3 Critical Elements Necessary for a Successful Demand Planning Solution
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Nearly every industry is being challenged with ever higher expectations, regulation and ongoing shifts of market forces and dynamics that continually shape how business is done. Fundamental changes are affecting every aspect of business whether they are a retailer attempting to deliver a better customer experience, a manufacturer looking for operational efficiencies, or just wrangling with the carrying costs of inventory.

Old approaches to new problems are no longer a viable solution for these shifting demands. Demand planning today requires a much more sophisticated and collaborative approach in order to overcome the challenges businesses are facing. Years of implementing demand planning in various industries have led us to the following three critical elements necessary for a successful demand planning solution which are presented through QueBIT’s Galileo Predictive Demand Planning system.

1 – It must be data driven

For many companies, planning demand has been a manual or semi-manual process. Insurance companies might model premium income by assessing policies currently in force, estimating attrition, forecasting marketing effectiveness and adding the factors of increases or decreases in premiums in order to arrive at a projection of policy volumes and premium income. The process is laborious and reliant upon the subjective judgment of an expert in a particular market. Another example is a retailer where purchasing managers estimate demand volume at a product group or distribution center level. The demand plan is then pushed down to a store/SKU level by some mechanism for consumption by inventory management systems. In many manufacturers, the forecasting process merely consists of entering their retailers’ best estimates of demand into a spreadsheet, producing a prediction that is mostly human-driven, controlled by the customers and quite typically inaccurate.

What’s needed is a data-driven approach. By using existing data and combining it with the advanced capabilities of predictive analytics, highly accurate demand predictions can be obtained that go well
beyond simple trending analysis or moving averages. Baseline forecasts at the most granular level can be created entirely from historical demand. These forecasts are unbiased and free from any flawed human perceptions. While this information can be extremely useful in and of itself, the complexities of demand typically need more descriptive information to be more accurately understood. This is where causal data plays a role.

Causal data are factors that tend to influence demand and have some relationship in driving demand up or down. For instance, marketing, advertising, and promotional efforts can significantly affect consumer demand. In the case of a clothing manufacturer, demand for jackets and coats will differ depending on the weather in a geographic area. Data on new home builds may be closely linked to product performance for flooring manufacturers while economic indicators and pricing can also influence sales. A myriad of causal elements could potentially be at play and an advanced demand planning system must be able to easily incorporate causal data to identify the interactions and effect of these drivers. When combining the historical data as a baseline and adding causal data, the nuances of demand come into sharper focus as does the subject of seasonality.

Seasonality refers to a cycle of demand that ebb and flows over time. Depending on the time frame, these cycles can be short, very long or even occur simultaneously. Utility companies see demand for power rise and decline throughout the day while at the same time they see a longer demand cycle when looking over the entire year as hotter months require extensive use of air conditioning in the warmer climates. A women’s clothing manufacturer may see demand peak before and during the holiday season and again before Mother’s Day while it subsides during other months. As the seasonality creates the peaks and valleys of demand, the causal factors, whether known or unknown will also drive the overall trend in addition to organic demand. A data-driven planning solution must be able to account for these analytic challenges with the ability to separately understand seasonality apart from the trending factors and organic demand to accurately predict what will likely happen in the future.
The Galileo Predictive Demand Planning solution by QueBIT has been specifically designed with the ability to incorporate and analyze these elements of demand. Galileo’s forecasting engine, called Euclid, has been purposefully built to encompass the cutting-edge functionality required for deep data-driven demand forecasts. Machine learning algorithms, a form of artificial intelligence, that have emerged within the last few years have drastically improved both the speed and accuracy of forecasting and have been integrated into the Euclid engine. Going back to the challenge of parsing seasonal versus trending data, a technique must be utilized called seasonal decomposition. Also, known as decomposition of time series, this is a statistical method that deconstructs a time series into its underlying components.

A typical time series plot is seen in Figure 1 above showing the unit demand for a single SKU over multiple retail weeks. We can see there is a pattern of demand peaking at the end of each year (every 52 weeks) and the peaks seem to be getting larger over time showing an upward trend in demand. But how much of the demand is seasonal and how much is the demand trend occurring outside of seasonality? We can now use Galileo’s Euclid forecasting engine to generate seasonal decomposition data in order to understand the true demand signal.
As we can see in Figure 2, the decomposition techniques built into the Euclid forecasting engine provide the ability to process and output the seasonal quantities apart from the demand trend for the same SKU seen in Figure 1. Euclid’s ability to identify and split the seasonality and underlying trend then combining these outputs with an understanding of causal data factors make it highly adept at accurately forecasting demand where these features are in scope.

Another important element to using data-driven demand planning is the ability to create a true “bottom-up” forecast. Many companies have resorted to avoiding bottom-up forecasting due to an inability to scale with the tools that are being used or a lack of technical sophistication particularly when thousands or a hundred thousand SKUs are involved. Unfortunately, in doing this the complexities of demand become obfuscated. The effects of causal data or other influences outside of the top-down hierarchy become “noise” and produce a highly generalized and inaccurate forecast. Using a data-driven approach with the intelligent and scalable capabilities of Galileo allows every nuance of demand to be associated with the demand signal for every SKU in a bottom-up forecast. The trends
of each individual item are preserved allowing easy aggregation of demand into any desired business hierarchy while still providing the ability for a user to drill down and understand the demand of a single SKU.

The modeling capabilities of Galileo also allows companies to model demand for cases where traditional approaches typically fall apart. Predicting demand for low-velocity items is a prime example. Most tools model demand for low-velocity items at a rolled-up level (such that the model can treat the item as high velocity). The disadvantage of this approach is that spreading the forecast back down to the lowest level (e.g. store level) is extremely error prone. The Galileo predictive demand planning solution can model inventory turns for the slowest moving inventory at the lowest level with a very high degree of accuracy. It has been applied with great success to inventory that turns only once per year at the store/SKU level.

Additionally, Galileo is adept at generating accurate forecasts for new store/SKU combinations. By modeling demand as the intersection of customer and product attributes, Galileo can predict demand for products where there is no peer product in the supply chain. Whether the item is new to a store or new to the entire supply chain, predictive data-driven algorithms inside Galileo can generate accurate forecasts for that item. Imagine having the ability to simulate new product introductions into new stores, markets or companywide and with an accurate demand forecast that can be financially modeled in a highly interactive interface.
2 – It must be collaborative

Accurate demand planning requires input from many parts of the organization. We often see companies with established planning processes that exclude input from important areas that can have a significant effect on demand. Marketers establish a budget for marketing to push certain products and adjust pricing. In the case of manufacturing, purchasers understand the material supply pipelines while operations have purview over capacity and logistics. Sales and finance also have knowledge extremely valuable to the demand planning process. The Galileo predictive demand planning solution provides a mechanism to ensure all pertinent voices within the enterprise are heard and incorporated into the process. No longer is each entity creating their own forecasts to be painstakingly reconciled down the road (if at all). Organizations must move away from siloed data and spreadsheets that are not integrated with operational, corporate and financial goals. A key element of the Galileo solution is providing a highly scalable and very fast financial performance management solution that supports the entire planning cycle and easily unites input from all aspects of influence. It allows an enterprise to have a single, unified vision of the demand planning across all departments and allows a full view of their impact on the demand forecasting.

3 – It must be interactive

As a company progresses in capability using more sophisticated tools for demand planning, it is critical to measure how elements within and participants along the workflow process are contributing to the overall business of demand planning. Even the most advanced forecasting system must have checks in place to ensure the process stays within acceptable limits due to the costs and risks at stake in demand planning. In our experience involving numerous deployments of critical forecasting and demand planning systems, we have integrated the concept of Forecast Value-Added Analysis (FVA)
into the Galileo solution. Forecast Value-Added Analysis uses statistical methods to measure how each step and participant in the process are impacting forecast accuracy.

At its root, FVA measures the change in a forecast performance metric and attributes that change to the step or participant. By collecting and tracking data on accuracy before and after each process step, the Galileo system provides constant feedback on what is working and what is not. As an example, in a basic implementation a business will have the data-driven predictive forecast in the first stage, an analyst or sales person with ability to interact and override a given forecast in the second stage, and finally managerial or executive authority to interact and adjust the final forecast based on their view of the business. This interaction allows the flexibility of the process to accommodate circumstances that cannot be incorporated into an automated system. A natural disaster affecting a particular region may require a downward adjustment to an item forecast if a manager knows it will be impossible to distribute in the area for a period of time. An executive may also have knowledge of a positive change in relationships with an account that will drive incremental demand in the foreseeable future. Not only is it imperative to allow these types of interactions, it is critical to measure them.
Over time, as the variance between the forecast and adjustments to the forecast are compared to the actual numbers, a clearer picture arises as to which adjustments are adding value and those that are negatively impacting the forecast. Seen above in Figure 3, is a small dashboard example showing the FVA metrics on the far right with summary performance over the past 3, 6 and 13 (month) periods. Because the Galileo system tracks these adjustments down to the item level, automated notifications can be deployed to alert managers when changes to the forecast are consistently being made in the wrong direction and not adding value.

Another tool that enables analysts and managers to make informed decisions is understanding demand through what-if scenarios. The Galileo predictive demand planning system allows a user to run multiple what-if scenarios. The Euclid forecasting engine inside Galileo uses historical and causal data to find the patterns and relationships of demand in addition to ascertaining the direction and significance of influence for these factors based on history. This process creates a model or rule set through which new data can be fed in order to simulate demand for multiple scenarios to project a full P&L and cash flow. This allows analysis of sales based on historical season patterns and long-term trends, the impact of weather, marketing spend and macroeconomic factors to understand the effect not only on demand for an individual item but across the entire enterprise. Complex scenarios can be evaluated at a very granular level, such as what inventory levels will be based on sales, manufacturing costs, and collections – or how a 5% increase in the Euro will impact demand and profitability. How will a 10% increase in marketing spend in a specific store impact inventory levels in the regional
distribution center? The Galileo predictive demand planning system allows users to easily and rapidly test and understands these types of complex what-if scenarios.

The ease of conducting rapid, real-time analysis means demand planners have the capacity to create rolling forecasts to reflect all manner of changing conditions, while the system automatically reruns the Euclid predictive models each week or each month. Over time, Euclid learns and gets better as additional actual history is added into system.

**What are the results?**

The Galileo Predictive Demand Planning system by QueBIT, is data-driven, collaborative and interactive. Companies that have deployed Galileo benefit from the ability to:

- Maximize profits by being able to calculate ideal price points, discount and promotions by product store and channel
- Plan for inventory demands across locations and channels to have the right product in the right location at the right time
- Decrease inventory levels while reducing out of stocks, improving sales and reducing transportation costs
- Determine the best responses to shifting customer demands
- Improve decision-making through what-if scenario analysis
- Understand the impact of marketing campaigns on sales
- Improve customer satisfaction
- Drastically increase forecast accuracy
- Full automation of the entire forecast process and the ability to integrate with inventory management or manufacturing systems

The combination of these three critical elements have a direct impact on the bottom line and optimizes the use of working capital. It provides higher inventory turn, less product obsolescence, lower inventory carrying costs, and improved financial planning and cash flow – which translates to an increase in competitiveness and higher profits.
About QueBIT

We are trusted experts in analytics. Our purpose is specific: We’re driven to help organizations improve their ability to make intelligent decisions that create value. Astute decision-makers learn from the past to manage the present, predict the future, and take prescriptive actions. This is why we’re resolute in our commitment to excellence in business analytics strategy and implementation.

Our company is based on the following core principles:

✓ **Provide expert strategic analytics advice.** With our focus in business analytics, we have the ability to determine which functions will derive the most ROI from analytics and ensure your organization fully leverages any existing analytics investments.

✓ **Apply analytics to key corporate functions in any industry.** QueBIT has the expertise to implement analytics solutions for financial performance management, sales and marketing measurement and planning, and operational demand planning and reporting.

✓ **Develop deep expertise in a broad range of analytics solutions**—and enrich them.

✓ **Provide an analytics foundation for data management.** We help organizations collect and clean diverse operational, ERP, and other system data.

For more information, case studies and webinars showcasing the Galileo demand planning solution, please visit [http://quebit.com/demand-planning-for-enterprise-businesses/](http://quebit.com/demand-planning-for-enterprise-businesses/)

Contact our team to learn more about how the Galileo solution can impact your business at info@quebit.com