



## **Track 1: Optimizing Social Media Ad Campaign Performance for Audience Engagement and ROI** **(Data Analytics)**

### **Project Overview**

As a **Data Analyst** at TrendWave, a consumer goods company launching its flagship product line, you have been tasked with conducting a comprehensive analysis of social media advertising campaigns. Your role is to translate raw campaign data into actionable insights that will help the marketing team understand channel performance, audience engagement, and cost efficiency. The ultimate goal is to maximize ROI and guide future ad budget allocations through data-driven recommendations.

### **Business Context**

TrendWave has run paid campaigns across Facebook, Instagram, Twitter, and LinkedIn over a three-month period. The company has collected granular data on daily impressions, clicks, conversions, ad spend, and demographic breakdowns. Despite substantial investment, there is no clarity on which platforms, creatives, and audience segments deliver the best value. With quarterly targets approaching, the company needs an analytical framework to:

- Allocate ad budgets across platforms for optimal cost per acquisition (CPA)
- Compare performance across audience demographics and segments
- Identify underperforming campaigns for reallocation or optimization
- Detect time-based performance trends and seasonality
- Provide evidence-backed recommendations for the next product launch

### **Problem Statement**

**Primary Challenge:** TrendWave lacks a comprehensive performance analysis framework to evaluate social media channels, quantify the impact of ad spend on conversions, and optimize targeting strategies. This gap results in suboptimal ROI and missed growth opportunities.

### **Key Questions to Address**

1. Which age and gender groups are responsible for the highest sales and ad spend, and how does their conversion efficiency compare?
2. How effective is the campaign in converting impressions into clicks and clicks into sales, as demonstrated by CTR (Click Through Rate) and conversion rate?

3. Are there significant differences in Cost per Action (CPA) and Cost per Mille (CPM) between different demographic segments, and what does this imply for budget optimization?

### KPIs to generate:

- **CPM (Cost per Mille):** It is a metric that represents the cost of displaying an ad to 1,000 people. In other words, it measures how much a business pays for every 1,000 ad impressions.
- **Cost per click (CPC):** It is a metric that represents the cost of getting a user to click on an ad. It measures how much a business pays for every click on their ad.
- **Click-through rate (CTR):** It is a metric that represents the percentage of users who click on an ad after seeing it. It measures the effectiveness of an ad in getting users to click through to a website or landing page.
- **CPA (Cost per Acquisition/Action):** It is a metric that represents the cost of acquiring a new customer through an ad campaign. It measures how much a business pays for every new customer acquired through their ad.

### **Dataset-**

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### About Data

- **ad\_id:** A unique ID for each ad
- **xyzcampaignid:** An ID associated with each campaign of XYZ company
- **fbcampaignid:** An ID associated with how Facebook tracks each campaign
- **age:** Age of the person shown the ad
- **gender:** Gender of the person shown the ad
- **interest:** A code specifying the interest category of the person (from their public Facebook profile)
- **Impressions:** Number of times the ad was shown
- **Clicks:** Number of clicks on the ad
- **Spent:** Amount spent on the ad
- **Total conversion:** Number of people who enquired about the product
- **Approved conversion:** Number of people who bought the product

### **Evaluation Parameters**

- **Clarity and Structure (20%)**

- Present the analysis in a clear, logical sequence (problem → approach → findings → recommendations).
- Use well-labeled visuals and concise explanations.
- Ensure the work directly answers the key questions given in the problem statement.
- **Business Understanding (20%)**
  - Show awareness of the overall business goal (e.g., maximizing ROI, improving targeting, optimizing spend).
  - Connect insights to real decision-making needs, not just numbers.
  - Explain why the findings matter in practical business terms.
- **Data Utilization (20%)**
  - Make full use of the dataset (impressions, clicks, conversions, spend, demographics, time).
  - Compare across platforms, audience segments, and creatives where relevant.
  - Avoid ignoring key variables that affect performance.
- **Communication Skills (10%)**
  - Convey insights in simple, non-technical language that stakeholders can easily understand.
  - Use charts, graphs, and summaries to make results digestible.
  - Focus on clarity over jargon or complex math.
- **Insightfulness (10%)**
  - Move beyond surface-level reporting (not just “Platform A has more clicks”).
  - Highlight actionable recommendations (e.g., shifting budgets, adjusting targeting, refining timing).
  - Spot hidden trends or patterns that add extra value.
- **Tools and Technique (20%)**
  - Apply the right metrics and methods (e.g., CPA, CTR, conversion rate, trend analysis).
  - Use appropriate tools (Excel, Python, Power BI, Tableau, etc.) to analyze and visualize data.
  - Show rigor in methodology (segmentation, comparisons, time-series analysis, etc.)