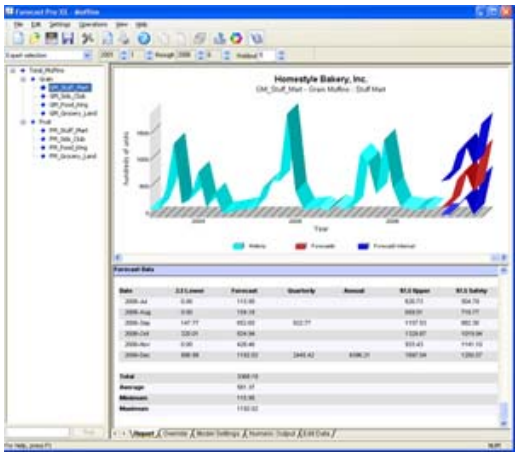
TRENDS
Tips, Techniques, Information and Insight for Forecasters
ForecastPRO
Subscribe | www.forecastpro.com

Welcome
Welcome to *Trends*, the e-newsletter from Business Forecast Systems. *Trends* puts more than two decades worth of forecasting knowledge, experience and expertise at your fingertips every other month. Watch this space for tips & techniques, information & insight, observations & opinions and more. Thanks for reading!

Introducing Forecast Pro Version 5

The all new Forecast Pro XE Version 5 and Forecast Pro Basic Version 5 are packed with enhanced models and easy-to-use, intuitive features to make business forecasting more accurate and easier than ever—all at a very affordable price! Incorporating 20+ years of forecasting knowledge, this major new release has everything you need to tackle even the most advanced forecasting problems—with V5, you will save time and money while improving your planning and decision-making.



Read more…

Forecasting 101: *Out-of-Sample Testing*

Measuring Expected Forecast Accuracy via Out-of-Sample Testing

This article examines the use of out-of-sample testing to estimate expected forecast accuracy. It explains how the procedure works, the distinction between a "rolling" and "static" approach and the limitations of within-sample statistics.

Read more…

Relating Sales & Operations Planning (S&OP) to Forecasting

S&OP is one of those acronyms you've likely heard. The following article gives an overview of how S&OP relates to forecasting. When implemented, the S&OP process enables the forecasting team to improve their forecasts by allowing visibility into assumptions and plans across all functional areas of the business.

Read more…

Managerial Judgment as an Input to the Statistical Forecasting Process

While much is written about adding management judgment to forecasts by adjusting or changing the model-based forecast numbers, knowledge of the business can and should also be incorporated into the actual development of the statistical model. In his article from the October 2005 issue of *Foresight: The*

July 2006

Calendar of Events

Forecast Pro Training
Product training workshops teach you how to use Forecast Pro most effectively.

Forecast Pro Training
July 24-25, 2006
Boston, Massachusetts USA

Forecast Pro V5 Quick Start NEW!
August 14, 2006
Chicago, IL

Forecast Pro V5 Quick Start NEW!
August 15, 2006
Los Angeles, CA

Forecast Pro V5 Quick Start NEW!
August 21, 2006
Washington, DC

Forecast Pro V5 Quick Start NEW!
August 22, 2006
Atlanta, GA

Forecast Pro Training
September 11-12, 2006
Brussels, Belgium

Forecast Pro Training
September 28, 2006
Boston, Massachusetts USA

Forecasting Summit
Forecasting Summit offers a unique combination of education, discussion, instruction and perspectives on business forecasting for practitioners.

Forecasting Summit 2006
September 25-27, 2006
Boston, Massachusetts USA

Forecast Pro Appearances
Look for Forecast Pro at the following events.

Forecasting Summit 2006
September 25-27, 2006
Boston, Massachusetts USA

International Journal of Applied Forecasting, Rob Dhuyvetter of J.R. Simplot discusses the issue and describes how judgment has been formally integrated into the statistical modeling process at Simplot.

Read more…

Lighter Side

An economist is an expert who will know tomorrow why the things he predicted yesterday didn't happen today.
- Evan Esar

APICS Conference
October 29-31, 2006
Orlando, Florida USA

Feedback

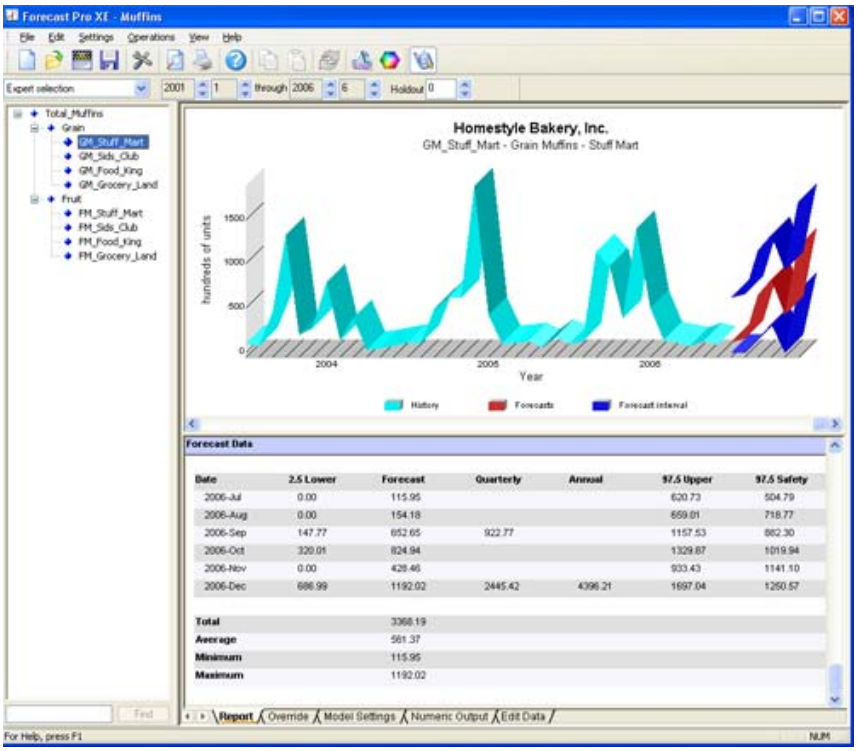
We at Trends value your feedback. Please feel free to send us your comments, questions or requests at newsletter@forecastpro.com.

Business Forecast Systems, Inc. | 68 Leonard St. | Belmont, MA 02478, USA
Phone: 617.484.5050 | Fax: 617.484.9219

Forecast Pro Overview
- Overview
- Which Edition
- XE & Basic
- Unlimited
- Integrating

Literature & Demos
Reviews
FAQ
Order
V5 Upgrade Central

V5 Upgrade Central



Introducing Forecast Pro Version 5

The newly re-designed Forecast Pro XE Version 5 and Forecast Pro Basic Version 5 will make your forecasting easier and more accurate. Here's just a sample of what you'll find in V5:

- **Improved Expert Selection** for more accurate automatic forecasting. Expert Selection now chooses from a broader range of models, more accurately detects seasonality in low-volume data sets and includes improved "special handling" for anomalous data sets.
- A **brand new, intuitive interface** lets you view and interpret your data more easily and navigate effortlessly through large data sets and multi-level product hierarchies.
- Powerful new **graphing and reporting capabilities** allow you to create dazzling, presentation-quality reports in seconds. Version 5 includes four professionally-designed standardized report formats in addition to a custom reporting option for maximum flexibility.
- Seasonal Simplification, **a powerful new *must-have* methodology** if you are forecasting data with more than 12 observations per year. Seasonal Simplification reduces the number of seasonal indexes used to model the data and often substantially improves forecast accuracy.

- A **streamlined regression modeling** facility with **enhanced diagnostics** that will save you time and improve your models. Using the new navigator-based modeling options, you can add and delete terms from your current model with a click of the mouse.

For more information about V5:

- Click here to view the streaming video quick tour of Forecast Pro XE Version 5. (Presented in Windows Media Player, best viewed in Version 9)

- Click here to download the Forecast Pro XE and Forecast Pro Basic Version 5 product brochure (440k PDF)

Upgrade to V5 Now-Limited-time Special Offer

If you are using a previous version of Forecast Pro Standard or Forecast Pro XE (Version 4 or earlier), you can **upgrade to Version 5 for only $199!** Click here for an order form and all the details.

Forecast Pro XE V 5 Quick Start Product Training

This new one-day workshop is designed to provide a comprehensive overview of Forecast Pro XE Version 5 so that you can "hit the ground running." You are provided with a computer loaded with Forecast Pro XE V5 and guided through numerous forecasting problems using real business data. If you sign up for the XE V5 Quick Start Product Training at the same time you upgrade to XE V5, you will receive a **$200 discount**—it's like getting theV5 product upgrade free! Click here for a course description and schedule.

Forecast Pro Unlimited Users, your current version is 4.4. We are currently developing Forecast Pro Unlimited Version 5 and you will be notified when it is available.

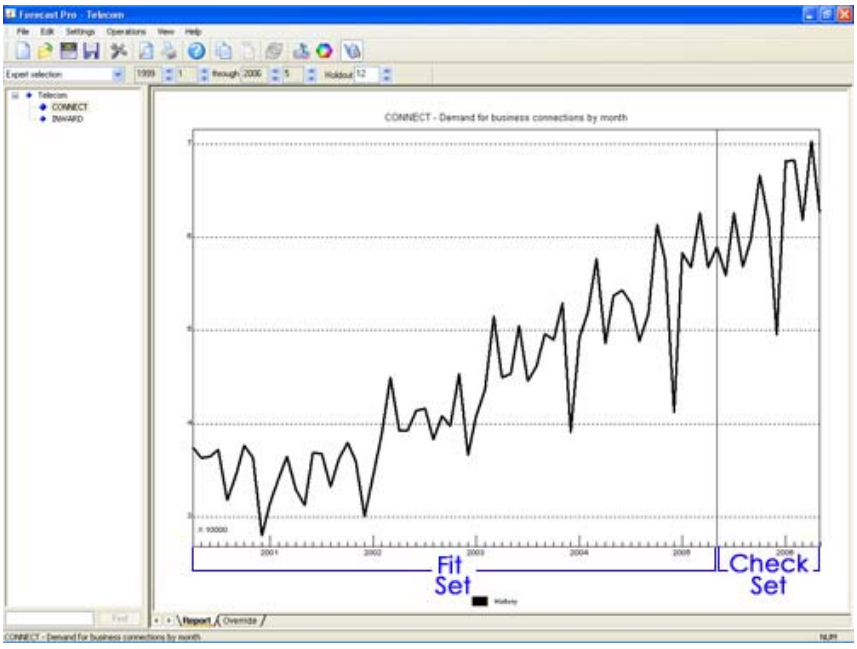
Forecasting 101: *Out-of-Sample Testing*

Measuring Expected Forecast Accuracy via Out-of-Sample Testing

In the last issue of *Trends* this column discussed using within-sample statistics to compare and contrast different forecasting models. Although it is tempting to assume that the forecast accuracy of a given model will be similar to the within-sample fit—this is usually not the case.

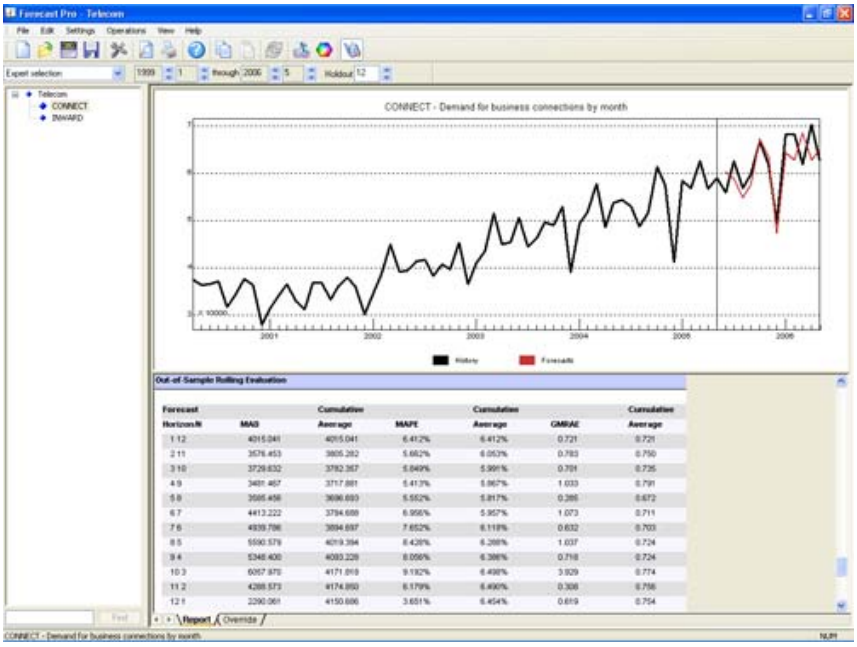
Within-sample statistics measure the goodness of fit to the historic data. Within-sample fit is almost always better than actual (out-of-sample) forecasting performance. This is due to the fact that the parameters of a statistical model are selected to minimize the fitted error over the historic data. The parameters are thus adapted to the historic data, and reflect any of its peculiarities. Put another way, the model is optimized for the past—not for the future.

So how do we estimate expected forecast accuracy? One option is to perform a simulation and generate out-of-sample error statistics. *Generally speaking, out-of-sample statistics yield a better measure of actual forecast accuracy than within-sample statistics.*



The procedure is very straightforward. You begin by dividing the data into two parts—the “fit set” and the “check set.” The fit set is used to identify the model, estimate its coefficients and prepare forecasts for the check set period. The check set data is only used to compute the forecast errors.

Thus, the results do not show how accurately the method *fit* the past; the results show how accurately the method *would have forecast* the future had it been used.



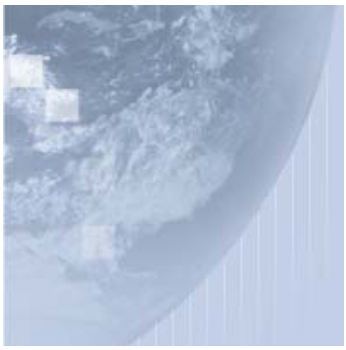
Out-of-sample testing can be performed using either a *static* or a *rolling* base. With a static-base test you withhold a certain number of data points from the end of the historic data and generate a single forecast. The red line on the graph above shows a static-base forecast. In the example, we withheld the last twelve data points and generated a twelve month forecast. A significant weakness of this approach is that it uses only one forecast base, the last point in the fit set. Thus, you obtain only a "snapshot" of performance from one point in time. Selecting a forecast base just before or after a dramatic event in the data may completely change the results. Furthermore, you obtain only one forecast error for each horizon length (i.e., a single one-month-ahead forecast, a single two-month-ahead forecast, etc.).

A rolling-base evaluation is generally recognized as a superior approach. The procedure begins in the same way. However, after the initial static forecasts have been made, the base is rolled forward by one period (i.e., the length of the hold-out is shortened by one period). Forecasts are then made from the new base to the end of the withheld data. This process is repeated until the withheld data sample is exhausted. If 12 data points have been withheld, then you obtain 12 one-step forecasts, 11 two-step forecasts, 10 three-step forecasts, etc.

Forecast Pro provides a convenient facility to perform out-of-sample testing. You simply specify the length of the hold-out sample and Forecast Pro automatically performs the analysis. Results are shown on both a static and rolling basis and include the MAPE (Mean Absolute Percent Error), MAD (Mean Absolute Deviation) and GMRAE (Geometric Mean Relative Absolute Error).

About the author:
Eric Stellwagen is Vice President and co-founder of Business Forecast Systems, Inc. (BFS) and co-author of the Forecast Pro software product line. He consults widely in the area of practical business forecasting—spending 20-30 days a year presenting workshops on the subject—and frequently addresses professional groups such as the University of Tennessee's Sales Forecasting Management Forum, APICS and the Institute for Business Forecasting. Recognized as a leading expert in the field, he has worked with numerous firms including Coca-Cola, Procter & Gamble, Merck, Blue Cross Blue Shield, Nabisco, Owens-Corning and Verizon, and is currently serving on the board of directors of the International Institute of Forecasters (IIF).

Home
Conference Program
Registration
Pre-Conference Workshops
FAQ's
Visiting Boston
Past & Future Conferences
Get Conference Updates



E-mail us:
info@forecasting-summit.com
register@forecasting-summit.com

Relating Sales & Operations Planning to Forecasting

Many times, despite having invested considerable resources into forecasting, companies continue to struggle with improving their forecast accuracy. The results show up as inventory (too much of the wrong stuff and not enough of the right stuff), inefficiency (lower margins, higher costs) and ultimately, unhappy customers.

The irony is that even though people recognize that regular, ongoing communication between the functional areas of the business would surely improve forecasting and overall company performance, they can't seem to find a way to make it happen. All too often, each part of the company operates with its own forecasts and associated set of assumptions about where the business is going.

To a forecaster, the laments are common: "If only manufacturing had told us that Production Line A was going to be down for three weeks for equipment replacement"; "If only Sales had told us that Customer B was changing over their entire in-store stocking program in 450 stores last quarter"; etc.

Sales & Operations Planning (S&OP) is an ongoing monthly process which consists of a series of structured meetings where the functional areas of the company present and discuss their plans and assumptions (including forecasts) and come to a consensus on how to balance demand, supply and financial goals. Most companies already have processes in place that approximate parts of what S&OP does. The problem is that these processes tend to be incomplete, undocumented and often sporadic at best. One of the most important benefits of S&OP is that the process formalizes communication and makes sure that it happens.

In his article *Sales & Operations Planning: An Executive Level Synopsis*, George Palmatier of Oliver Wight, a leading business improvement consultancy, defines S&OP as, "an integrated management process through which the executive team continually achieves focus and alignment between all functions of the organization. The S&OP process regularly and routinely reviews customer demand and supply resources and 're-plans' quantitatively and qualitatively across an agreed upon rolling planning horizon (typically 18 to 24 months). The replanning process occurs at least monthly. The process helps the management team understand how the company achieved its current level of performance but is primarily focused proactively on future actions and anticipated results."

Palmatier also points out that best practice S&OP is "demand driven. It starts with answering what is happening in our marketplace? What do our customers want to buy? What do we want to be prepared to sell? What are we committed to selling? From this anticipated demand forecast, supply resource priorities and plans are developed. Conflicts between demand and supply are resolved in each S&OP monthly cycle".

This makes perfect sense and underscores how important forecasting and demand planning really are. Our assumptions of demand (our forecasts) are a key driver in the overall S&OP process.

One important thing to note with respect to Sales & Operations Planning is that the process generally involves members of the cross-functional management team coming to consensus on the plan. A key responsibility of that team is to clearly articulate and communicate the consensus plan to their people. For instance, in the case of demand planning, the Demand Manager needs to communicate to the Demand Planners and Forecasters such things as: "Production Line A will be down for three weeks in August for equipment replacement" or "Customer B will be changing over their entire stocking program in 450 stores next quarter".

At the upcoming September 2006 Forecasting Summit in Boston, Bill Mackie, Managing Principal of Oliver Wight presents a workshop entitled, *Implementing Sales and Operations Planning for Improved Company Performance*. In the workshop, Mr. Mackie will define the characteristics of a "Class A" S&OP process and review methods for implementing or improving an S&OP process.

Reference: Palmatier, George E., "Sales & Operations Planning: An Executive Level Synopsis", Oliver Wight White Paper Series. Available at www.oliverwight.com.

Managerial Judgment as an Input to the Statistical Forecasting Process

Without doubt, in most businesses a good model-based statistical forecast can play a pivotal role in the overall development of a valid demand plan. However, without practical human input, statistical forecasts can prove to be inadequate, leading to a less than optimal demand plan.

Statistical models used in developing forecasts work with raw data; the models do not know whether the numbers represent potato chips or memory chips. The models on their own cannot necessarily interpret a dip in sales as a production or purchasing constraint, nor can a model tell whether a large spike in sales is the result of additional advertising or a one-time sale not believed to be repeatable.

Investing time and energy into developing a well-documented process where day-to-day business knowledge is incorporated into statistical modeling will help forecasters create more accurate statistical forecasts and reduce the number of manual overrides required.

At the J.R. Simplot Company, Sales and Marketing personnel participate in “predemand” meetings. At these meetings, we organize, evaluate and formulate the latest field information into forecasting assumptions. We document the process fully and share the results with our forecasters prior to the construction of statistical models.

Once we generate the statistical forecasts, we review the results with the demand planning team. We compare the new forecasts to previous forecasts and also list particular items for which we would like additional information. The end result is a consensus on the statistical forecasts.

By implementing a process that formally captures management knowledge and incorporates that information in the construction of our baseline statistical forecast we have improved our forecast accuracy by 10 to 15 percent and reduced the number of manual adjustments by over 40 percent.

Click here for the full article “Managerial Judgment: Best as an Input to the Statistical Forecasting Process” from the October 2005 issue of Foresight: The International Journal of Applied Forecasting

About the Author
Rob Dhuyvetter is a management-science analyst with the J.R. Simplot Company, one of the world's largest frozen-potato processors, annually turning out 3 billion pounds of french fries and other potato products worldwide. Rob has spent the past four years working with the company’s food-group division on forecast improvement and its improvement throughout the supply chain.

About *Foresight*
Foresight is a publication of The International Institute of Forecasters (IIF), the leading non-profit organization dedicated to forecasting theory, research and practice standards. Foresight offers readable articles that focus on practical applications of forecasting methods, on forecasting processes in organizations and on ways to improve forecasting performance.

FORECASTING PROCESSES: LESSONS FROM SUCCESSFUL COMPANIES

MANAGERIAL JUDGMENT: BEST AS AN INPUT TO THE STATISTICAL FORECASTING PROCESS by Rob Dhuyvetter

Preview: Rob Dhuyvetter shares his ideas and experience at the J.R. Simplot Company on the combining of statistical and judgmental forecasts. His main recommendation: rather than limit the use of managerial judgment to the adjustment of the outputs of statistical forecasting models, bring managerial judgment directly into the development of the statistical forecasting model. A key in doing this is timely communication with sales and marketing, and full documentation by sales and marketing of those assumptions they present to the forecasters and planners.

Rob Dhuyvetter is a management-science analyst with the J.R. Simplot Company, located in Boise, Idaho. He has spent the past four years working with the company's food-group division on forecast improvement and its application throughout the supply chain. Rob holds an M.A. degree in mathematics from Minot State University and earned an M.S. degree in industrial and management systems engineering while teaching statistics at the University of Nebraska-Lincoln.

- Without practical human input, statistical models may not provide adequate forecasts for demand planning. Human input in the statistical forecasting process can be critical.
- The main focus of human input should be shifted toward the development of statistical forecasting models and away from manual adjustment of the models' forecasts.
- Prior to statistical forecasting, persuade your sales and marketing teams to provide the latest field information and to formulate this information into forecasting assumptions.
- Obtain detailed documentation of forecasting assumptions and adjustments to the resulting statistical forecasts.

Introduction: Human input into the statistical forecast

The development of a statistical forecast plays a pivotal role in the creation of a valid demand plan, and should not routinely be treated as a black box. Christopher Koch (2004, http://www.cio.com/archive/061504/nike.html) warns that "Throwing a bunch of historical sales numbers into a program and waiting for a magic number to emerge from the algorithm – the basic concept behind demand-planning software – doesn't work well anywhere."

Many forecasters have realized that, without practical human input, statistical forecasting models do not provide adequate forecasts for the demand-planning functions. In an article for *CIO Magazine*, Ben Worthen (2003, http://www.cio.com/archive/071503/future.htmlkjcv) quotes Sumantra Sengupta, CIO for the Scotts Company, as saying "Demand forecasting sounds scientific; but I would say that if you looked at the split between people, science and process, people are half the equation."

In the special feature of the June 2005 *Foresight*, several authors focused on the resolution of statistical and judgmental forecasts. Nigel Harvey (2005, p.18) summed it up: "Like Paul Goodwin and others, I take the view that judgment and statistical methods complement one another in the forecasting process and that the problem for practitioners is to decide when to combine them and how to achieve the best combination."

Many demand planners realize that unaided automatic forecasting does not do the job. Statistical models used in developing forecasts work with raw data. The models do not know whether the numbers represent potato chips or

memory chips. The statistical models are not able to interpret a dip in sales as a production or a purchase constraint, nor can a model tell whether a large spike in sales is the result of additional advertising or a one-time sale not believed to be repeatable. Least of all, statistical models do not predict unexpected circumstances. Anne Ku (2002, http://www.analyticalq.com/energy/demand/default.htm) aptly notes "If the inputs to your forecasting model are poor, it would be very difficult to get a good forecast no matter how good your model is."

It is important to note that the foregoing applies when there is going to be a manual review process of some kind, not situations where mass forecasting of huge numbers of items is called for.

Sales and Marketing Input – Predemand Meetings

Many demand-planning processes follow this sequence:

(1) Produce a statistical forecast,
(2) Judgmentally adjust the statistical forecasts based on market knowledge,
(3) Come to consensus and publish the results.

I think it is a better strategy to bring managerial knowledge to bear as an input in developing statistical forecasts. This strategy has strong support among some forecasting researchers. J. Scott Armstrong (2001, p. 736), in his book *Principles of Forecasting*, conveys the importance of using sales and marketing knowledge as inputs in developing a functional forecast.

> *Principle 11.2: Use structured judgment as inputs to quantitative models.*
> *Principle 11.3: Use prespecified domain knowledge in selecting, weighting, and modifying quantitative methods.*

Investing time and energy into interpreting model assumptions properly and incorporating outside knowledge properly will help forecasters to create more accurate statistical forecasts, will reduce the number of manual overrides required, and I believe, will improve forecast accuracy.

The process for bringing managerial judgment to bear on forecasts must be well documented. Sales and marketing groups make numerous well-informed assumptions

regarding future sales, and full documentation of those assumptions is a critical input to the statistical modeling process. Paul Goodwin (2005) emphasizes the importance of keeping records of the original statistical forecasts and the judgmental adjustments made to them. With the documentation, forecasters can review adjustments from prior forecasting sessions and evaluate the results of proposed adjustments.

At the J.R. Simplot Company, Sales and Marketing personnel participate in "predemand" meetings. At these meetings, we organize, evaluate and formulate the latest field information into forecasting assumptions. We document the process fully and share the results with our forecasters prior to the construction of statistical models.

Let me offer some specific examples in which Sales' and Marketing's input of human judgment improved our statistical forecasting results:

1. We questioned whether we were applying our statistical models at the proper levels in our product hierarchy, for example, statistically forecasting at a SKU (stock-keeping unit) level and then distributing those results to product-group forecasts.
2. We identified particular items for which the forecasts were biased, that is, consistently over or consistently under demands, and then checked the sales and marketing assumptions made for these items.
3. We focused our time and energy on our A-class items, those deemed most critical to the business, not on the B- and C-class items. We review A-class items every forecasting cycle, B-class items

every other cycle, and C-class items still less frequently.

4. We identified certain items as too challenging or even inappropriate for statistical modeling: items to be phased out over the next few months, items governed by contracts stating volumes and months of delivery, new items for which we had no historical data, and seasonal items for which we have data for fewer than two complete seasonal cycles. We thus avoided making inevitably poor statistical forecasts and later overruling them.
5. We identified special promotion events. We dealt with them explicitly in the modeling process so their effects would not distort the seasonal indexes. Moreover, with our forecasting software, we obtained statistical estimates of the future effects of these events, should they recur.
6. We identified patterns in which sales can ramp up suddenly, making the initial sales pattern unrepresentative. We often made two sets of forecasts, one that included the early data and one that excluded them.

Review and Consensus

We still make judgmental adjustments for events not yet incorporated into the historical data or documented at predemand meetings. Once we generate the statistical forecasts, we review the results with the demand-planning team**.** We have in hand our reports of new items being forecasted and items no longer requiring statistical forecasts. We compare the new forecasts to previous forecasts. We also list particular items for which we would like additional information. The end result is consensus on the statistical forecasts.

Once we come to consensus on the statistical forecast, we institute further reviews by Sales, Marketing, Operations, and senior management to consider the need for further judgmental adjustments. Reasons for the additional changes include newly planned promotions, gain or loss of major customers, expected shortages because of production constraints, and recent managerial actions to align sales with strategic goals, such as the decision to promote a particular product to achieve the goal of enlarging its market share.

Summary and Conclusion

Many companies rely on computer-generated statistical baseline forecasts to initiate their demand planning cycle, followed by manual adjustments to incorporate sales, marketing, and operational knowledge. At the J.R. Simplot Company, we have implemented a process that formally captures managerial knowledge and incorporates that information in the construction of our baseline forecast. Since June 2003, we have improved our forecast accuracy by 10 to 15 percent and reduced the number of manual adjustments by over 40 percent.

References

Armstrong, J.S., ed. (2001). *Principles of Forecasting*, Boston: Kluwer Academic Publishers.

Goodwin, P. (2005). How to integrate management judgment with statistical forecasts, *Foresight: The International Journal of Applied Forecasting*, 1, 8-12.

Harvey, N. (2005). Relative merits of different ways of combining judgment with statistical forecasts. *Foresight: The International Journal of Applied Forecasting*, 1, 18-20.

Koch, C. (2004). Nike rebounds – how (and why) Nike recovered from its supply chain disaster. *CIO Magazine*, June 15, 2004, http://www.cio.com/archive/061504/nike.html

Ku, A. (2002). Demand forecasting. *Global Energy Business*, March-April, http://www.analyticalq.com/energy/demand/default.htm

Worthen, B. (2003). Future results not guaranteed. *CIO Magazine*, July 2003, http://www.cio.com/archive/071503/future.html

Contact Info:
Rob Dhuyvetter
J. R. Simplot Company
Robert.Dhuyvetter@simplot.com