Improving Performance with SKU Forecast

A Step-by-Step Guide to Creating a SKU Forecast

Accelerated Analytics®

September 2009

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Objectives

The purpose of this article is to explain the process of creating a SKU forecast. A SKU forecast is used to predict future sales demand so you can ensure adequate inventory is available on the shelf. In the Store Analysis and SKU Analysis articles in this series, we explain that part of the overall methodology is to determine which stores and SKU's are the highest contributors. This is so you can reduce the volume of data that you need to analyze and focus on the most important contributors. We recommend you read these two articles before conducting the SKU forecast, and then limit the SKU forecast to the A and B stores and SKU's.

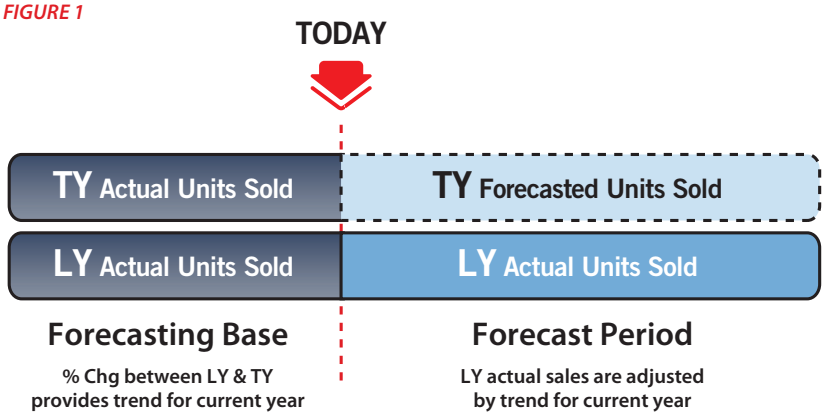
Key Considerations

A SKU forecast is often compared to an out of stock analysis. An out of stock analysis provides a rear view look at what has happened; a SKU forecast looks into the future to predict and avoid out of stocks.

It should be noted the forecasting model in this article is for store replenishment, and is not intended to be used for manufacturing production planning. Many vendors produce product outside the U.S. which makes long range forecasting necessary due to long transportation lead times. In this article, the forecast model is meant to identify short-term out of stocks before they happen so you can work with your replenishment manager to take corrective action. Corrective action is going to require the vendor order inventory and have it on the shelf within a 2 or 3 week period of time.

The forecasting process uses two time periods to determine the forecasted units: a current selling period which we call the forecasting base, and prior year actual sales which we call the forecast period. The forecasting base is a current period of sales and is compared to the same period in the prior year to determine the trend (growth or decline) of sales this year over last year. The forecast period of LY actual units sold is then adjusted by the trend for the current year to reflect current market conditions. *See Figure 1.*

FIGURE 1



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There are several things to consider before setting up your data table. First, how many weeks should be included in the forecasting base period? To make this decision, consider: are your products seasonal or subject to other large changes in sales velocity due to promotional events, weather, or other factors? If the answer is "Yes," then the forecast base period should be relatively small to avoid missing a change in velocity. If the answer is "No," then a longer forecasting base is suitable. Typically, a seasonal vendor should choose a forecast base of approximately 5 weeks, while a non-seasonal replenishment vendor with little variability should choose a forecast base of approximately 10 weeks.

The next decision to be made is how many weeks in the future to forecast demand. Most of the time, the forecast period will be 5 to 20 weeks. The forecast period should correspond to the lead time necessary to ship inventory to stores. A forecast that is longer than 20 weeks is likely to introduce errors due to changing demand, especially for a seasonal vendor.

Step-By-Step Construction

Pre-Work: Set-up Data Table

To prepare for the analysis, set up a data table as seen in Figure 2. Notice the table is at a SKU and store level of detail, and each individual combination is uniquely forecasted based on what is happening at that store. To set up the table, you will use units sold for the base forecasting period (both this year and the comparable period from last year), the units sold for the forecast prediction period, and the current OH. Insert several rows between the sales numbers and the OH column. We will be adding calculated columns to the data table between the sales columns and the OH column, but exporting the sales data with the OH data will save a step later and avoid having to match rows to ensure accuracy. *See Figure 2.*

FIGURE 2

		THRU WEEK ENDING 8/30 MOST RECENT 5 WEEKS ROLLING		
STORE	**SKU**	**LY UNITS**	**TY UNITS**	**CURRENT OH**
266	154787	23	25	7
6367	154787	25	33	2
233	149446	65	66	29
265	149446	15	21	14
6331	149446	53	56	22
6350	149446	35	52	28
6363	149446	95	118	29
6335	156743	51	130	46

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1. Calculate Percentage Change in Unit Sales

The first step is to calculate the percentage change in unit sales year-over-year for the base forecast period. See Figure 3 for where the % Chg is placed in the data table. To calculate the percentage change, use the formula:

$$\frac{\text{Current period} - \text{Prior period}}{\text{Prior period}}$$

2. Adjust Total Units Sold

The next step is to adjust the total units sold in the forecast period based on the current year percentage change in sales. In Figure 3, the column "Predicted 16 Wk Unit Sales Based on Last Year" is the forecast period. In other words, the forecast period is last year's actual sales from today forward. To perform the adjustment, use the formula below, which will adjust the forecast period sales to reflect the current year change in demand. *See Figure 3*

$$\text{Forecasted period} * (1 + \text{Percentage change})$$

FIGURE 3

		THRU WEEK ENDING 8/30 MOST RECENT 5 WEEKS ROLLING			PREDICTED 16 WK UNIT SALES BASED ON	PREDICTED 16 WK UNIT SALES BASED ON	
STORE	SKU	LY UNITS	TY UNITS	% CHG	LAST YEAR	CURRENT 5 WK TREND	CURRENT OH
266	154787	23	25	8.70%	73.00	79.35	7
6367	154787	25	33	32.00%	66.00	87.12	2
233	149446	65	66	1.54%	174.00	176.68	29
265	149446	15	21	40.00%	75.00	105.00	14
6331	149446	53	56	5.66%	106.00	112.00	22
6350	149446	35	52	48.57%	141.00	209.49	28
6363	149446	95	118	24.21%	208.00	258.36	29
6335	156743	51	130	154.90%	187.00	476.67	46

3. Divide Adjusted Total by Number of Weeks in Forecast Period

The adjusted demand number seen in the column "Predicted 16 Wk Sales Based On Last Year" is a total for the prediction period. Therefore, we need to divide the adjusted total by the number of weeks in the forecast period. In our example, the forecast period is 16 weeks. We divided the total predicated sales by 16 to yield a weekly predicted units sold. *See Figure 4.*

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FIGURE 4

STORE	SKU	THRU WEEK ENDING 8/30 MOST RECENT 5 WEEKS ROLLING LY UNITS	TY UNITS	% CHG	PREDICTED 16 WK UNIT SALES BASED ON LAST YEAR	PREDICTED 16 WK UNIT SALES BASED ON CURRENT 5 WK TREND	PREDICTED WKLY UNITS SOLD	CURRENT OH
266	154787	23	25	8.70%	73.00	79.35	4.96	7
6367	154787	25	33	32.00%	66.00	87.12	5.45	2
233	149446	65	66	1.54%	174.00	176.68	11.04	29
265	149446	15	21	40.00%	75.00	105.00	6.56	14
6331	149446	53	56	5.66%	106.00	112.00	7.00	22
6350	149446	35	52	48.57%	141.00	209.49	13.09	28
6363	149446	95	118	24.21%	208.00	258.36	16.15	29
6335	156743	51	130	154.90%	187.00	476.67	29.79	46

4. Calculate Current Weeks of Supply (WOS)

The next step is to calculate the current weeks of supply (WOS) given the predicted weekly sales. WOS is calculated by dividing current on hand by the predicted weekly units sold. In our example table, we use weeks of supply at 100% demand. If you want to make your forecast more conservative, you can adjust demand to be less than 100%. For example, if the predicted weekly units sold is 10, you might use only 80% of the forecasted demand. In this case, your WOS calculation would be divided by the reduced demand figure. If you have a very conservative replenishment manager, this approach will make the forecast more conservative and perhaps more credible. To adjust the forecasted demand down as described, use the formula below. *See Figure 5.*

Current OH / (Predicted weekly units sold * 0.8)

FIGURE 5

STORE	SKU	THRU WEEK ENDING 8/30 MOST RECENT 5 WEEKS ROLLING LY UNITS	TY UNITS	% CHG	PREDICTED 16 WK UNIT SALES BASED ON LAST YEAR	PREDICTED 16 WK UNIT SALES BASED ON CURRENT 5 WK TREND	PREDICTED WKLY UNITS SOLD	CURRENT OH	CURRENT WOS AT 100% DEMAND
266	154787	23	25	8.70%	73.00	79.35	4.96	7	1.41
6367	154787	25	33	32.00%	66.00	87.12	5.45	2	0.37
233	149446	65	66	1.54%	174.00	176.68	11.04	29	2.63
265	149446	15	21	40.00%	75.00	105.00	6.56	14	2.13
6331	149446	53	56	5.66%	106.00	112.00	7.00	22	3.14
6350	149446	35	52	48.57%	141.00	209.49	13.09	28	2.14
6363	149446	95	118	24.21%	208.00	258.36	16.15	29	1.80
6335	156743	51	130	154.90%	187.00	476.67	29.79	46	1.54

5. Calculate Unit Forecast Needed to Maintain Target WOS

The final column is a calculated unit forecast needed to maintain a target WOS. The formula to calculate the column is:

(Target WOS – Current WOS) * Predicted weekly units sold

So the forecast results do not become a stumbling block when you present them, we recommend you obtain the target weeks of supply directly from the replenishment manager. Some items in your product list may have different target weeks of supply. In such a case, you could perform the

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analysis for a set of SKU's with the same target weeks of supply in one table and a different set of SKU's in another table; or you can sort your data table by SKU and enter a custom formula for the target weeks of supply for the range of SKU's desired. ***See Figure 6.***

The forecast example included in this article's figures uses only units on hand because most vendors have EDI 852 data, and those files will not include shipping, on order, and/or in transit data. However, if you are able to add this data using your purchase orders or other sources, the end result will be a more accurate predicted weeks of supply calculation. Simply add those values into the current OH so the weeks of supply are not based only on what is in store at this time, but also what is on its way to the store. This will ensure you do not forecast units for a store which has already identified the shortage and placed an order.

FIGURE 6

		THRU WEEK ENDING 8/30 MOST RECENT 5 WEEKS ROLLING			PREDICTED 16 WK UNIT SALES BASED ON	PREDICTED 16 WK UNIT SALES BASED ON			CURRENT WOS AT 100%	UNITS NEEDED FOR 4 WOS AT
STORE	SKU	LY UNITS	TY UNITS	% CHG	LAST YEAR	CURRENT 5 WK TREND	PREDICTED WKLY UNITS SOLD	CURRENT OH	DEMAND	100% DEMAND
266	154787	23	25	8.70%	73.00	79.35	4.96	7	1.41	12.84
6367	154787	25	33	32.00%	66.00	87.12	5.45	2	0.37	19.78
233	149446	65	66	1.54%	174.00	176.68	11.04	29	2.63	15.17
265	149446	15	21	40.00%	75.00	105.00	6.56	14	2.13	12.25
6331	149446	53	56	5.66%	106.00	112.00	7.00	22	3.14	6.00
6350	149446	35	52	48.57%	141.00	209.49	13.09	28	2.14	24.37
6363	149446	95	118	24.21%	208.00	258.36	16.15	29	1.80	35.59
6335	156743	51	130	154.90%	187.00	476.67	29.79	46	1.54	73.17

Conclusion

Buyers are not always open to vendors forecasting and recommending orders and even if they are open to considering a vendor forecast, they may be constrained by corporate replenishment rules and systems. Even if your buyer is not open to accepting a forecast, tell them you are working on a model for internal use. Ask them to give you the forecasting base and forecast period they would use if they were forecasting your products, as well as what target weeks of supply they would use. This helps avoid a conversation later if your forecast is shot down simply because you used numbers they did not like. In other words, if they provide the numbers, they may have some small amount of ownership for the end result since they can't argue with their own numbers.

Also, if you need to build a business case on why forecasting is beneficial, we find converting the units into dollars is helpful. This can be done easily by multiplying the predicted weekly units sold by the item price resulting in a predicted weekly dollar sales. You would then save 8 consecutive weeks of the forecast and study the saved reports to identify situations where the WOS is less than the lead time needed to replenish a store. This enables you to put a dollar value on lost sales. The store may not have actually gone out of stock, so look at the numbers carefully. However, it is reasonable to assume $150 to $200 in lost sales occurred if a store has a 0.4 WOS, a predicted dollar sales volume of $125, and a two week replenishment lead time.

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Another article in this series describes the process of conducting an out of stock analysis based on actual OH and actual units sold. The out of stock analysis is also a very strong tool for building a business case on the benefits of forecasting.

Next Steps

This analysis is one in a series of articles that provides step-by-step guidelines to creating reports and analyses that can help you better understand and improve SKU and store performance. The series includes the following articles:

- Store Analysis
- SKU Analysis
- Out of Stock Analysis
- SKU Forecast

To purchase and download additional articles in this series, visit www.acceleratedanalytics.com.

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