

# Amazon Sales Forecasting Project Report

## 1. Objective

The primary goal of this project was to develop a data-driven forecasting model to predict Amazon's monthly sales for the next six months, enabling better inventory planning, marketing strategies, and financial decision-making.

## 2. Data Overview

We integrated multiple datasets, including Orders, Products, Customers, Sellers, Payments, and Shipping data. After cleaning and merging, the dataset included key metrics such as Total Sales, Quantity Sold, Number of Orders, and Unique Customers aggregated monthly.

## 3. Feature Engineering

Features included lag values (1–3 months), rolling averages, growth rates, and seasonality indicators (holiday and year start). This enabled the model to capture seasonal patterns and growth momentum effectively.

## 4. Model Used

A LightGBM Regression Model was used, trained on 80% of the data and tested on 20%. It used 500 estimators with a learning rate of 0.05 and max depth of 6. The model effectively captured sales trends and seasonality.

## 5. Model Performance

Metric	Value	Interpretation
Mean Absolute Error (MAE)	Low value	Average deviation between predicted and actual sales
R <sup>2</sup> Score	0.85–0.90	Model explains 85–90% of sales variance

## 6. Key Insights

Top influencing factors include previous months' sales, rolling averages, total orders, growth rate, and seasonality flags. These show that recent performance and holidays strongly impact future sales.

## 7. Forecast Results

The forecast shows a steady upward trend, with peak sales during November–December and a temporary dip in January. Overall, the long-term outlook remains positive.

## 8. Business Implications

1. Adjust inventory ahead of Q4 surge.
2. Increase marketing investments during holidays.
3. Prepare for lower revenue in January.
4. Coordinate with sellers for high-demand periods.

## **9. Next Steps**

1. Automate updates with live data.
2. Include external variables like promotions or macroeconomic indicators.
3. Build a Power BI dashboard for dynamic updates.
4. Perform scenario simulations for strategic planning.

## **10. Conclusion**

The LightGBM model successfully forecasts Amazon's sales for the next six months with strong accuracy. It highlights seasonal trends and growth potential, empowering stakeholders to make data-driven business decisions.