

Skyrose Case Study

Skyrose Marketing Agency

- Specializes in beverage industry clients
- Cynthia Wright (VP) leads a team of 4 associates
- Focus areas:
 - New business acquisition
 - Serving existing clients: Vintage Vino (Wine), On The Rocks (Whiskey)
 - Potential client: Downtown Brew Co. (Craft Beer)

The Challenges They Faced

Heavy Workload Cycles: Overwhelmed during holidays, underutilized in quiet periods

Unpredictable Client Needs: Last-minute campaigns → stress & reduced creativity

Client Pressures: Vintage Vino: launch timing advice
On The Rocks Whiskey: demand shift insights
Downtown Brew Co.: proving ability to support rapid growth

Google Trends Exploration: Useful for spotting interests, but data was relative, event-driven & not tied to sales

Data Overview

- Source: Google Trends data (Aug 2020–Aug 2025)
- Frequency: Weekly Sales (~ 262 weeks)
- Geography: Canada
- Products: White Wine (Vintage Vino), Whiskey (On The Rocks), Craft Beer (Downtown Brew Co.)
- Data features: weekly frequency, seasonality, volatility
- Train/Test Split: 80% training, 20% testing.

Objectives

Analyze weekly sales data for three beverages: White Wine, Craft Beer, Whisky

Identify patterns, trends, and seasonality

Evaluate and compare forecasting models to recommend the best approach

Methodology Used

-  Data Inspection – Loaded CSV into pandas DataFrame.
-  Stationarity Check – Augmented Dickey-Fuller(ADF) test.
-  Time Series Decomposition – Trend, seasonality, residuals.
-  Moving Average Analysis – 3-, 6-, 9-, 12-week windows.
-  Exponential Smoothing Models – SES, Holt, Holt-Winters.
-  ARMA Modeling – auto_arima to select best (p,q).
-  Evaluation Metrics – MSE, MAE, MAPE.
-  Model Comparison – Consolidated results to identify best performers.

White Wine Insights

Model Performance Metrics:

	MSE	MAE	MAPE
3-Week MA	7.082906	1.500000	6.188176
6-Week MA	13.941634	2.224384	9.170974
9-Week MA	16.069068	2.451006	10.018527
12-Week MA	17.133660	2.656375	10.920298
Simple ES	11.809160	1.977099	8.086576
Holt's Trend	12.399626	2.056714	8.505689
Holt-Winters	3.247790	1.167965	4.931331

Best performing model based on MSE: Holt-Winters (MSE: 3.25)
Best performing model based on MAE: Holt-Winters (MAE: 1.17)
Best performing model based on MAPE: Holt-Winters (MAPE: 4.93)%



Stationarity:

Confirmed (ADF p-value ≈ 0.000).



Seasonality:

Peaks around Week 26 (late spring/early summer).



Trend:

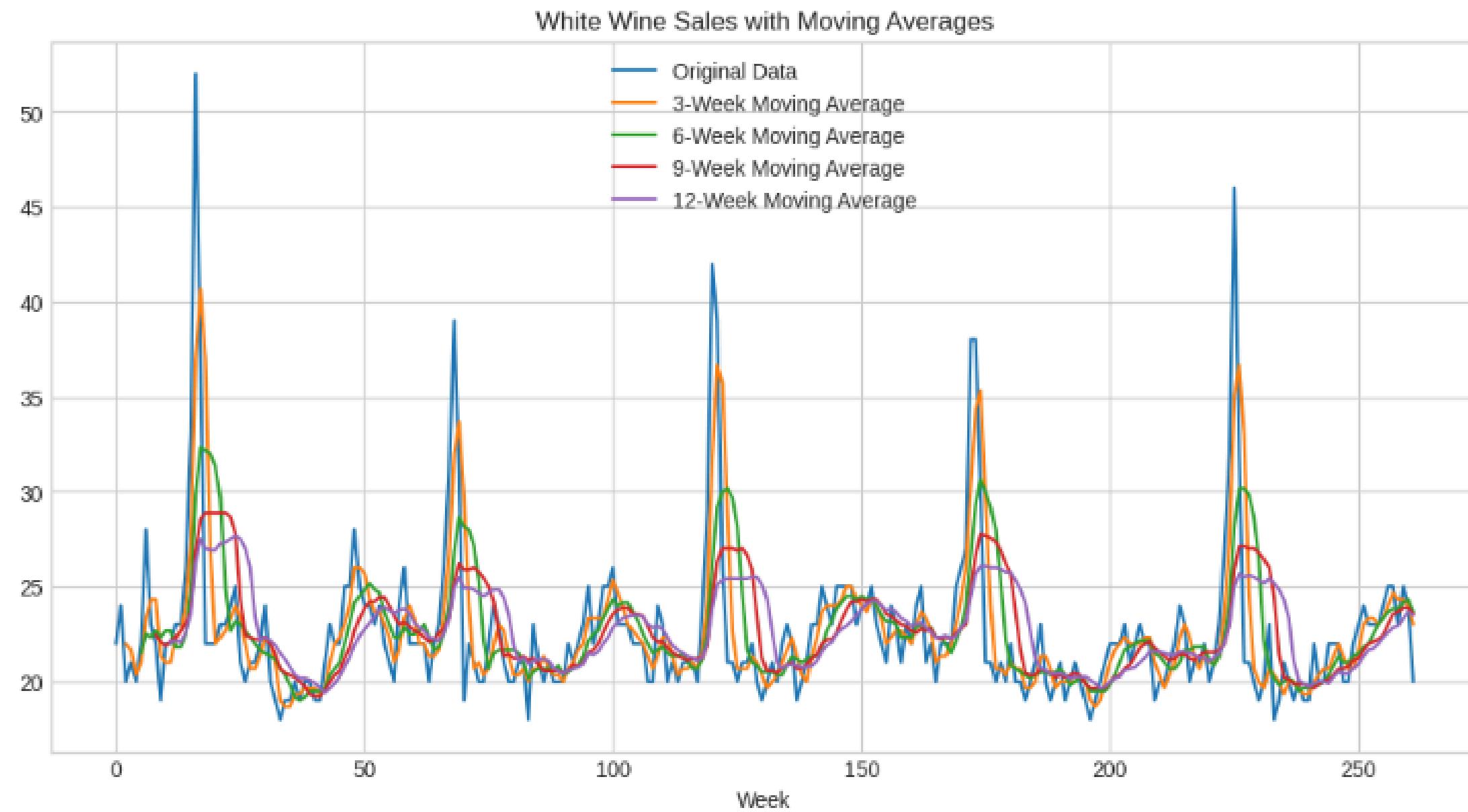
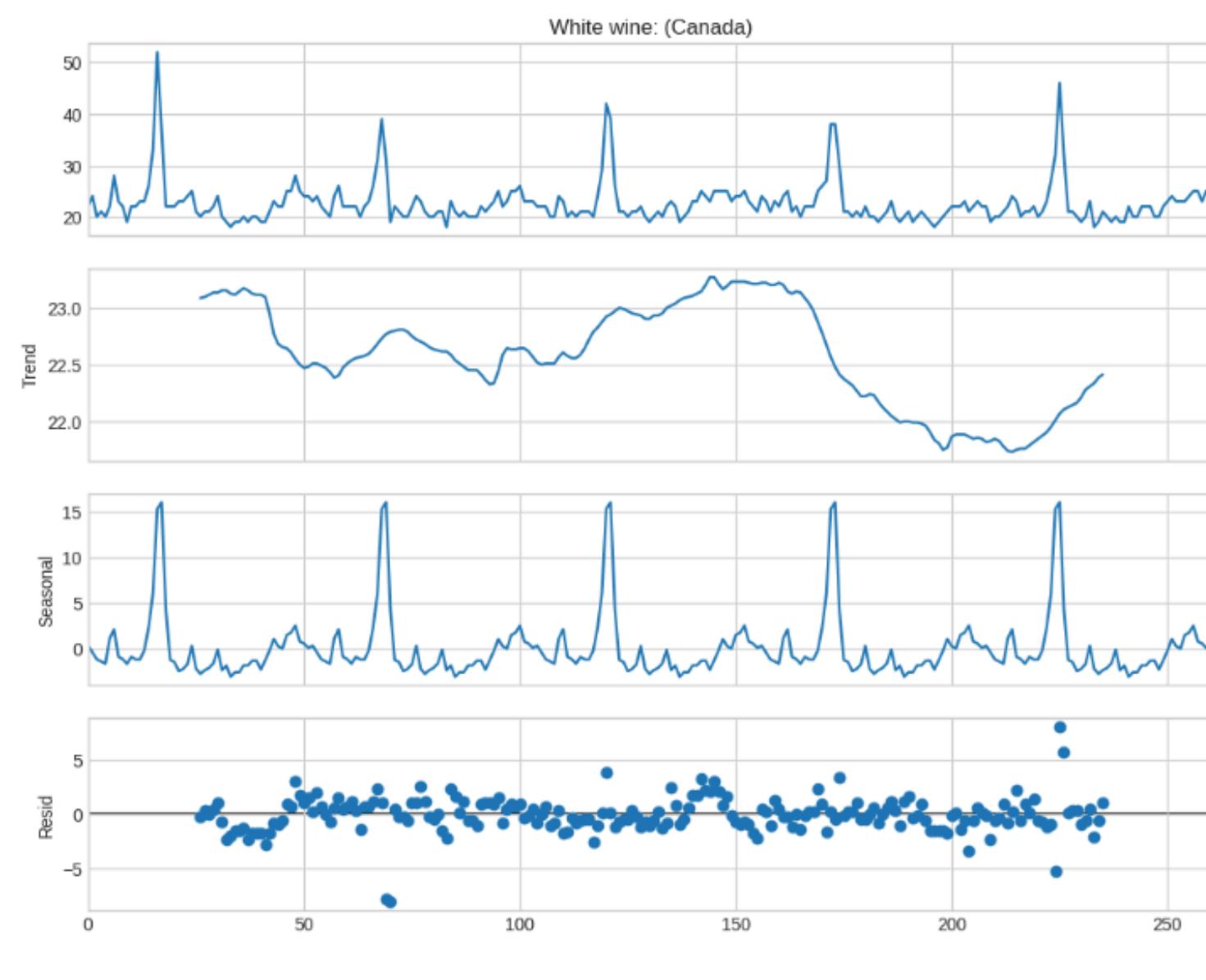
Upward trend with mid-series dip and recovery.



Performance:

Holt-Winters Seasonal Smoothing:
MSE=3.25, MAE=1.17, MAPE=4.93% → Best.

Visualizations (White Wine)



Craft Beer Insights

Craft Beer Model Performance Metrics:			
	MSE	MAE	MAPE
3-Week MA (Craft Beer)	0.292308	0.430769	7.303595
6-Week MA (Craft Beer)	0.574903	0.597276	10.109678
9-Week MA (Craft Beer)	0.872023	0.741470	12.498747
12-Week MA (Craft Beer)	1.099712	0.837981	13.965171
Simple ES (Craft Beer)	0.629594	0.643856	10.893175
Holt's Trend (Craft Beer)	0.703772	0.673152	11.376966
Holt-Winters (Craft Beer)	0.359480	0.475867	7.969880
ARMA (1,0,1) (Craft Beer)	1.770893	1.165494	25.249306

Best performing model based on MSE: 3-Week MA (Craft Beer) (MSE: 0.29)
Best performing model based on MAE: 3-Week MA (Craft Beer) (MAE: 0.43)
Best performing model based on MAPE: 3-Week MA (Craft Beer) (MAPE: 7.30)%



Stationarity:

Confirmed (ADF p-value ≈ 0.011).



Seasonality:

Annual peaks similar to wine but declining trend overall.

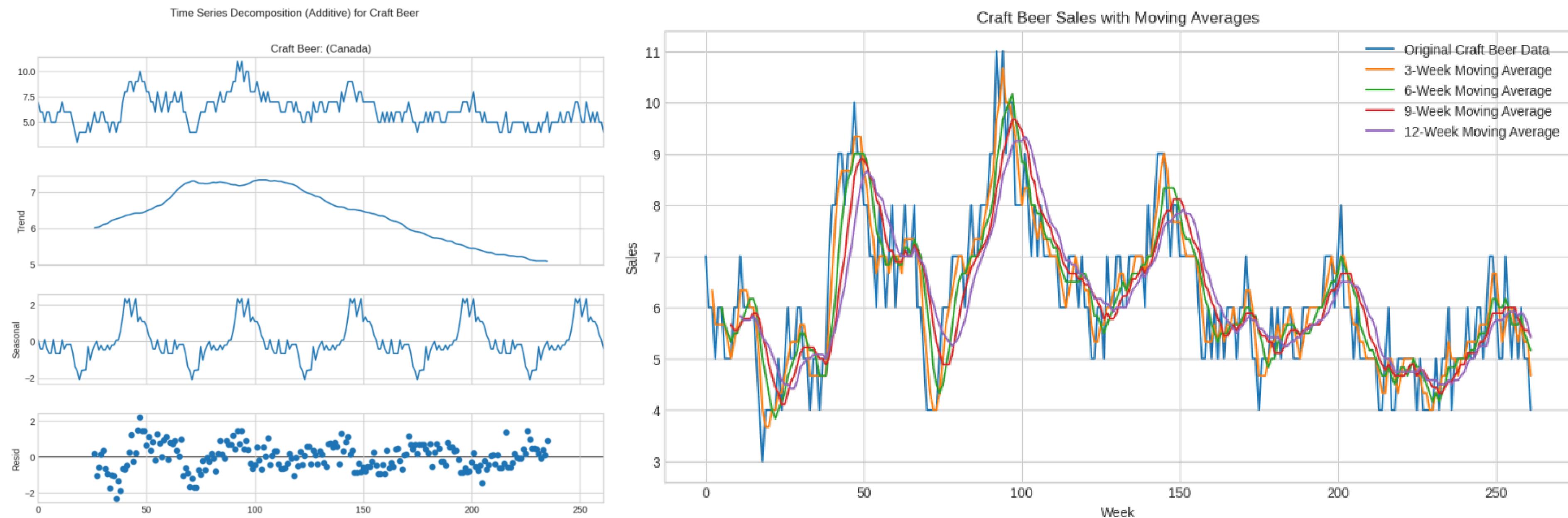


Performance:

3-Week Moving Average: Lowest MSE=0.29, MAE=0.43.

Holt-Winters: Lowest MAPE=7.97%, good for seasonal patterns.

Visualizations (Craft Beer)



Whisky Insights

Whisky Model Performance Metrics:			
	MSE	MAE	MAPE
3-Week MA (Whisky)	25.961538	3.053846	5.531065
6-Week MA (Whisky)	52.675638	4.470169	8.071747
9-Week MA (Whisky)	72.087149	5.506124	9.966021
12-Week MA (Whisky)	83.599436	6.074369	10.992311
Simple ES (Whisky)	45.416031	4.125954	7.465857
Holt's Trend (Whisky)	46.497761	4.162000	7.617715
Holt-Winters (Whisky)	13.673142	2.580144	4.871093
ARMA (1,2) (Whisky)	120.490285	6.192305	9.500618

Best performing model for Whisky based on MSE: Holt-Winters (Whisky) (MSE: 13.67)
Best performing model for Whisky based on MAE: Holt-Winters (Whisky) (MAE: 2.58)
Best performing model for Whisky based on MAPE: 4.87)%



Stationarity:

Confirmed (ADF p-value ≈ 0.000017).



Seasonality:

Peaks at Week 51–52 (holiday season).



Trend:

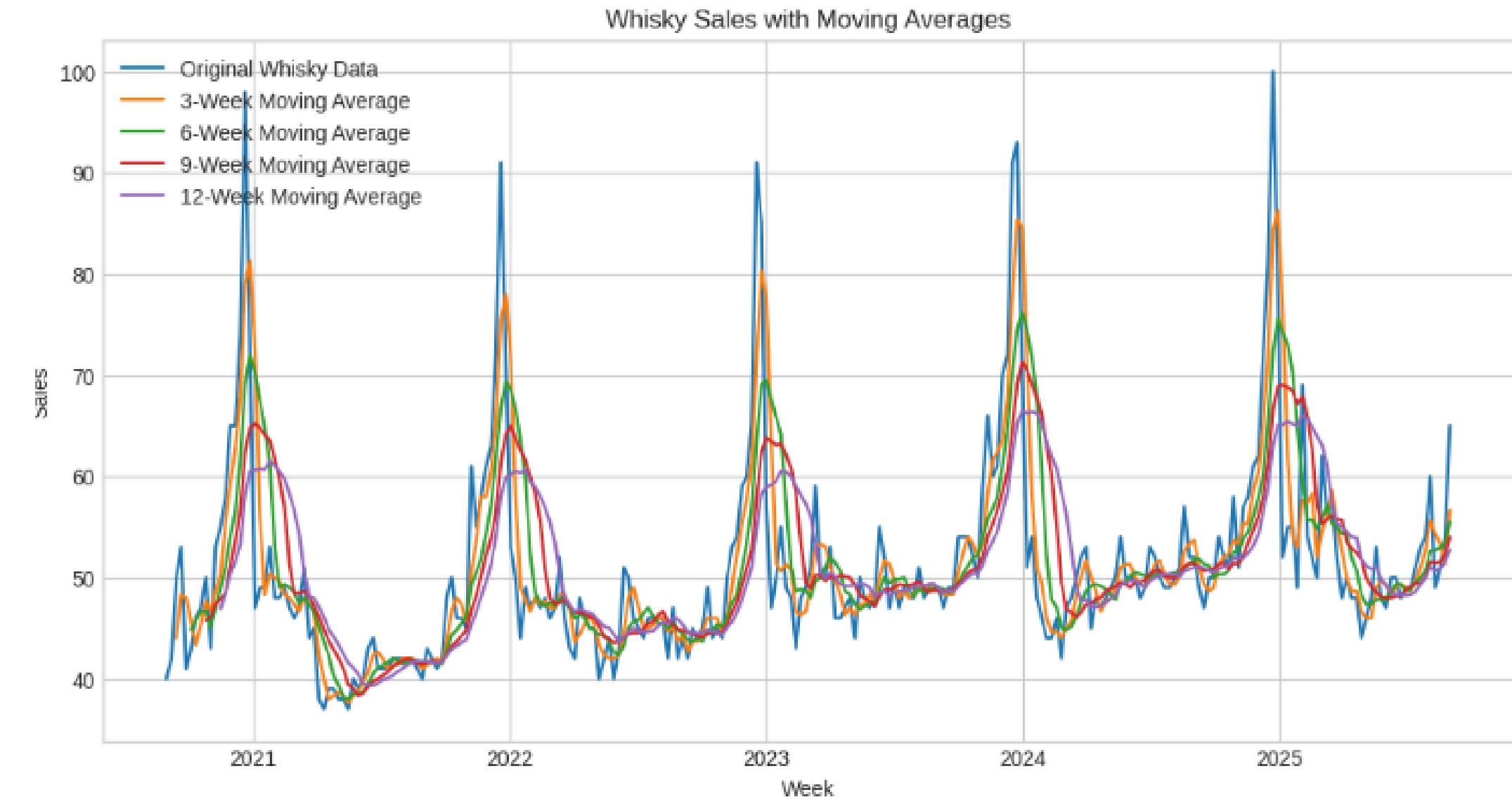
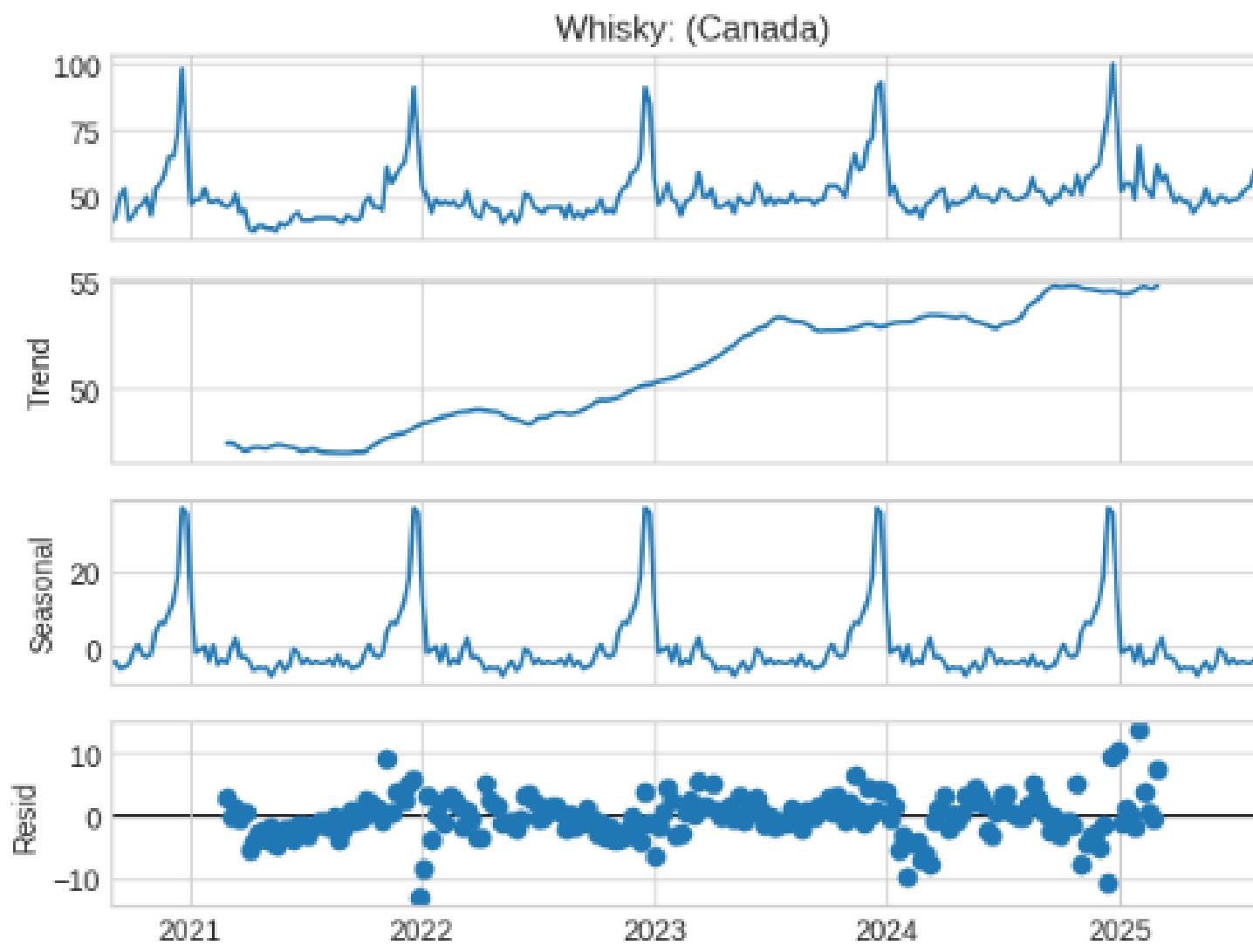
Consistent upward growth in sales.



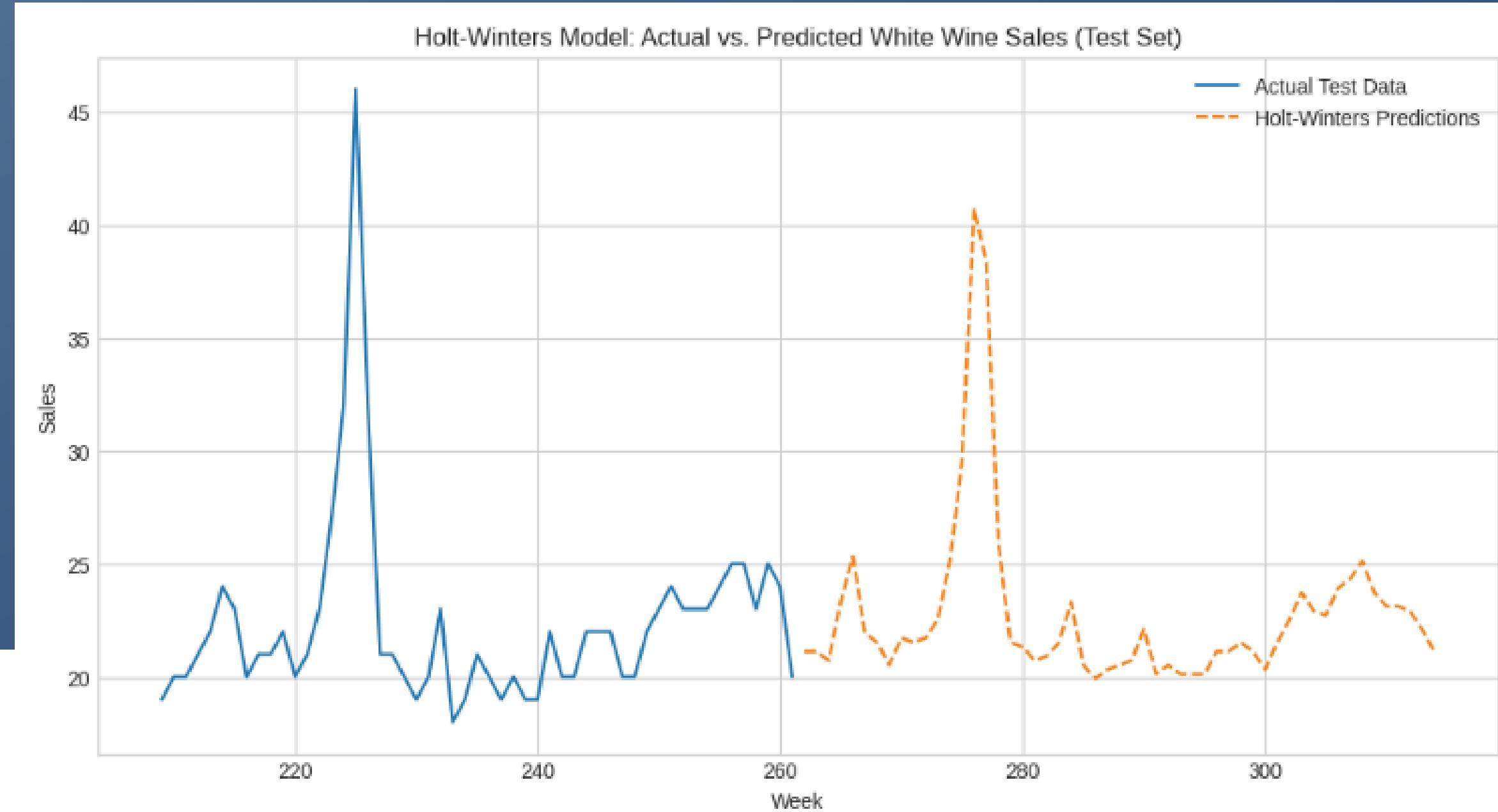
Performance:

Holt-Winters: Best across all metrics.
Moving Averages: Higher MAPE (5.53% for 3-week MA).

Visualizations (Whisky)



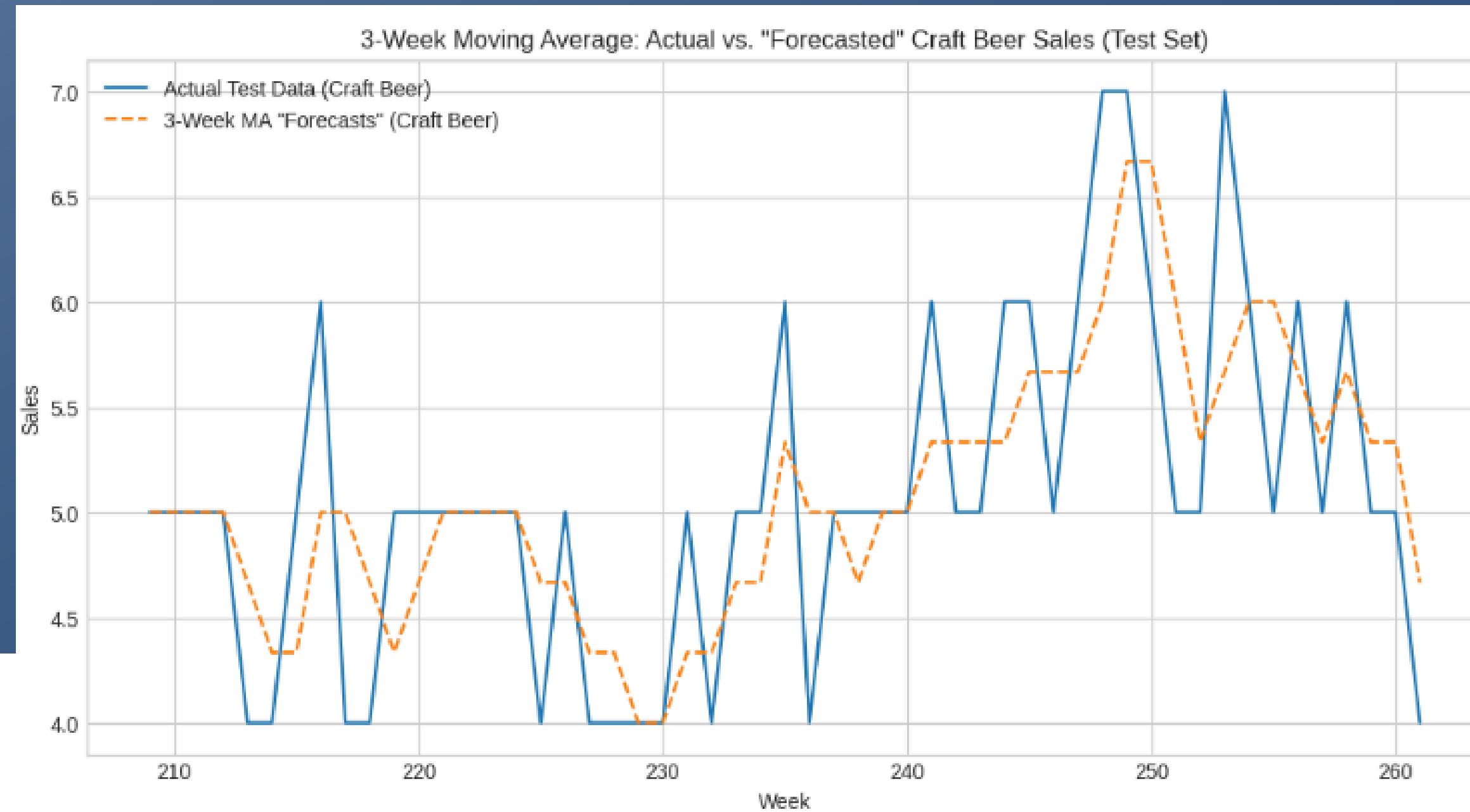
Forecast Results and Projections



White Wine

- Holt-Winters predicts steady growth with seasonal peaks continuing around Week 26.
- Expected slight dip mid-year before recovery.

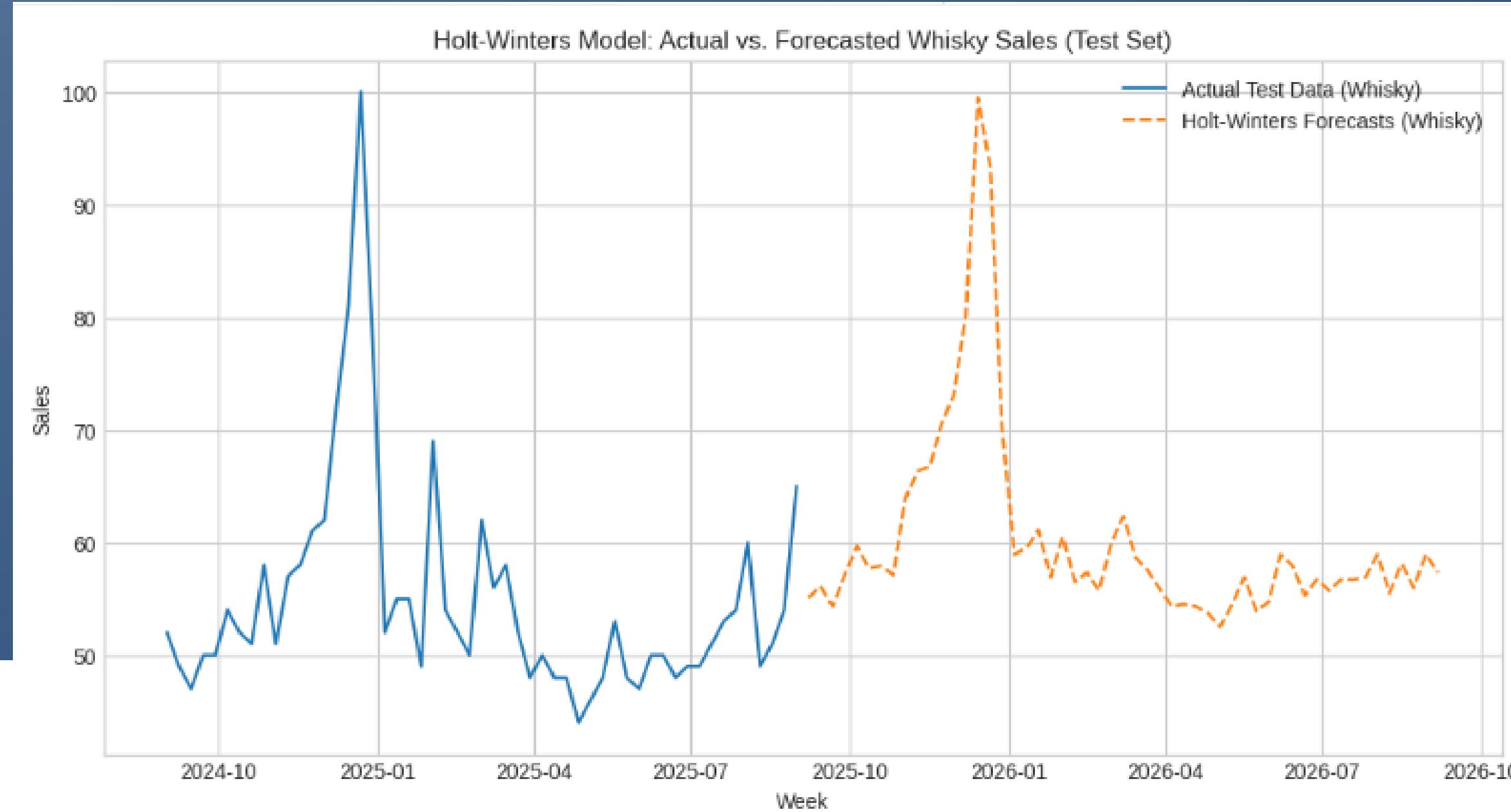
Forecast Results and Projections



Craft Beer

- 3-Week Moving Average suggests a continued downward trend with smaller seasonal spikes.
- Short-term smoothing captures recent changes effectively.

Forecast Results and Projections



Whisky

- Holt-Winters projects strong holiday season peaks around Week 51–52.
- Upward long-term trend indicates growing popularity.

Recommendations

Inventory & Supply Chain Optimization	Marketing & Sales Strategy	Strategic Decisions
<p>Align production & stock with forecasted peaks:</p> <p>White Wine: Build inventory before late spring/early summer (Week 26).</p> <p>Whisky: Increase capacity & distribution before holiday season (Week 51–52).</p> <p>Craft Beer: Gradually reduce production but stay agile for short-term spikes.</p>	<p>Launch targeted campaigns around peaks (e.g., whisky before holidays, wine in early summer).</p> <p>Use bundling or cross-promotions during high-demand seasons.</p>	<p>Diversify or refresh the Craft Beer portfolio to counter its decline.</p> <p>Reassess distribution channels to match forecasted spikes, especially for whisky.</p>

Use forecast-driven planning to align production, inventory, and marketing with seasonal peaks, while leveraging error metrics and dashboards to optimize supply chains, refresh product strategies, and enhance decision-making for Skyrose Beverages.

Business Impact



Inventory Optimization:
Reduced
stockouts/overproduction.



Marketing Timing: Better
alignment with peak
demand periods.



Revenue Growth:
Leverage seasonal
insights for promotions.

THANK YOU