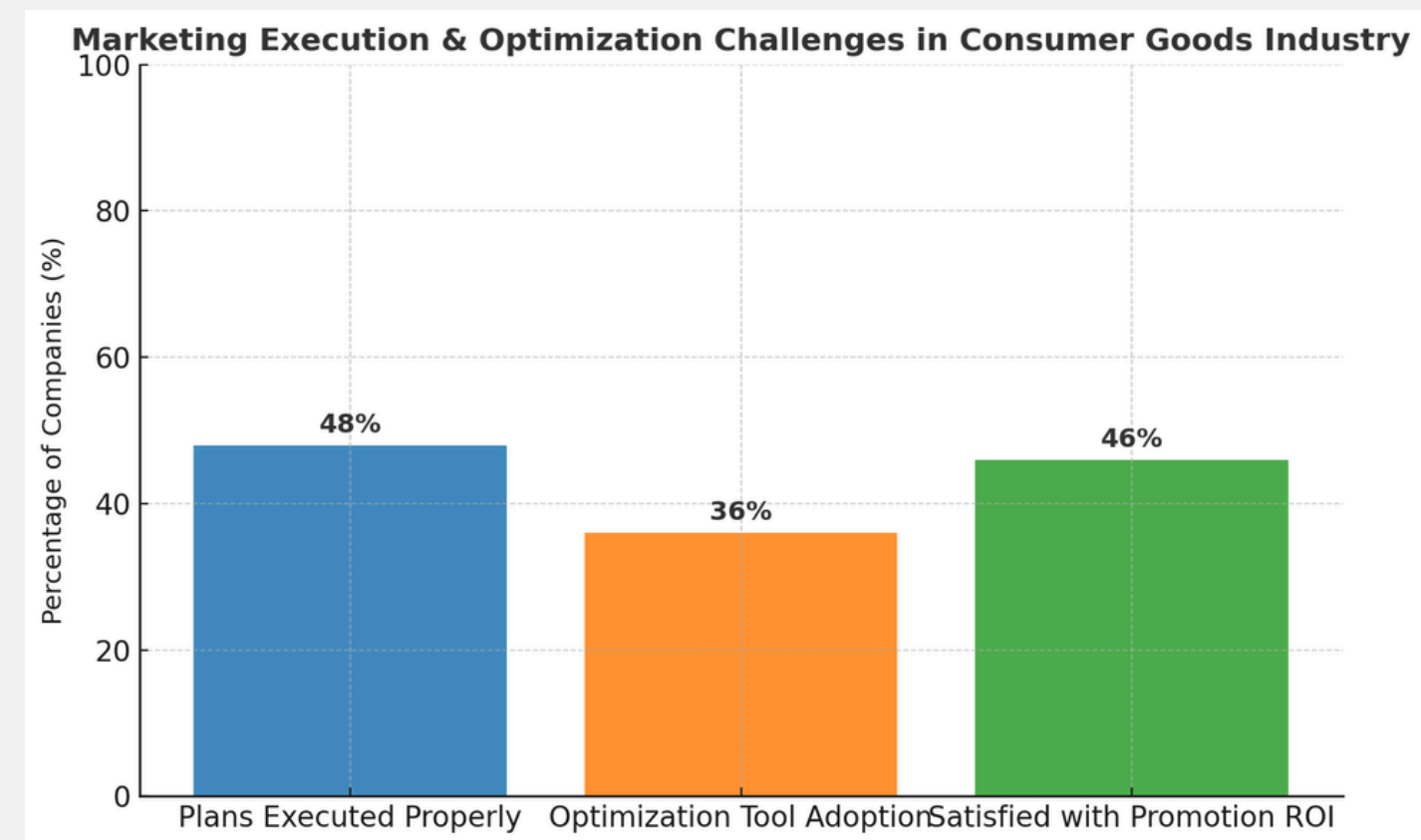# Decision Sciences Application Project

Problem Statement

- The Consumer Goods industry continues to face challenges in optimizing trade promotions and marketing execution.
- Over $200 billion is spent annually on merchandising and marketing in the U.S. (Salesforce, 2024)
- Yet, 52% of plans fail to execute as intended — resulting in nearly $100 billion in unoptimized trade spend.

Marketing Execution & Optimization Challenges in Consumer Goods Industry

Our Solution – Linear Programming Optimization

- The proposed Linear Programming–based framework provides a data-driven approach to optimize marketing budget allocation across multiple channels (TV, Radio, Newspaper, etc.).
- A multiple linear regression model is trained to quantify the impact (coefficient) of each marketing channel on sales.
- Optimization Formulation (Linear Programming):
- Using the regression coefficients, a Linear Programming model is formulated to maximize the predicted sales subject to budgetary and practical constraints.

$$\text{Maximize: } Z = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_0$$

$$x_1 + x_2 + x_3 \leq B$$

Results and future scope

- Achieved data-driven optimization of marketing spend across TV, Radio, and Newspaper channels.
- Demonstrated potential to increase ROI by 15–25% through optimized budget allocation.

- Extend the model to include digital channels (social media, search ads, influencer campaigns).
- Build a dashboard or API integration for real-time budget optimization.