3. So, this year's sales are 5% more than last year's in month 1 and 10% more in month 2 and 15% more in month 3 then the average over the past three months is 10% ($5\% + 10\% + 15\% / 3$). The Yellow line is then calculated by applying a 10% lift to last year's sales for months 4, 5 and 6. However, in this case, what actually happened was in months 4 and 5 sales dropped and for month 6 sales rebounded. As such, purchasing done to the sales demand of the Yellow line created excess inventory.

- **No Capturing Field Sales Knowledge**

The next problem is the inability to systematically capture field sales knowledge into the forecast about future events that could affect sales demand. For example, a salesman of a consumer electronics manufacturer learns that a mall where one of his customers is located will be holding a Greek Festival. More foot traffic can increase sales but demand planning software, business intelligence or ERP software has no systematic way to capture this knowledge or obtain a likely impact on sales. Typically, these events are sometimes transmitted via emails but in a random manner.

- **No Correlation of Events on Demand**

Product promotions can have a material effect on sales demand but manufacturers and distributors may only know of promotional events through ad-hoc emails. Further, even if promotional activities are known, there is usually no analytic correlation of the effect the promotion had on sales. Further, there is no quantitative assessment of whether or not the promotion produced lift or if it had a negative effect to cannibalize a primary product. As such, this knowledge typically resides in someone's head and it is left to memory or gut feel to determine the impact on demand.

- **No Incorporation of External Data**

External forces have a large affect on demand. For example, in consumer packaged products it is often said that weather is the best (or worst) salesman. However, this major external influence of weather is missing from most demand planning, business intelligence and ERP software. To be able to use a 10 day weather forecast on upcoming demand would have a profound impact on decisions regarding inventory levels. Other examples of external forces abound like fuel costs, CPI, competition, etc.

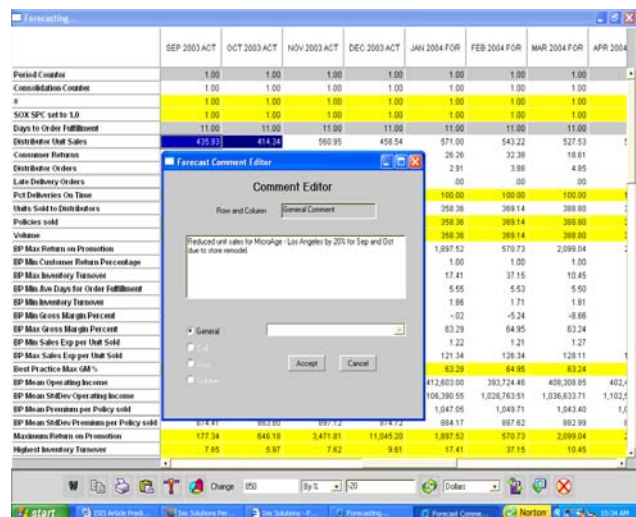
ISIS Predictive Purchasing

The ISIS **Predictive Purchasing** solution responds the weaknesses in current systems through:

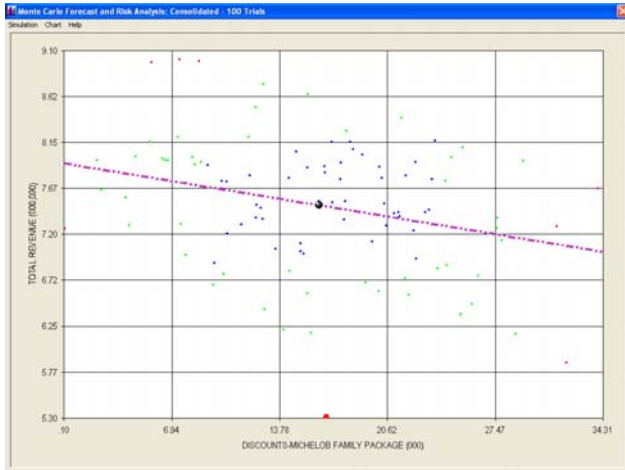
- Sophisticated non-linear forecasting formula
- Systematic capture of field sale knowledge
- Correlation to determine the affect of past actions on lift
- Incorporation of external structured and unstructured data
- Predictive analytics to calculate the confidence in the forecast

Forecasting: The first problem to tackle is the need to look beyond mere inventory turns. ISIS **Predictive Purchasing** starts with sales demand and brings a sophisticated non-linear forecasting mathematics that can more precisely calculate the future.

Field Sales Knowledge: Next, is the ability to systematically capture field sales knowledge. For example, presented on the figure below is the ISIS forecast box that is simply accessed over the web (and note it is similar in form to a spreadsheet that most users are familiar with). A sales manager informs of an impending event by swiping the sales forecast for the upcoming time period then lowering the forecast, in this example by -20%. The sales manager then describes the reason for the decline in forecast sales (due to a store remodel) and the modified forecast is automatically sent for review and approval. This simple and powerful system connects the field sales with purchasing.

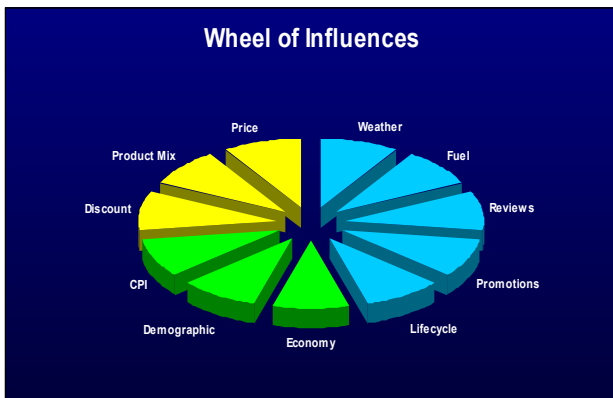


Correlation: Knowing the effect of past actions on demand is required to better predict future demand. For example, is discounting producing lift? The scatter graph below shows the affect of discounting a product on revenue. The **Purple** line is a linear regression analysis on the scattered dots.



The Correlation Coefficient (not shown on the graph) is a negative 30% and reflected in the negative slope on the graph above. The translation is that discounting this product has a weak and negative effect to produce lift. Knowing this enables better decisions about what products, when and where to put on discount.

External Data: Then there are factors outside the company’s data that are needed to be known as they affect demand. On the figure below several influences can affect demand. These include weather, fuel, promotions and discounts, product lifecycle to name a few. These influences also correlated to determine their affect on producing lift.

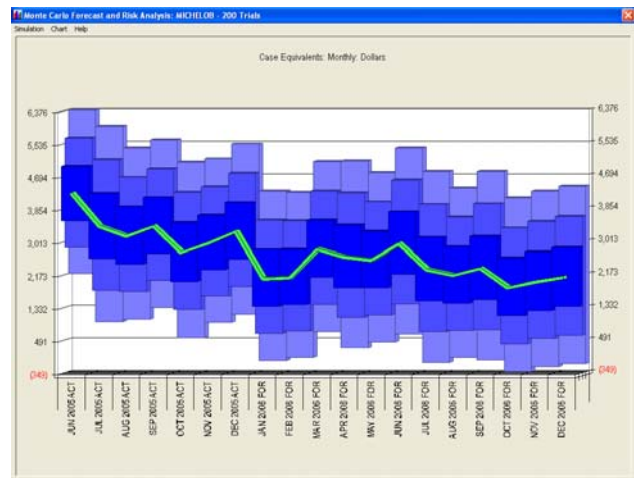


In ISIS **Predictive Purchasing** both structured and unstructured data can be incorporated and analyzed. For example, for wine distributors the rating of a wine can significantly influence sales. The opportunity is to absorb

the unstructured wine review and to learn the product and its rating then incorporate this into the sales forecast.

Predictive Purchasing: From the advanced forecasting formula, to the input of future events to the correlation of past activities and external data a more sophisticated, complete and precise calculation of demand can be made. Finally, the forecast is run through a Monte Carlo Simulation to determine the probable range of confidence.

Presented on the graph below is a Monte Carlo Simulation about a product forecast. The **Green** line is the monthly forecast made from a Holt-Winters formula and the **Blue** bars around the forecast line are the standard deviations. The darkest blue bar represents one standard deviation around the forecast or a 68% probability that the future outcome will fall into that range. Each of the next lighter blue bars is two standard deviations with a 15% probability. Each of the lightest blue bars is three standard deviations with a 1% probability the future outcome will fall into this range. Accordingly, a purchasing manager would typically confine purchases to the darkest blue bars where the probability is the highest.



Summary

ISIS Discovery & Predictive Analytics™ has powerful application in Predictive Purchasing to materially reduce excessive inventory. **Predictive Purchasing** enables purchasing decisions to look ahead and go beyond demand planning, business intelligence and ERP software.

Forecasting and Predictive Analytics powerfully combine to foresee the future. They assure the optimum deployment of capital and the mitigation of risks. **Predictive Purchasing** in conjunction with demand planning, business intelligence and ERP software form a complete purchasing environment.



About ISIS Solutions, Inc.

ISIS Solutions, Inc. is the center of *Predictive Analytics* and the *ISIS Discovery & Predictive Analytic™* software enables users to harness the power of prediction through a simple English language interface, without programming, spreadsheets or IT support to engage sophisticated mathematical models that uncover the meaning in the data and foresee the future. ISIS delivers all *12 Essential Analytics™* necessary for every business to improve operations and includes the leading indicators of future trends, forecasting, probability of achieving the forecast and efficiency metrics used to improve the deployment of human and capital resources. ISIS amplifies legacy and business intelligence software to produce cost effective continuous information improvement.

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