PROJECT REPORT

Price Optimization Analysis using Regression

Submitted By : Riya

University Roll No : 2236971

Task Assessment Provided By Spotmies LLP

Role Applied : Data Analyst

Assessment Platform : Reaidy.io

Submission Date : 30/12/2025

1. Objective

The objective of this analysis is to identify optimal pricing points for products using historical sales data. Statistical regression techniques are applied to understand the relationship between product price and quantity sold, estimate price elasticity, and recommend pricing strategies that maximize revenue.

2. Dataset Overview

The dataset used for this analysis is a sample sales dataset containing historical order-level information. Key attributes in the dataset include:

- PRICEEACH – Unit price of the product
- QUANTITYORDERED – Quantity sold per order
- SALES – Total sales value
- PRODUCTLINE – Product category
- ORDERDATE – Date of order

To ensure focused and meaningful analysis, the study was limited to a single product category, **Classic Cars**, to reduce variability caused by multiple product types.

3. Data Cleaning and Preparation

Data cleaning was performed to ensure accuracy and reliability of the analysis. The following steps were applied:

- Missing values in critical columns were identified and handled
- Rows with invalid or missing price and quantity values were removed
- Date fields were converted into proper datetime format
- Data types were verified for consistency

Only valid and complete records were retained for regression modeling.

4. Methodology

A linear regression approach was used to model the relationship between product price and quantity sold. The regression equation is defined as:

$$\textbf{Quantity} = \beta_0 + \beta_1 \times \textbf{Price}$$

Where:

- β_0 represents the intercept
- β_1 represents the price coefficient

Price elasticity of demand was calculated using the regression coefficient to measure how sensitive demand is to price changes. Revenue was then simulated by multiplying predicted quantity with different price points within the historical price range.

5. Price Elasticity Analysis

Price elasticity was computed to understand customer responsiveness to price changes. The elasticity value was found to be close to zero, indicating relatively **inelastic demand**.

This suggests that changes in price have a limited impact on the quantity sold for the selected product line.

6. Revenue Optimization

Using the regression model, revenue was simulated across a range of prices. Revenue was calculated as:

Revenue = Price × Predicted Quantity

The optimal price was identified as the price point that maximized simulated revenue. The analysis showed that revenue increased steadily across the evaluated price range, with maximum revenue achieved at the upper end of historical prices.

7. Visualization and Interpretation

A Revenue vs Price curve was generated to visually assess the impact of price changes on revenue. The graph clearly indicates a positive trend, with revenue peaking at higher price levels.

This visual evidence supports the conclusion that the selected product line exhibits low price sensitivity.

8. Assumptions and Limitations

The analysis is based on the following assumptions:

- A linear relationship exists between price and demand
- External factors such as promotions, competitor pricing, and seasonality were not considered
- The model relies solely on historical data

As a result, the findings should be validated with additional business context before implementation.

9. Final Recommendation

Based on the analysis, it is recommended to maintain pricing for the Classic Cars product line at the higher end of the historical price range to maximize revenue. However, business constraints such as market competition and customer perception should be considered before final pricing decisions are made.