

# **Executive Summary: Profit Analysis & Forecasting Project**

## **1. Project Overview**

This project involved a comprehensive analysis of monthly business data from **2000 to 2005**. The primary objective was to understand the drivers of profitability and forecast future performance for the upcoming **year (2006)**.

## **2. Key Findings from Exploratory Data Analysis (EDA)**

**Data Health:** After rigorous cleaning and symbol removal, the dataset was transformed into a monthly time-series format.

**Stationarity:** The Augmented Dickey-Fuller (ADF) Test confirmed that the '**Profit**' data is stationary, making it suitable for advanced time-series modeling.

**Seasonality:** Decomposition revealed a clear seasonal pattern, where profit fluctuates consistently at specific intervals throughout the year.

## **3. Predictive Modeling Performance**

### **A. Driver-Based Prediction (Linear Regression)**

**Methodology:** Utilizing '**Quantity**' and '**Cost**' as independent variables to predict '**Profit**' and '**Revenue**'.

**Accuracy:** This model achieved a high accuracy of **87%**.

**Insight:** Profit is heavily influenced by operational drivers (how much is sold and at what cost).

### **B. Time-Series Forecasting (SARIMA)**

**Methodology:** Analyzed historical time patterns to predict the **next 12 months**.

**Accuracy:** Achieved a **55.26%** accuracy (**Final Model Accuracy**).

**Insight:** While lower than the regression model, this forecast captures the "**rhythm**" of the business. The lower accuracy is due to the inherent volatility and lack of external variable inputs (like quantity) in the **SARIMA** equation.

## **4. Future Forecast (Next 12 Months)**

**Total Expected Profit:** The model projects a total profit of **496,436.43** for the next year.

**Average Monthly Expectation:** Approximately **41,370** per month.

**Stability:** Despite monthly fluctuations, the business is expected to remain consistently profitable within the established confidence intervals.

## 5. Final Conclusion & Recommendations

The analysis confirms that while time-based trends provide a seasonal roadmap, the true growth engine of the business is Sales Quantity. To maximize the projected profit of 496K, focus should remain on optimizing the quantity-to-cost ratio, as evidenced by the superior 87% accuracy of the regression model.