

# Business Report

## Exploratory Data Analysis Summary

{'plot\_type': 'Correlation Heatmap', 'n\_rows': 200, 'n\_cols': 5, 'columns': ['TV\_Ad\_Spend', 'Radio\_Ad\_Spend', 'Social\_Media\_Spend', 'Influencer\_Spend', 'Sales\_Revenue'], 'last\_updated': '2026-02-25 23:43:40'}

## Model Metrics

{'type': 'Regression', 'model': 'Linear Regression', 'params': {}, 'metrics': {'mse': 6.917687756001791, 'rmse': 2.6301497592345937, 'r2': 0.7436438874311798}, 'target\_col': 'Sales\_Revenue', 'feature\_columns': ['TV\_Ad\_Spend', 'Radio\_Ad\_Spend', 'Social\_Media\_Spend', 'Influencer\_Spend']}

## Predictions

[15.72297065 11.89958613 17.68307239 15.55793933 6.11677964 21.4809369  
23.179409 16.10087024 19.06389317 22.23480608 9.72528681 21.4409531  
20.90986335 17.63550792 18.61376275 15.23237046 8.79021926 11.87911937  
11.90257019 7.45280668 14.6898799 10.45625759 10.59739399 14.44285241  
15.5653493 12.80490981 15.14212356 20.91103099 16.53035986 11.46475441  
17.14192953 16.95543166 20.79204951 22.49302423 20.51520036 21.50726344  
14.95235532 19.50382663 9.18733148 17.78167469 12.52635368 20.42442801  
18.86906019 13.48042691 13.94856749 16.06152547 7.63307379 15.58184017  
13.49576954 17.7161861 ]

## Agent Insights

Here is an executive summary of the key insights and actionable recommendations from our recent analysis:

**\*\*Executive Summary: Optimizing Ad Spend for Sales Growth\*\***

Our analysis, based on 200 data points covering various ad spend channels and sales revenue, indicates a strong relationship between advertising investments and sales performance. A Linear Regression model successfully explains approximately 74% of the variability in Sales Revenue, suggesting that our current advertising efforts are a significant driver of sales. This model provides a

reliable foundation for strategic decision-making regarding ad spend.

### **\*\*Key Findings:\*\***

- \* **\*\*Strong Predictability of Sales:\*\*** The model's R-squared value of 0.74 (out of a possible 1.0) demonstrates that TV, Radio, Social Media, and Influencer Ad Spends collectively explain a substantial portion of Sales Revenue fluctuations. This indicates that our advertising investments are indeed impactful.
- \* **\*\*Reliable Sales Forecasting:\*\*** The model predicts Sales Revenue with an average error (RMSE) of approximately 2.63 units. This level of accuracy allows for dependable sales forecasting based on planned advertising budgets.
- \* **\*\*Comprehensive Ad Channel Impact:\*\*** The model incorporates all identified ad channels (TV, Radio, Social Media, Influencer), suggesting they all contribute to sales generation. While specific channel effectiveness requires deeper analysis (e.g., coefficient examination), the overall synergy is evident.

### **\*\*Actionable Recommendations:\*\***

1. **\*\*Strategic Budget Allocation:\*\*** Utilize this predictive model to simulate different budget allocations across TV, Radio, Social Media, and Influencer Ad Spend. The goal should be to identify the optimal mix that maximizes Sales Revenue within budget constraints. We can now move beyond historical performance and proactively model future outcomes.
2. **\*\*Enhanced Sales Forecasting and Target Setting:\*\*** Leverage the model's predictions for more accurate sales forecasting. This will enable better inventory management, resource planning, and more realistic sales target setting for upcoming periods. For instance, if we plan specific ad spends, we can now predict the expected sales revenue with a known margin of error.
3. **\*\*Further Channel-Specific Optimization:\*\*** While the current model confirms the overall impact, a deeper dive into individual channel coefficients would reveal which specific ad spend channels offer the highest return on investment. This next step would allow for even more granular optimization, potentially shifting resources to the most effective channels to drive sales beyond the current 74% explanatory power.

### **## Charts**

[Chart file] chart\_TV\_Ad\_Spend.png

[Chart file] chart\_Radio\_Ad\_Spend.png

