

CASE STUDY

# Improving Demand Forecast Accuracy by 600 BPS

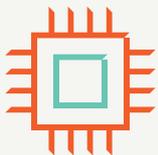
for a Top 10 Retailer Using Machine Learning





The 50+ person Financial Planning & Analysis team at a top 10 retailer was responsible for setting the organization's sales, margin and inventory forecasts. Despite the importance of the demand forecast, the retailer was struggling with high Mean Absolute Percent Errors (MAPEs) and accuracy rates below 90%. Their financial planners were working in isolation using manual spreadsheet-based approaches that were time-consuming, prone to error and subjective.

### With help from Tredence, the retailer wanted to:



**Leverage technology** to streamline the forecasting process, create a unified approach for all planners and significantly improve accuracy.

Create a **fact-based approach** to breakdown the drivers of their business to answer questions such as "why am I off plan?" or "what drove my sales increase last week?"



**Optimize inventory** and markdowns for seasonal products through a better understanding of real-time demand to help course correct price adjustments before it is too late.



## Challenges - The Day in the Life of a Planner

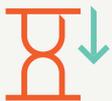
The job description for the average demand planner is overwhelming – create forecast, hand tune legacy solution providers forecast, track actuals vs. forecast, explain deviations in performance, manage end of life inventory, forecast new & converted stores, communicate exceptions to stakeholders and much more. With a job description that long and varied it is not surprising that there are significant challenges.



Works in isolation with lack of visibility across categories & channels due to inconsistent data sources.



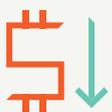
Relies on a manual forecasting process, which is iterative, spreadsheet-based, prone to subjectivity.



Spends considerable time on explaining “what happened.” The approach is inconsistent across the category teams.



Has limited visibility and understanding of decisions on overall financials due to fragmented reporting.



Managing seasonal products well, which requires relying heavily on intuition and is difficult to pass over time. This can significantly impact the top and bottom line due to unsold inventory or lost sales.

## Machine Learning Significantly Improves Forecast Accuracy

To transition from their legacy intuition and excel-based approach, the retailer needed a more advanced solution, not just a univariate time series regression used by most off-the-shelf forecasting tools. In addition, the solution needed an advanced model to predict demand accurately and various models to address the nuances of different item types: continuous, promotional, and seasonal products. Leveraging an ensemble modeling approach, with customized approaches and feature sets for each item type, we created over 10,000 machine learning models and much more. With a job description that long and varied it is not surprising that there are significant challenges.



### Best model selected based on cross-validation assessment

#### TIME SERIES

Prophet

XG Boost

Random  
Forest

Hueristic  
Decompositon

#### REGRESSION

Segmented  
Linear models

UCM + Spline  
Regression

Log - Log Models  
for Price Impact

# In production, these models helped improve forecast accuracy by over 600 basis points and reduced the time planners took to create forecasts by over 50%.

## The best part?

Through anomaly detection, automated alerts were created to highlight demand anomalies and inventory shortfalls so planners could quickly focus on the items that mattered.

### Diagnosing the Drivers of Performance

Every week, planners would get the same age-old questions: Why am I above/below plan, or compared to last year, what is driving my changes vs. Last year. Historically, they would have to mine through reams of data to try and determine an answer that was grounded more in the gut than fact.

Using the Tredence causal model, the planners were able to decompose volume changes and forecast deviations with precision and confidence into key drivers, such as: weather, promotion response, competitive activity, out of stocks, and much more. In addition, the causal model enabled them to run different scenarios using both macro and micro inputs to help their teams understand the impact of increased stimulus or inflation as an example. The truest sign of buy-in-over 90% adoption rate driven by our robust change management program.

### Continuously Optimizing Seasonal Inventory

Seasonal inventory presents huge challenges for planners. Limited history makes it hard to predict demand. Over buying means you have too much inventory and then need to mark it down. Too little inventory means you run out before the peak season. And all of this must be managed dynamically throughout the season.

Leveraging daily ML model refreshes and real-time inventory positions, Tredence helped the retailer compare its predicted demand to inventory. Alerts were created to help planners know when they had either too much or too little inventory and need to take action.



### The net impact

**6% improvement** in inventory costs for seasonal products.

## The Bottom Line

While the Demand Planning process has historically been a huge challenge, modern technology and machine learning can significantly improve the process:



Accuracy

**600**

basis point accuracy improvement



Efficiency

**50%**

time savings for planners



ROI

**6%**

improvement in inventory costs

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Beyond Possible