Regression Analysis Report: Profit vs R&D, Administration, Marketing

Objective: Determine how R&D; Spend, Administration, and Marketing Spend affect Profit, and predict Profit for given inputs.
Dataset rows (after cleaning): 50 (dropped 4 rows due to non-numeric/missing values)
Regression Equation: Profit = 50122.1930 + 0.805715*R&D; + -0.026816*Administration + 0.027228*Marketing
Model Performance: R-squared = 0.9507, RMSE = 8855.3445

Top 5 rows of cleaned dataset:

index	R&D Spend	Administration	Marketing Spend	Profit
0.0	165349.2	136897.8	471784.1	192261.83
1.0	162597.7	151377.59	443898.53	191792.06
2.0	153441.51	101145.55	407934.54	191050.39
3.0	144372.41	118671.85	383199.62	182901.99
4.0	142107.34	91391.77	366168.42	166187.94

Regression Coefficients:

Intercept = 50122.1930
R&D; Spend: 0.805715
Administration: -0.026816
Marketing Spend: 0.027228

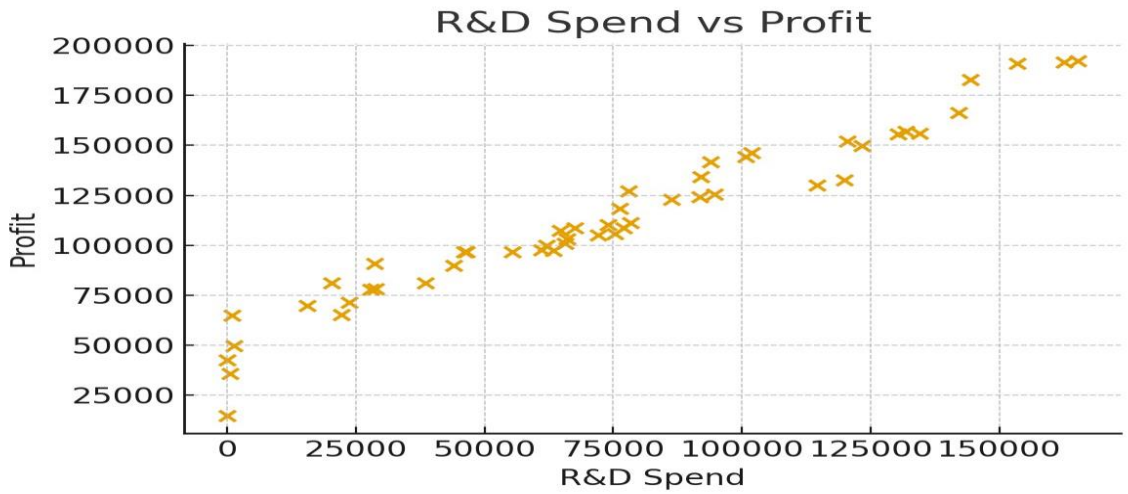
Model Metrics:

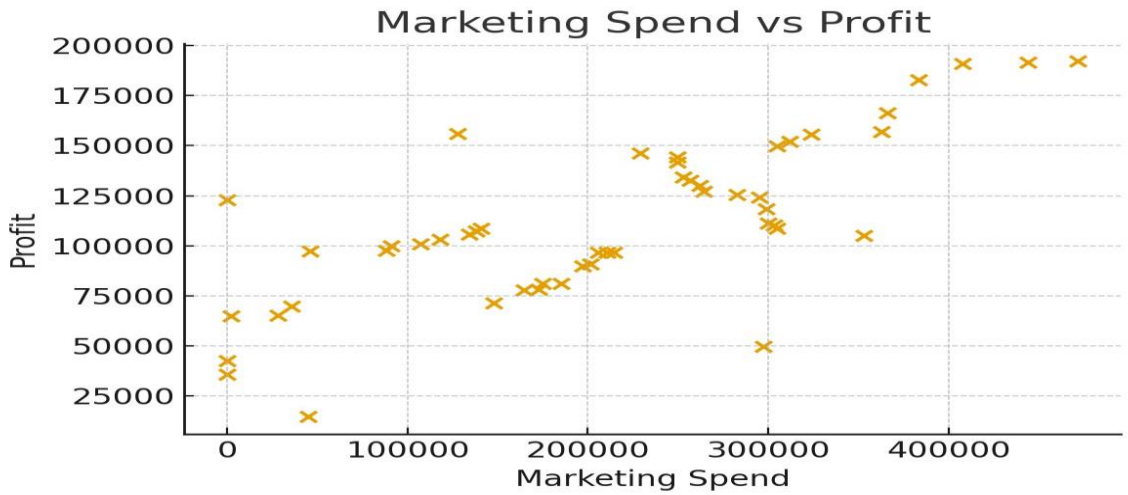
R-squared: 0.9507
RMSE: 8855.3445
MSE: 78417126.0191

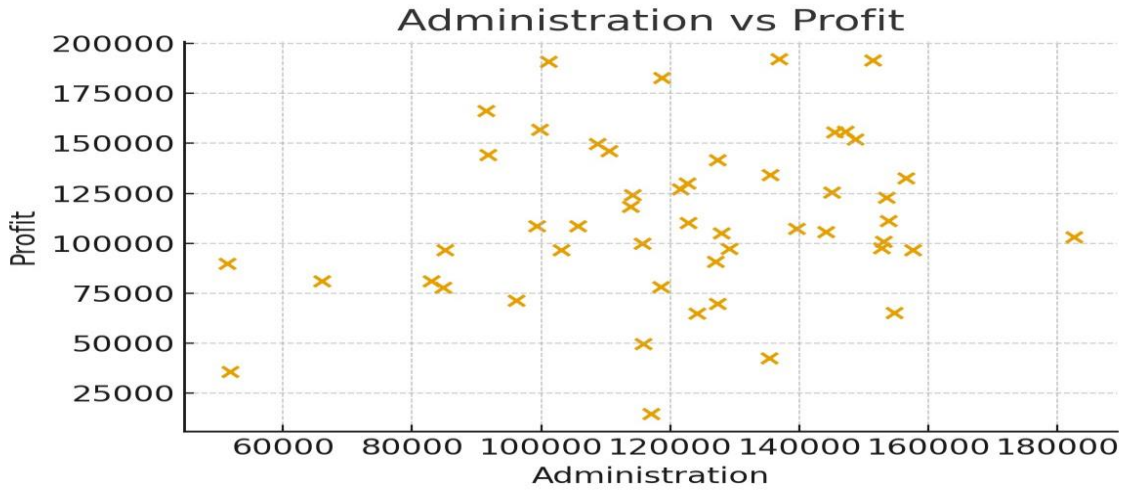
Predictions for provided inputs:

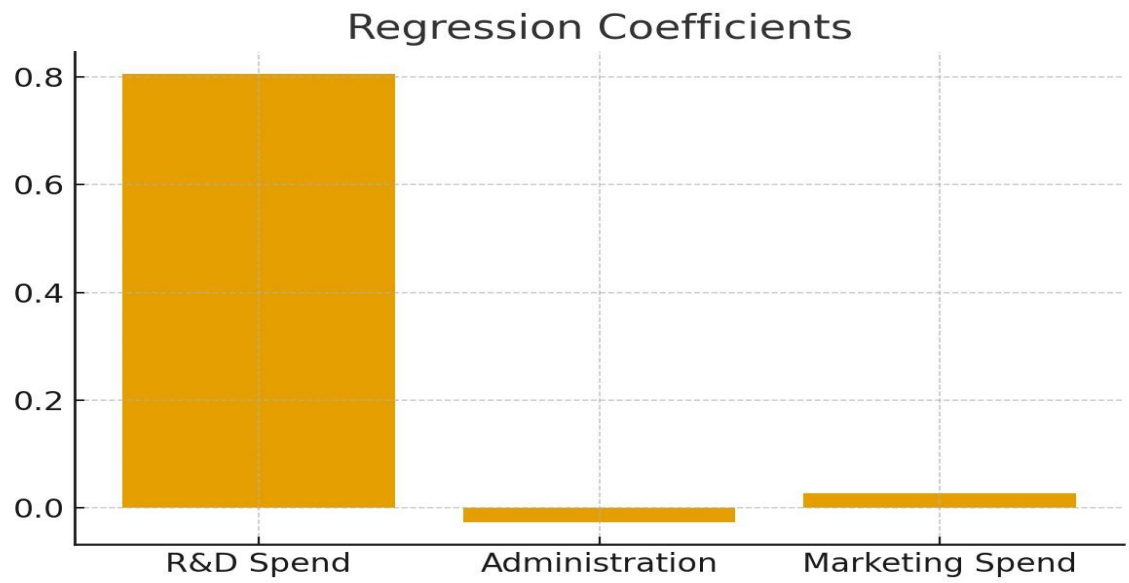
index	R&D Spend	Administration	Marketing Spend	Predicted Profit
0.0	21892.92	81910.77	164270.7	70037.9047654328
1.0	23940.93	96489.63	137001.1	70554.57255992683

Key Visualizations









Business Recommendations:

- R&D; Spend shows influence on Profit (based on coefficient magnitude) — consider investing more in high-ROI R&D; projects.
- Marketing Spend has moderate effect — optimize marketing for channels with measurable ROI.
- Administration shows low/insignificant effect — investigate and reduce unnecessary administrative costs.
- Re-run model periodically and consider adding features like 'Location', 'Product Type', or 'Sales Volume' for better predictions.