LOGILITY

PLANNING OPTIMIZED

Beyond Basic Forecasting

WHITE PAPER

Beyond Basic Forecasting

Forecasting techniques that produce superior results

Executive Summary

> Forecast: To calculate or predict some future event or condition, usually as a result of study and analysis of available pertinent data.

Of all factors that affect business success over the long term, most executives agree that generating accurate forecasts is right at the top of the list. Forecasting has a powerful impact on an organization's ability to satisfy customers and manage resources cost effectively. A forecast is not simply the projection of future business. It is a request for product and resources that ultimately affects almost every decision the company makes. That means decisions by Sales, Finance, Manufacturing, Logistics and Marketing are all enhanced or diminished by the quality of the company's forecast.

Forecasting isn't everything, but it is the main shaper of how a company serves customers, exploits opportunities and drives performance.

As the company's managers toil against the grindstone of increasing customer requirements and shareholder expectations, their struggles are aggravated by the imperative to continually improve customer service while consuming fewer resources. Better forecasting is one of the few core competencies that can drive this agenda. Frustratingly, many companies suffer from common shortcomings that impair their ability to move beyond a basic level of accuracy, where forecasts based only on rules of thumb and simple math are applied to all products in the portfolio.

This paper identifies typical impediments and prescribes smart countermeasures to overcome them.

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Supply chain organizations routinely rank “forecast error” as a major obstacle in meeting their supply chain goals.

Overcoming the Barriers to Improved Forecasting

Businesses use forecasts to create plans for every department. Sales managers set goals and motivate account execs to exceed those goals. Finance departments determine cost projections and capital requirements. Production managers use the short-term forecast as input to production planning, and the long-term forecast to plan plant and equipment resources. Logistics distributes the right products to the right places in time to meet customer demands using forecasts at the product-by-location level. Marketing contributes information on product life cycle changes, promotional campaigns, channel placement, and pricing moves.

The success of all these business functions, dependent as they are on accurate forecasts, is definitely compromised when a company's forecasting capabilities remain stubbornly immature. **Stakeholder confusion** arises when sales and operations planning (S&OP) meetings can't resolve a cacophony of departmental estimates based on competing data from disconnected forecasting processes. Progress stalls when **complexity** overwhelms efforts to create demand plans by product, business, and geography, over varying forecasting horizons and in multiple units of measure, from both volumetric and financial perspectives. Complexity is additionally magnified when trying to forecast each stage of the product life cycle. Lack of adequate analytics and "what-if" scenario analyses hurts **planner productivity,** impairing the ability to anticipate and respond to changes in demand. With growth, the ability to manage forecasts through spreadsheets fails. Data entry and calculation errors become pervasive and effective collaboration becomes impractical.

Logility's experience with customers in a variety of industries and markets around the world has shed light on why these problems exist and persist. Five key barriers often stand in the way of forecasting success: :

1. The real value of forecasting is often hidden from executive management.
2. Forecasting expertise is difficult to hire, train, and retain.
3. Forecasting tends to be decentralized, lacking an executive champion.
4. Using Excel as a forecasting "system" is not a best practice
5. Companies tend to use an inadequate mix of forecasting techniques.

Best-in-class forecasting may seem just out of reach, but it's really just around the corner.

Barrier I. The Value of Forecasting is Often Hidden from Executive Management

Too often, it can be frustratingly difficult to get approval for forecast improvement projects. C-Level executives show greater interest when a positive relationship is seen between this investment and increasing shareholder value. Executives who do not care deeply about forecast accuracy per se will care about its impact on shareholder value.

To gain support for improving forecast capabilities, supply chain managers must show the relationship between forecast accuracy and shareholder value. They must speak in the terms the executive team thinks in (revenue, growth, service, value).

Bottom line: When the executive team understands forecasting's impact on higher customer service and lower operating costs, doors will open.

The DuPont Financial Performance Model is a framework for viewing how changes in sales, capital, and operating expenses impact return on shareholder value. Improving forecast accuracy has direct impact on all three of these factors: an accuracy increase of 10% can increase sales revenue by the same percentage, while decreasing inventory costs and freeing up working capital trapped in inventory.

The DuPont Model can be applied to many types of companies. Figure 1 demonstrates how improvements to revenue and savings driven by better forecasting convert to higher profits and decreased invested capital, which, in turn, create greater shareholder value.

Focus on the impact of better forecast accuracy on strategic supply chain benefits to build the business case for demand-planning investments.

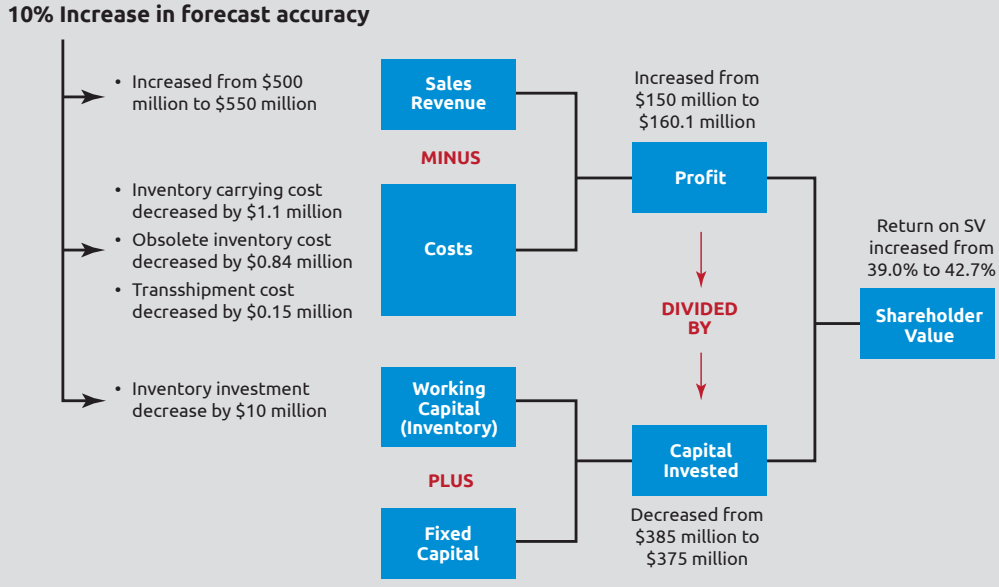


Figure 1. Impact of a 10% improvement in forecast accuracy on a $500M company, based on DuPont model

Barrier 2. Forecasting Talent is Hard to Find and Expensive to Hire, Train, and Retain

Creating a good sales forecast requires several skills: a strong understanding of statistics, in-depth knowledge of the company's products, customers and markets, and experience in combining data to develop a forecast that all business functions can use.

Bottom line: Put a premium on finding qualified forecasting professionals, providing business, system, and professional training, and developing clear promotion opportunities to retain these critical resources.

Figure 2 highlights the types of training and experience that makes members of a demand planning team effective in their roles. The best planners fully understand the products, customers, and markets they are planning for and have a clear understanding of business goals and strategies. The overall effort must include attainment of industry and company knowledge as well as training in the art of forecasting. Most demand planning solution suppliers offer both classroom and remote system training, allowing you to elevate the interaction and use a consistent process and method for the entire team.

A number of professional organizations offer training and certification in demand planning best practices, including the Institute of Business Forecasting (IBF), the Council of Supply Chain Professionals (CSCMP) and the Association for Operations Management (APICS).

Develop a strategy to recruit, train, and retain talent that will enhance the credibility of the demand planning process and help it mature.

Demand Planning Team Development

- Membership and participation in Industry Associations
- Extend supply chain knowledge beyond demand planning
- Exposure to business strategy and industry environment

Demand Planner	Lead Demand Planner/Mgr.	Demand Planning Director
• On-Boarding to include knowledge on products markets, production, suppliers and customers • Forecast solution training • Basic statistics refresher • APICS certification • Rotations to learn multiple forecast areas	• Advanced training on forecasting solution • Lean - 6 Sigma Green Belt • S&OP Training • Mgt training in consensus building, written and verbal communication, and negotiations • Business scenario evaluation training	• Lean - 6 Sigma Green Belt • APICS S&OP Education Certificate • Sponsor of S&OP process and improvement efforts • Company leadership development program • Financial and ROI training

Figure 2. Components of Demand Planning Team Development

Barrier 3. Forecasting Tends to be Decentralized, with No Executive Champion

Most companies find it difficult to significantly improve forecast accuracy without an executive champion and clear support from executive management. Good leadership prevents each business function from developing its own isolated incompatible approach. Active, ongoing executive support should include:

- Assigning an individual or group to be responsible for forecasting accuracy
- Leading the development of a clear strategy and vision for demand planning
- Ensuring dedicated demand planning resources are hired and trained
- Fostering a consensus forecast contributed to and used by all functions
- Supporting the funding of a comprehensive demand planning solution
- Aligning demand planning KPIs with organizational goals and incentive programs

Bottom line: An executive champion can create a vision and build consensus, advocate for the team, and directly lead improvement efforts. Such a leader sets the stage for dramatic demand planning process improvements to take place.

The role of an executive in the context of demand planning is to lead the change, craft the vision, define the cultural shift, and illustrate by example.



Figure 3. Characteristics of a demand planning executive champion

Barrier 4. Using Excel as a Forecasting "System" is Not a Best Practice

Studies have shown time and again that spreadsheets provide inadequate functionality and are riddled with errors. A survey conducted by APICS and Logility found almost one half of respondents use spreadsheets as their primary tool for demand planning. The same survey indicated that over one third of respondents relied on their enterprise resource planning (ERP) system to manage demand planning, despite the fact that most ERP systems have only rudimentary planning capabilities and, with few exceptions, are designed to receive a forecast, rather than develop one. Only 16% if respondents said they use Best-of-breed forecasting solutions which provide superior functionality and are enhanced more frequently.

Spreadsheets simply cannot consistently generate accurate forecasts or support best-in-class supply chain processes. The long list of problems and limitations involved in using spreadsheets includes:

- **Chronically Prone to Error**

  Typical root causes include inserting the wrong function or omitting parentheses in a formula, inadvertently changing cell references when copying equations to new locations, accidentally overwriting a formula in a cell by inserting a numerical value, mistakenly using the wrong formula (e.g. AVERAGE vs. AVERAGEA), and bad data input (entering numbers as text or date, or omitting data or equations).

- **Hard to Maintain**

  Spreadsheets are essentially nonprocedural computer programs that are rarely tested thoroughly and rolled out without a formal quality assurance process. A spreadsheet often reflects the work of essentially one person, who may leave the company or change jobs, creating an unsupported single point of failure.

Coopers and Lybrand found 90% of all spreadsheets comprised of more than 150 rows contained errors.

— Journal of Accountancy, "How to Make Spreadsheets Error-Proof"

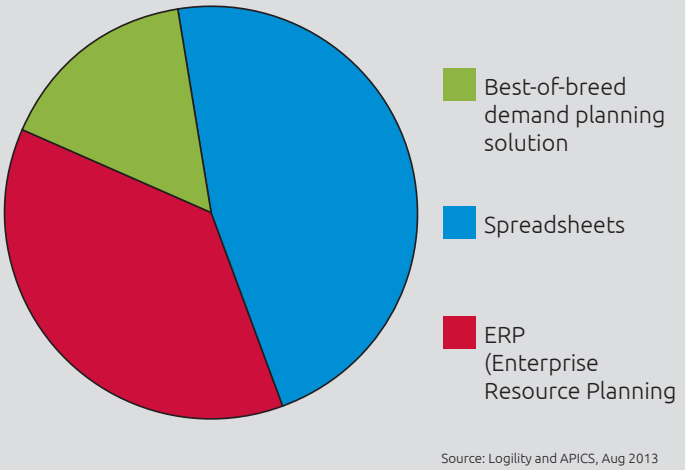


Figure 4. Three main sources of forecasting resources

- **Isolated and Difficult to Scale**

  Even organizations that place their spreadsheets on a central server can't ensure that collaboration behavior takes root across functional silos. Linked spreadsheets become cumbersome to maintain. The information "conduits" flowing from one sheet to another enable cascading error conditions that can prevent users from obtaining critical results on time. There are an ever increasing number of users who need to share data, and a growing volume of SKUs to plan for.

- **Difficult to Integrate to Enterprise Systems**

  Planning tools must exchange information such as inventory levels, orders, supply-side information, and more with the company's existing ERP system. Data loading into spreadsheets is always a non-real-time, manual process, very slow and prone to data entry errors.

- **Lengthy Time to Decision**

  Today's complex supply chains require availability of timely and accurate data in order to anticipate market changes and respond quickly to unforeseen events. It takes much longer to gather, assess, and evaluate information held in spreadsheets. Manual spreadsheet data updates are followed by manual examinations to spot issues, and a reporting phase, all of which takes time.

Bottom line: Implementing an advanced statistical forecasting solution is a fundamental step to improving forecast capabilities. Only integrated planning systems provide the level of flexibility, power, and collaboration necessary to meet today's supply chain planning needs.

The University of Hawaii found 20% to 40% of all spreadsheets contain errors.

— Journal of End User Computing's, "What We Know About Spreadsheet Errors."

Barrier 5. Companies Tend to Use an Inadequate Mix of Forecasting Techniques

Best-in-class companies have the ability to apply a series of forecasting techniques, tuned to perform best at different phases of the product life cycle.

At each life cycle stage they exploit both available historical data and forward-looking market knowledge, employing the forecasting method that best fits the circumstances.

- **Best-fit statistical methods**

  Modified Holt is used when demand is trended, but does not vary by time of the year. **Holt Winters** is used when demand is often higher or lower during certain times of year. **Moving Average** is a good choice when demand histories have random variations including no seasonality or trend, or exhibit fairly flat demand.

- **Derived forecasting methods**

  Inhibited forecasting is used to produce a zero forecast, while **Modified Parent-Child** is used to forecast products as a percent of the forecast for another product (dependent demand).

- **Intermittent demand methods**

  Modified Croston is used when demand is low, or when there are periods of zero demand, such as for slow-moving parts.

The ability to automatically change forecast methods during a product's life cycle is a feature of a comprehensive forecasting solution that goes far beyond what spreadsheets or ERP systems can offer.

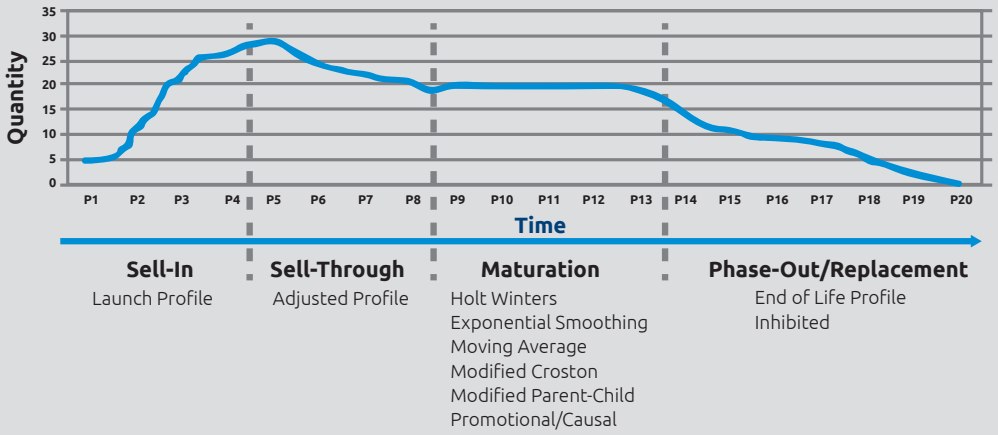


Figure 5. Life cycle demand planning

- **Attribute based methods**

  Demand Profiling employs user-defined attributes to model new product introductions and end-of-life retirement. **Proportional Profiles** are used when disaggregating higher-level forecasts into lower-level forecasts using user-defined attributes.

- **Causal forecasting methods**

  Causal forecasting is used to address the effects of promotional events such as price discounts, coupons, advertising and product placements on demand. One widely used casual technique is **regression analysis,** a statistical process that helps planners understand how the typical value of a dependent variable (or forecasted item) changes when one independent variable (like price, product placement, weather, etc.) is varied while the other independent variables are held fixed. Regression analysis can infer causal relationships between the independent and dependent variables.

Bottom line: A comprehensive forecasting solution can automatically change forecast methods during a product's life cycle to maintain maximum accuracy from launch to end-of-life. This is far beyond the capabilities of spreadsheets and ERP systems, and should be the centerpiece of any planning function's technology platform.

Typical benefits from a 15% improvement in forecast accuracy:

- 15%+ inventory reduction
- 10%+ service level improvement
- 20% increase in order fill rate
- 2% revenue lift, average
- 3% to 5% gross margin increase

Conclusion

Accurate forecasts are the foundation for profitable business growth. A forecast is not simply a projection of future business; it is a request for product (or a request for resources to ensure timely supply of a product investment to satisfy future customer orders). Forecast accuracy is crucial for achieving customer service goals and critical to ensuring proper utilization of resources.

Supply chain organizations routinely rank demand planning immaturity or forecast error as a major obstacle in meeting their supply chain goals. Many companies experience similar issues that inhibit their ability to progress beyond basic forecast accuracy: over-reliance on spreadsheets, inadequate executive management understanding and support, difficulty in developing expert resources, lack of capabilities such as management by exception and "what-if" scenario analysis, and decentralized execution by silo'd business functions. Unless these challenges can be overcome, S&OP meetings often play out as a cacophony of competing departmental spreadsheets.

A comprehensive demand planning system, managed by well-trained personnel and supported by an executive champion, can drive a consensus forecast on which all departments can base their individual plans. Aggregating and disaggregating demand creates more accurate global forecasts over any demand horizon.

The ability to select and apply the optimal forecasting method at each stage of the product life cycle is a vital advantage of an advanced demand planning solution. The system should automatically analyze multiple methods and recommend the most accurate alternative for each phase.

Best-in-class forecasting provides tangible business benefits, including lower inventory levels, shorter lead times, fewer out-of-stock events, increased perfect-order performance, and more successful new product launches. Start with a technology partner that can guide your organization through the key transformations necessary to implement a best-of-breed approach. Let Logility be the catalyst that takes your company beyond basic forecasting.

A best practice is to incorporate qualitative forecast inputs for sales, marketing and external partners as advisory information allowing the forecast planner the ability to consider what information should be included in the final resultant forecast.

About Logility

With more than 1,250 customers worldwide, Logility is a leading provider of collaborative supply chain optimization and advanced retail planning solutions that help small, medium, large, and Fortune 500 companies realize substantial bottom-line results in record time.

Logility Voyager Solutions™ is a complete supply chain management and retail optimization solution that features a performance monitoring architecture and provides supply chain visibility; demand, inventory and replenishment planning; sales and operations planning (S&OP); integrated business planning (IBP); supply and inventory optimization; manufacturing planning and scheduling; retail merchandise planning, assortment and allocation; and transportation planning and management.

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