**Store Sales Forecast – DIVE Summary Report**

**DIVE Journey:**

**D – Discover: Surface-Level Findings**

Using the ARIMA\_PLUS model on historical daily sales data (with constant 54 stores and 0 promotional flags), we forecasted sales for a 14-day horizon.

Key Findings:

- Forecasted sales range: $620K to $1.11M.

- Average predicted sales: ~$853K/day, with noticeable spikes on weekends.

- High variability exists even without promotions, suggesting demand cycles.

- The model identifies weekly/yearly seasonality and accounts for spikes, dips, and level shifts.

- Model evaluation (AIC ~40075.77, low variance) indicates robust predictive performance.

**I – Investigate: Root Cause Patterns**

- Constant store count (54) confirms variation is driven by external demand.

- Sales spikes align with weekends, end-of-month cycles, and likely paydays.

- Peak historical dates like 2013-12-01, 2014-03-23, and 2014-03-10 highlight non-promotional seasonal influence.

- Promotion impact is absent in modeling, yet significant trends are observed—this hints at strong organic consumer behavior patterns.

**V – Validate: Model Assumptions and Risks**

- Past behavior is predictive of future sales.

- No disruptions in store operations or product availability.

- Promotions and holiday effects not modeled.

- Ignores macroeconomic or competitive market dynamics.

- Unfit for black swan events (e.g., COVID-19, flash sales).

**E – Extend: Strategic Application**

Key Takeaway: Sales show strong weekly cycles and structural shifts, even without promotions.

Recommendations:

1. Next week: Align inventory and staff for predicted sales peaks (Aug 5–6, 12–13).

2. Next month: Add promotional and holiday data as inputs; monitor forecast drift.

3. Long-term: Use store-level forecasting; automate replenishment using ML pipelines.

**Action Plan**

Three Specific Actions for Store Managers:

**1.** Align Operations with Peak Days (Aug 5–6, 12–13):

- Increase staffing and product availability

- Enable express checkouts and extended hours

**2.** Counteract Troughs with Promotions (e.g., Aug 10):

- Run one-day flash sales

- Promote low-turnover items

**3.** Prepare for Seasonality Trends Ahead of Time:

- Analyze historical spikes around holidays

- Use model projections to place bulk orders early

**Success Metrics**

|  |  |  |
| --- | --- | --- |
| Objective | Metric | Target |
| Forecast Accuracy | % Deviation from Actual Sales | ≤ 10% |
| Inventory Availability | Stockout Rate | ≤ 5% |
| Promotion Effectiveness | Uplift on Trough Days | +10–15% |
| Operational Readiness | Staffing Match on Peak Days | ≥ 95% |

**Risk Mitigation Strategies**

- Data Drift Detection: Retrain models monthly using updated sales.

- Scenario Planning: Maintain manual override options during peak seasons.

- Data Enrichment: Integrate weather, local events, and promo schedules into the forecasting pipeline.

- Feedback Loop: Incorporate post-promotion sales to improve future predictions.