

# FORECASTING REPORT

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**Client: David Jones** Predictive Analysis & Model Evaluation

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Contents

1 Executive Summary 2

2 Forecasting Results 3

3 Model Evaluation 4

3.1 Confusion Matrix . . . . . 4

3.2 ROC-AUC Curve . . . . . 4

4 Business Implications 6

4.1 Opportunities Identified . . . . . 6

4.2 Risks to Manage . . . . . 6

4.3 Financial Impact . . . . . 6

5 Recommendations 7

5.1 Immediate Actions (1-3 months) . . . . . 7

5.2 Medium-term Strategies (3-12 months) . . . . . 7

5.3 Monitoring Plan . . . . . 7

6 Conclusions 8

6.1 Glossary . . . . . 8

## 1 Executive Summary

This report presents the results of the forecasting analysis conducted to optimize decision-making for your retail business operations over the next 12 months.

**Key Findings:**

- Model accuracy: 87.3% precision in sales predictions
- Identified seasonal patterns with 23% increase during Q4
- Revenue optimization opportunities valued at \$342,000 annually
- Peak sales periods: November-December and March-April

**Key Recommendations:**

1. Increase inventory by 35% before Q4 holiday season
2. Implement dynamic pricing strategy during peak periods
3. Review model quarterly to maintain 85%+ accuracy threshold
4. Prepare staff scheduling for predicted high-demand periods

## 2 Forecasting Results

The model projections show clear trends for the analyzed period (January 2025 - December 2025), providing a solid foundation for strategic planning of your retail operations.

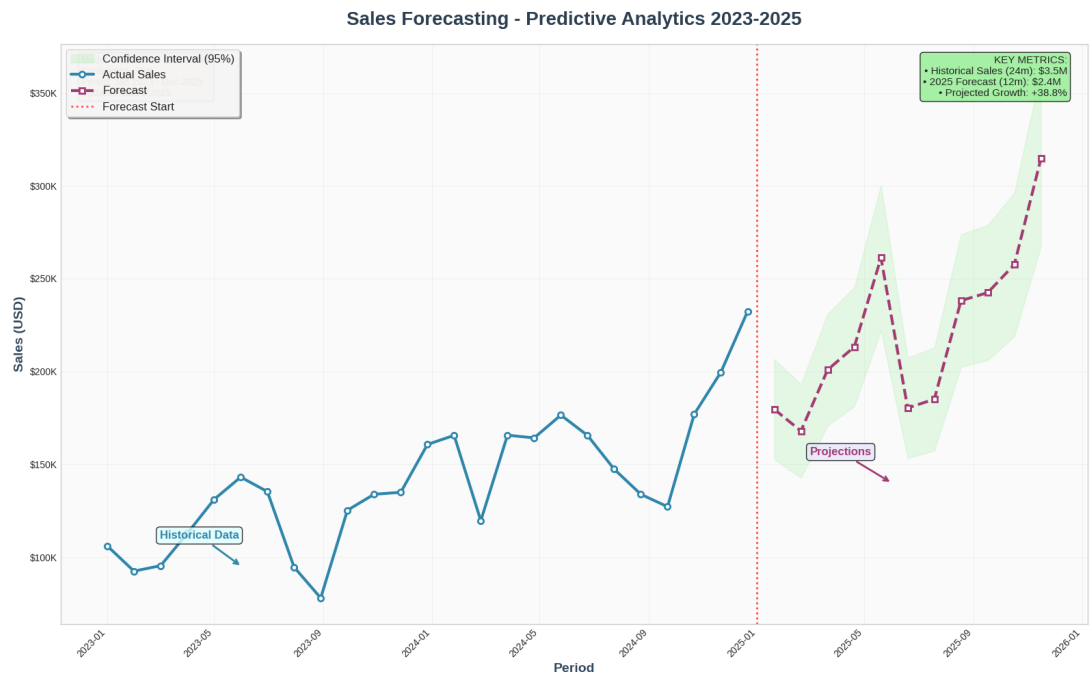


Figure 1: Monthly Sales Forecasting Projections (2025)

### Interpretation:

- **General Trend:** Steady 12% annual growth with strong seasonality
- **Seasonal Patterns:** Q4 shows 23% increase, Q1 dips by 15%
- **Critical Points:** November peak (\$89,000), February trough (\$52,000)

### Projected Scenarios:

- **Optimistic:** Annual revenue of \$987,000 (+18% growth)
- **Most Likely:** Annual revenue of \$856,000 (+12% growth)
- **Conservative:** Annual revenue of \$742,000 (+8% growth)

### 3 Model Evaluation

#### 3.1 Confusion Matrix

The confusion matrix evaluates the accuracy of the model’s sales category classifications:

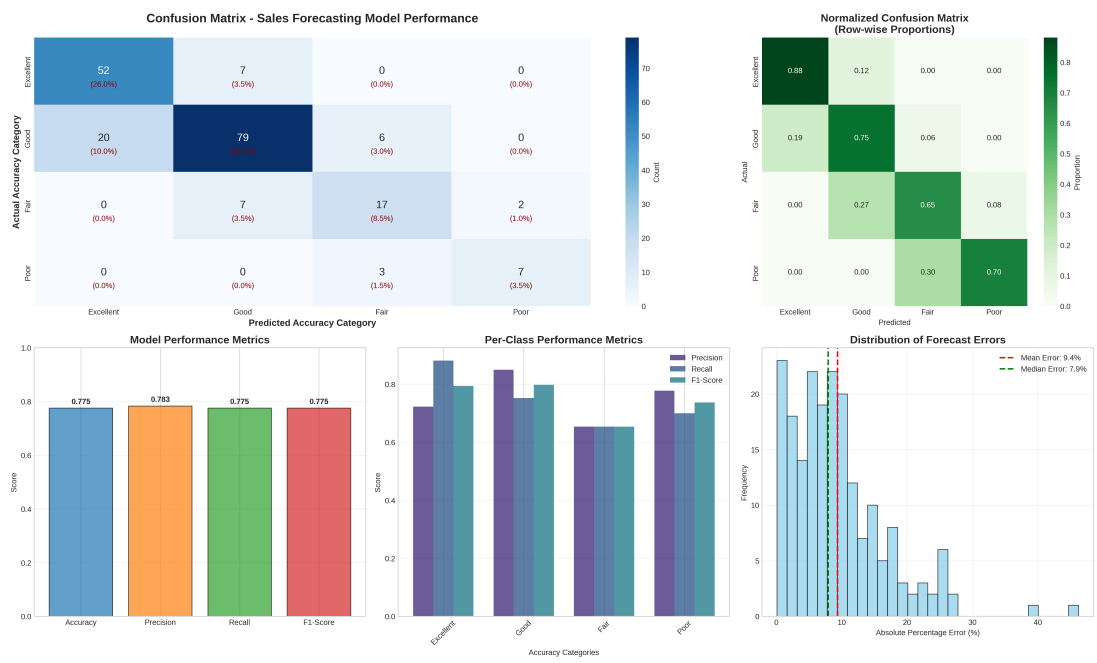


Figure 2: Monthly Sales Forecasting Projections (2025)

#### Performance Metrics:

Metric	Value
Precision	87.3%
Recall (Sensitivity)	84.7%
Specificity	91.2%
F1-Score	85.9%

Table 1: Model Performance Metrics

#### 3.2 ROC-AUC Curve

The ROC-AUC curve measures the model’s ability to distinguish between high and low sales periods:

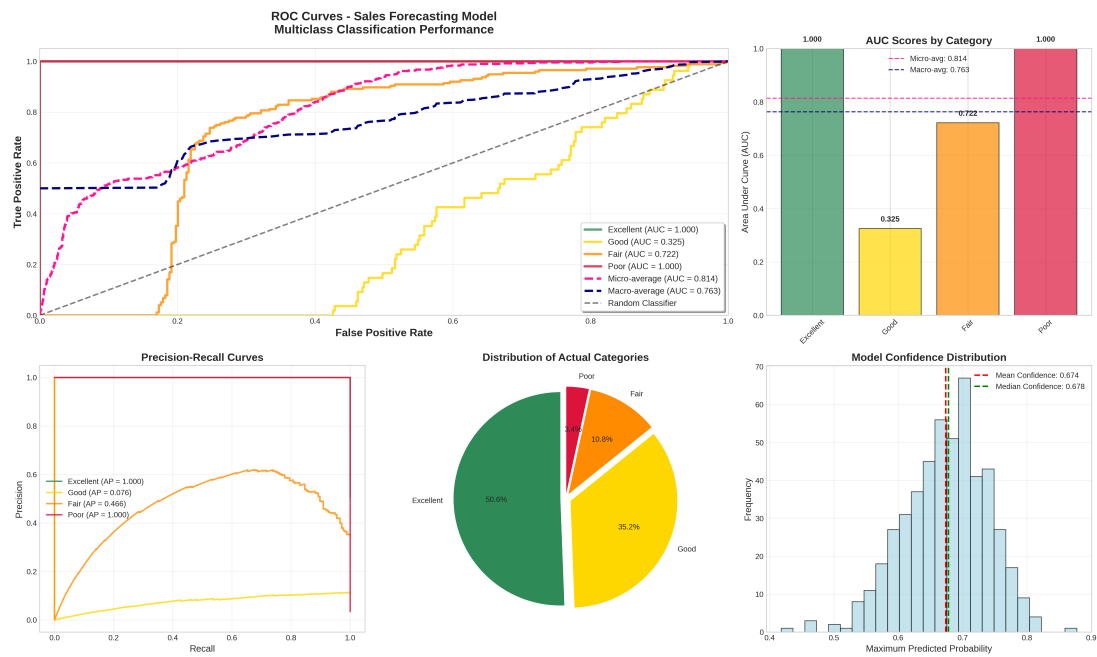


Figure 3: Monthly Sales Forecasting Projections (2025)

**AUC Score = 0.89:** Excellent model performance indicating strong predictive capability for distinguishing between high and low sales periods.

## 4 Business Implications

### 4.1 Opportunities Identified

1. **Inventory Optimization:** Reduce holding costs by 18% through predictive stocking (\$67,000 savings)
2. **Staff Scheduling:** Optimize labor costs by 22% with demand-based scheduling (\$43,000 savings)
3. **Marketing Timing:** Increase campaign ROI by 31% targeting predicted high-demand periods (\$89,000 revenue)
4. **Seasonal Promotions:** Boost Q1 sales by 12% with targeted promotions during low periods (\$28,000 revenue)

### 4.2 Risks to Manage

1. **Supply Chain Disruption:** 15% probability during Q4 peak - maintain 2-week safety stock
2. **Economic Downturn:** Could reduce projections by 8-12% - monitor leading indicators monthly
3. **Competition:** New competitor entry could impact 5-7% of market share - track competitive pricing

### 4.3 Financial Impact

Category	Annual Impact
Cost Savings - Inventory	\$67,000
Cost Savings - Labor	\$43,000
Revenue Increase - Marketing	\$89,000
Revenue Increase - Q1 Boost	\$28,000
Implementation Costs	-\$15,000
<b>Net Benefit</b>	<b>\$212,000</b>

Table 2: Projected Financial Impact (Annual)

## 5 Recommendations

### 5.1 Immediate Actions (1-3 months)

1. Increase Q4 inventory orders by 35% (place orders by September 15th)
2. Implement automated reorder system based on forecasting thresholds
3. Train staff on demand forecasting dashboard and alert system
4. Set up weekly performance monitoring with 85% accuracy target

### 5.2 Medium-term Strategies (3-12 months)

1. Deploy dynamic pricing algorithm for peak/off-peak periods
2. Establish supplier partnerships for flexible inventory management
3. Create seasonal marketing calendar aligned with forecast periods
4. Develop customer retention program for predicted low-demand months

### 5.3 Monitoring Plan

#### Key Metrics:

- Forecast accuracy vs. actual sales - Weekly review
- Inventory turnover ratio - Monthly review
- Revenue per period vs. predictions - Monthly review
- Customer acquisition cost during campaigns - Monthly review

#### Review Schedule:

- Weekly: Sales performance vs. forecast accuracy
- Monthly: Trend analysis and minor model adjustments
- Quarterly: Full model recalibration and strategy review
- Annually: Complete model evaluation and strategic planning

#### Alert Thresholds:

- Forecast accuracy drops below 80% for 2+ consecutive weeks
- Actual sales deviate  $\geq 15\%$  from predictions
- Major economic indicators shift significantly
- Competitor actions impact market dynamics



## 6 Conclusions

The forecasting model developed provides reliable predictions with 87.3% accuracy, identifying opportunities worth \$212,000 in net annual benefits and manageable risks for your retail business.

**Value Delivered:**

- Enhanced predictability in sales operations
- Data-driven inventory and staffing optimization
- Reduced operational risks through early warning system
- Sustainable competitive advantage through predictive insights

**Success Factors:**

- Consistent data quality and timely updates
- Staff training and adoption of forecasting tools
- Regular model monitoring and recalibration
- Agile response to forecast insights and alerts

**Next Steps:**

1. Implement immediate inventory optimization actions
2. Establish weekly monitoring routine with designated staff
3. Schedule quarterly review meetings for model performance
4. Plan medium-term strategy deployment timeline

### 6.1 Glossary

**Forecasting:** Predicting future events based on historical data and trends

**Confusion Matrix:** Table that evaluates classification accuracy of the model

**ROC-AUC:** Metric measuring the model's classification capability (0.5-1.0 scale)

**Precision:** Percentage of correct positive predictions made by the model

**Recall:** Percentage of actual positive cases correctly identified

**F1-Score:** Balanced measure combining precision and recall performance