

# How a Regional CPG Manufacturer Achieved 22% MAPE Improvement and 68% Forecast Bias Reduction with ML-Driven Demand Forecasting

Demand Forecasting → Statistical & ML-Driven Demand Forecasting

## At a Glance

### The Problem

- Demand forecasts built manually in spreadsheets — no statistical baseline
- Consistent over-forecast bias driving \$3–5M overproduction per quarter
- Under-forecast on fast-moving lines causing retailer OOS and chargebacks
- Promotions and price changes not captured in the forecast model

### The Solution

- ML-driven forecasting engine replacing manual spreadsheet process
- Automated POS signal and promotional calendar integration
- Weekly forecast bias monitoring with exception reporting
- Consensus forecast process connected to production scheduling

### The Result

- 22% MAPE improvement in 16 weeks
- 68% forecast bias reduction
- 18% inventory turns improvement
- 35% retailer OOS incident improvement

## Business Context

A regional CPG manufacturer distributing across 4,500+ retail doors had been running its demand planning process on a combination of spreadsheets and planner intuition. For a business producing 2,800 SKUs across four categories — ambient food, beverages, personal care, and household — the manual approach had reached its practical ceiling. Forecast accuracy, measured as MAPE, was running at 38–42% across the portfolio.

The consequences were appearing at both ends of the supply chain. Overproduction on slow-moving lines was driving \$3–5M in excess finished goods inventory each quarter. At the same time, under-forecast on high-velocity lines was creating stockouts at key retail partners — resulting in chargeback penalties and shelf voids that competitors were filling. The planning team was skilled, but no manual process could reliably model 2,800 SKUs across multiple channels and promotional windows simultaneously.

## Client Profile

### Industry:

CPG

### Geography:

North America — Regional Manufacturer

### Scale:

3 manufacturing sites, distribution to 4,500+ retail doors

### Revenue:

\$210–350M annual revenue range

### SKUs:

2,800 active SKUs across 4 product categories

## The Challenge In Depth

The forecasting process had not fundamentally changed in four years. Each planner maintained their own spreadsheet models, adjusted statistical baselines manually each week, and submitted consensus numbers through a slow email-based process that made mid-week corrections practically impossible.

- **Forecast Bias:** Consistent over-forecast bias of 18–22% on seasonal ambient lines drove systematic overproduction, resulting in \$3–5M in excess finished goods inventory per quarter.
- **No External Signals:** Promotional uplifts, price changes, and competitor activity were incorporated manually — meaning promotional periods routinely generated 2–3x the expected demand spike with no advance signal to production scheduling.
- **Planning Bottleneck:** Three planners manually maintaining 2,800 SKU forecasts spent 70% of their week on data assembly and reconciliation rather than analysis and exception management.
- **Retailer Penalties:** Under-forecast on high-velocity lines was generating an estimated \$280K annually in retailer OOS chargebacks, plus measurable shelf void losses that compounded over time.

## Our Approach

### 1. Replacing Manual Spreadsheets with a Statistical Forecasting Engine

Techverx deployed an ML-driven forecasting engine generating statistical baseline forecasts for all 2,800 SKUs automatically, incorporating historical sell-through, seasonality patterns, product lifecycle stage, and promotional calendars. Planners shifted from building forecasts to reviewing and enriching exception-flagged items — reducing data assembly workload by 70%.

### 2. External Signal Integration That Captures Demand Before It Arrives

The forecasting engine integrated retailer POS signals, promotional calendars, and pricing event data directly into the demand model. Promotional uplift was pre-built into the forecast rather than discovered after the fact. Promo-period forecast accuracy improved 34% in the first three promotional events post-deployment.

### 3. Forecast Bias Monitoring With Accountability Built In

A weekly bias monitoring dashboard tracked over/under-forecast patterns by category, channel, and planner — automatically flagging systematic biases for root-cause review. Forecast bias, which had been running at 18–22%, improved 68% within 16 weeks as the systematic drivers were identified and corrected in the model.



Replenishment on demand, delivered timely using our platform



## Results and Impact

Within 16 weeks, MAPE improved 22% across the active portfolio — the largest forecast accuracy improvement the business had recorded. Forecast bias, the most damaging driver of systematic over/underproduction, improved 68%. Inventory turns improved 18% as production volumes aligned more closely to actual demand. Retailer OOS incidents improved 35%, with chargeback penalties falling significantly in the first full quarter post-deployment.

## What Happened Next

- **Weeks 1–16:** ML forecasting engine live for all 2,800 SKUs; MAPE improved 22% and forecast bias improved 68%.
- **Month 5:** Retailer POS signal integration activated for top-20 retail partners.
- **Month 7:** Forecast bias monitoring dashboard embedded in weekly S&OP review cycle.
- **Currently:** Evaluating demand planning module integration to connect forecast outputs directly to production scheduling.

22%

MAPE  
Improvement (16 Wks)

68%

Forecast Bias  
Reduction

18%

Inventory Turns  
Improvement

35%

Retailer OOS  
Improvement

# axlian

Axlian helps retail teams make faster decisions, reduce inventory costs, eliminate stockouts, and protect margins; so retailers never fall behind.

[axlian.com](https://axlian.com)