EVALUATING SALES CONVERSION RATES ACROSS DIGITAL CHANNELS USING SAS

1. Overview

Client:

A mid-sized U.S. e-commerce company operating in the consumer electronics market

Objective:

To analyze and compare the conversion efficiency of different digital marketing channels using SAS. The goal was to reallocate advertising spend based on data-driven insights to improve return on investment (ROI).

2. Background

The client ran concurrent campaigns across Google Ads, Facebook, Instagram, and LinkedIn. Despite heavy investment, conversions fluctuated unpredictably, and ROI remained unclear. They required a robust analytical approach to determine which channels delivered the best outcomes and where inefficiencies lay.

3. Data Summary

Dataset:

Campaign-level data collected over 6 months

Observations:

~15,000 ad impressions per channel per week

Variables Used:

Variable	Type	Description
Channel	Categorical	Google / Facebook / Instagram / LinkedIn
Impressions	Continuous	Number of times ads were shown
Clicks	Continuous	Total ad clicks
Conversions	Continuous	Completed purchases attributed to the channel
Spend_USD	Continuous	Total ad spend in USD

Campaign_Type	Categorical	Awareness / Engagement / Purchase
Week_Number	Integer	Weekly time frame identifier

4. Methodology

Software Used:

SAS 9.4

SAS Workflow:

1. **Data Preparation:**
    - Imported ad data from .csv using PROC IMPORT
    - Created derived metrics: CTR, Conversion Rate, Cost per Conversion
    - Encoded categorical variables using PROC FORMAT and dummy coding
2. **Exploratory Analysis:**
    - Used PROC MEANS and PROC UNIVARIATE to examine central tendencies
    - Generated boxplots using PROC SGPLOT to compare channel spend and performance
3. **Statistical Modeling:**
    - ANOVA with PROC GLM to test mean differences in conversion rate
    - Multiple regression using PROC REG to model conversion rate against impressions, clicks, and channel
    - Interaction terms tested for Campaign_Type × Channel effect
4. **Validation & Diagnostics:**
    - Residual analysis for model fit
    - Outlier detection using Cook's D
    - Tested robustness with log-transformed response variables

5. Key Results

Metric	Result	Interpretation

Google Ads	Highest conversion rate (3.8%)	Outperformed other channels on average
Instagram	Best CTR but low conversions	High engagement, weak purchase follow-through
LinkedIn	Highest cost per conversion ($78)	Least efficient channel
Significant Predictors	Clicks ($p < 0.001$), Channel ($p = 0.004$)	Platform and user engagement are key drivers

Model Fit:

- Adjusted $R^2 = 0.69$
- No multicollinearity detected (VIF < 1.5)
- Residuals approx. normal with no severe outliers

6. Visual Outputs (from SAS):

- Channel-wise bar plot of cost per conversion
- CTR vs. conversion scatterplot with regression line
- Line graph of conversion trends over 6 months
- Interaction plot for Campaign Type × Channel

7. Deliverables

- Annotated .sas script files for all procedures
- Full analysis report (18 pages) containing:
    - Channel performance metrics
    - Regression and ANOVA outputs with interpretations
    - Strategic insights for future campaign planning
- Executive dashboard (4-slide presentation):
    - Channel efficiency rankings
    - Cost-to-conversion tradeoffs
    - Budget reallocation recommendations

8. Application & Outcome

- Client reduced LinkedIn ad spend by 70% and increased Google budget
- Achieved **28% improvement in conversion efficiency** within 2 months
- Used SAS scripts as a template for monthly marketing performance reviews

9. Strategic Value Delivered

- Provided **clear, actionable metrics** across marketing channels
- Enabled **budget realignment based on real conversion data**
- Delivered a **repeatable SAS analysis pipeline** for digital performance tracking