

Marketing Campaign Data Exploration



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INTRODUCTION

Marketing isn't just about running ads, it's about understanding what works and why. Every campaign leaves behind a trail of data, and within that data lies the key to better engagement, smarter spending, and higher conversions.



This report takes a deep dive into a marketing campaign dataset, uncovering the patterns behind

- **Conversion rates**
- **Return on investment (ROI)**
- **Click-through rates (CTR)**
- **Cost per click (CPC)**
- **Engagement scores**, across various marketing channels.

Through visual analysis and data-driven insights, we'll identify what drives success and where there's room for improvement.

This report offers clear takeaways for optimizing future marketing strategies.

Let's dive in and unlock the power of marketing analytics.



Explanation of the Key Metrics used in this Analysis

- **Cost Per Click (CPC):** How much we pay per ad click, this is the amount an advertiser pays each time a user clicks on their ad. It's a critical metric for budgeting and assessing the cost-effectiveness of campaigns. Lower CPCs allow for more clicks within the same budget, increasing potential reach and conversions.
Lower CPC = More cost-efficient campaigns.
- **Click-Through Rate (CTR):** Measures how effective an ad is at generating clicks. The percentage of users who click on an ad after viewing it, calculated as $(\text{Clicks} \div \text{Impressions}) \times 100$. A higher CTR indicates that the ad resonates well with the audience, leading to increased engagement and potential conversions.
Higher CTR = More relevant ads.
- **Return on Investment (ROI):** Measures the profitability of a campaign, calculated as $(\text{Net Profit} \div \text{Total Investment}) \times 100$. A positive ROI signifies that the campaign generates more revenue than costs, making it a key indicator of success.
Higher ROI = Better profitability.

Dataset Overview

This dataset consists of **15 columns**, categorized as follows:

- ◆ **Identifiers:** Campaign_ID, Company
- ◆ **Campaign Attributes:** Campaign_Type, Duration, Channel_Used, Target_Audience
- ◆ **Performance Metrics:** Conversion_Rate, ROI, Acquisition_Cost, Clicks, Impressions, Engagement_Score
- ◆ **Demographics & Time Factors:** Location, Date, Customer_Segment

📌 Key Observations:

- **5 companies** running marketing campaigns.
- **6 unique marketing channels** used.
- **5 locations** targeted.
- **901 unique values for clicks, 9001 unique values for impressions**, indicating a wide performance range.
- **ROI varies significantly** (601 unique values), suggesting opportunities for optimization.
- No duplicate records found. Data is clean and unique.

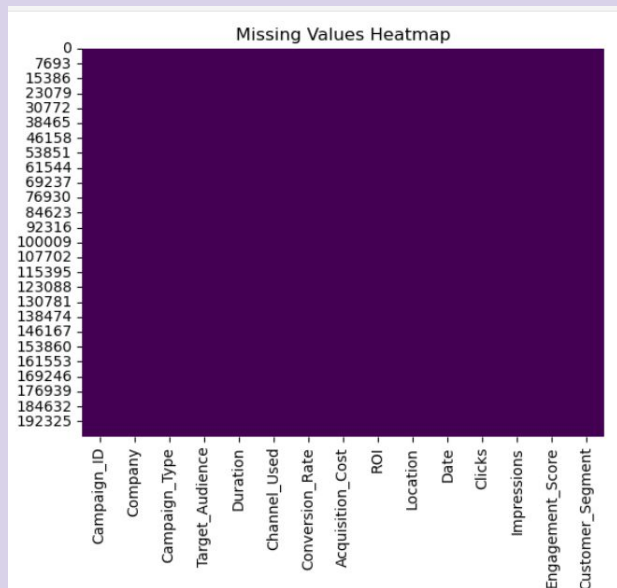
Data Exploration

- ◆ **Performance Metrics Analysis:**
 - **Campaign ROI:** Best & worst-performing campaigns.
 - **Click Through Rate (CTR) Analysis:** High vs. low engagement campaigns.
 - **Cost Efficiency:** Cost Per Click (CPC) insights for different marketing channels.
 - **Conversion Analysis:** Factors influencing higher conversions.
- ◆ **Demographic & Regional Trends**
 - Which locations drive the highest engagement?
 - Do different regions respond better to specific channels?
- ◆ **Marketing Channel Performance**
 - Which channels (social media, email, search ads) have the highest Return On Interest (ROI)?
 - Where should the marketing budget be allocated?

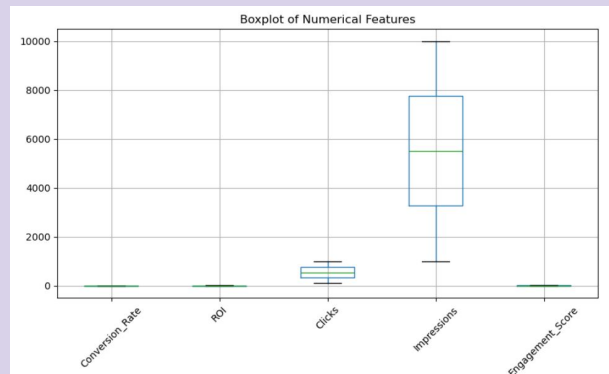
INSIGHTS

Missing Data Analysis

A **missing value heatmap** was generated to identify gaps in the dataset. The results show **no missing values**, ensuring completeness for analysis.



Outlier Detection



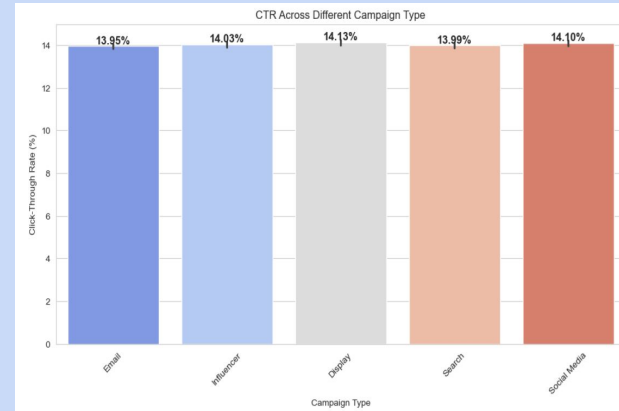
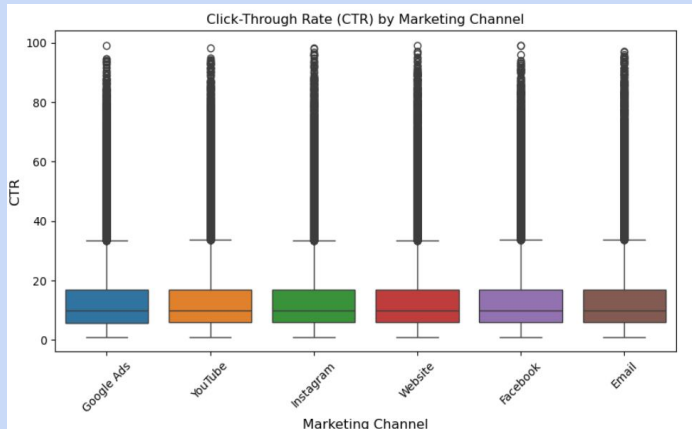
A **boxplot visualization** was created for numerical features to detect potential outliers.

- **Observations:**
 - **Impressions** shows a **high variance**, indicating a wide reach difference across campaigns.
 - **Clicks** is relatively stable, with some variability.
 - **ROI** and **Conversion_Rate** contain **several outliers**, which might represent exceptional campaign performance or potential data entry errors.

Click-Through Rate (CTR) Analysis by Marketing Channel

A box plot visualization was used to analyze CTR across various marketing channels, including:

- **Google Ads, YouTube, Instagram, Website, Facebook, and Email.**
- The distribution shows a significant number of outliers, suggesting that while the median CTR is relatively stable across channels, some campaigns achieved exceptionally high engagement rates.
- Overall, the median CTR remains consistent across all channels, indicating no drastic differences in engagement effectiveness.



CTR Across Different Campaign Types

A bar chart was created to compare CTR across different campaign types:

- **Display (14.13%)**
- **Social Media (14.10%)**
- **Influencer (14.03%)**
- **Search (13.99%)**
- **Email (13.95%)**

These values indicate that campaign type has minimal impact on CTR, with all types showing similar performance.

Cost Per Click (CPC) Analysis Across Campaign Types: Amount paid per ad click, **Lower CPC = More cost-efficient campaigns**

A bar chart visualization was used to examine CPC across different campaign types:

- **Influencer: \$32.10**
- **Email: \$32.04**
- **Social Media: \$32.01**
- **Search: \$31.96**
- **Display: \$31.92**

The **CPC values are fairly similar across all campaign types**, suggesting that **no particular campaign type incurs significantly higher or lower costs per click**. This implies that budget allocation should **consider other performance factors** like engagement and conversion rates rather than just CPC.

Finding the Balance Between Cost & Engagement

- CPC values are **relatively stable across campaign types**.
- Channels with lower CPC often have higher engagement.
- High CPC campaigns need **refined targeting** and **bidding strategies**.

Recommendations to Lower CPC:

- ✓ Shift budget to high-engagement, lower-cost channels
- ✓ Adjust bidding strategies based on performance trends
- ✓ Improve audience segmentation to reduce wasted spend

ROI Analysis & Recommendations

Which Campaigns Generate the Best Returns?

The **average ROI across all channels is very close**, ranging between **4.99 and 5.02**.

Facebook (5.02) and Website (5.01) lead slightly in ROI, but the difference is minimal.

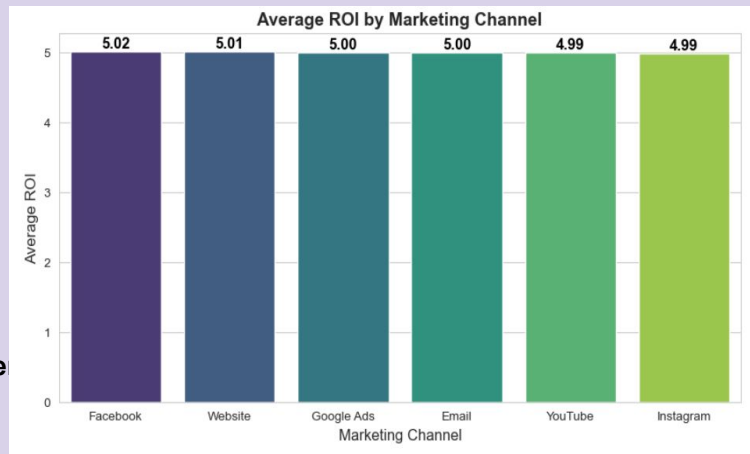
This suggests **consistency in marketing effectiveness** across platforms rather than a single dominant channel.

📌 Key Takeaways:

- ✅ ROI is relatively stable, meaning **budget allocation can be flexible** across platforms.
- ✅ The small variations indicate that **content, targeting, and audience engagement matter more than platform selection**.
- ✅ Even small ROI differences can translate into **significant revenue impact at scale**.

📌 How to Improve ROI:

- ✅ **Refine targeting:** Since ROI is similar across platforms, better segmentation can help improve engagement.
- ✅ **Optimize high-performing channels:** While all platforms perform similarly, **Facebook and Website** have a slight edge—scaling efforts here could yield additional gains.
- ✅ **Test ad creatives and messaging:** Even minor tweaks in design, copy, or call-to-action can lead to noticeable improvements in ROI.

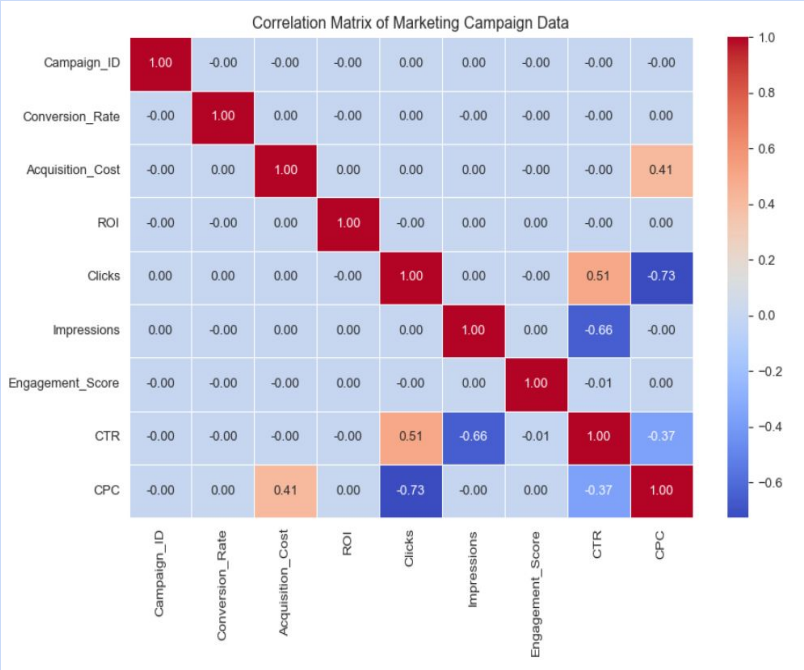


Rather than shifting budgets drastically between channels, the focus should be on optimizing ad creatives and audience targeting to improve engagement and, ultimately, ROI.

Correlation Analysis of Marketing Metrics

A correlation matrix was used to analyze relationships between key marketing performance metrics. Key insights include:

- **Clicks vs. CPC (-0.73):** A strong negative correlation suggests that as clicks increase, CPC tends to decrease, which is beneficial for cost efficiency.
- **CTR vs. CPC (-0.37):** A moderate negative correlation indicates that campaigns with higher engagement (higher CTR) tend to have lower CPC, making them more cost-effective.
- **Acquisition Cost vs. CPC (0.41):** A moderate positive correlation suggests that as CPC increases, acquisition costs also rise, emphasizing the need for CPC optimization.
- **Clicks vs. CTR (0.51):** A positive correlation shows that higher CTR typically leads to more clicks, reinforcing the importance of engagement-driven strategies.
- **Impressions vs. CTR (-0.66):** A strong negative correlation implies that higher impressions do not necessarily translate into higher engagement, highlighting the need for improved ad targeting.



Recommendations Based on Correlation Analysis:

1. **Increase Clicks to Reduce CPC:** Focus on creating compelling ads to boost engagement and drive costs down.
2. **Optimize Ad Targeting for CTR Growth:** Higher CTR leads to lower CPC, improving overall campaign efficiency.
3. **Reduce Unnecessary Impressions:** Targeted campaigns should be optimized to ensure impressions translate into meaningful engagement.

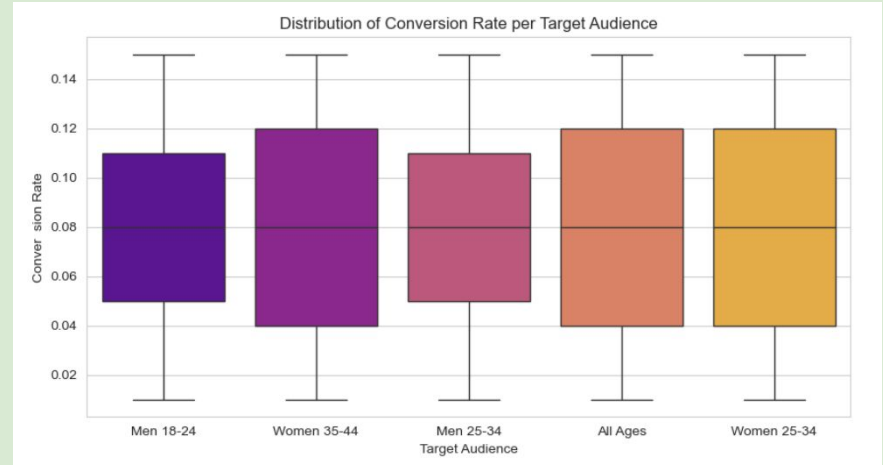
Conversion Rate Analysis by Target Audience

A box plot was used to analyze the distribution of **Conversion Rates** across different target audiences:

- **Men 18-24**
- **Women 35-44**
- **Men 25-34**
- **Women 25-34**
- **All Ages**

Insights:

- **Similar median conversion rates** suggest that campaigns are performing consistently across demographics.
- **Men 18-24 and Men 25-34** show more variability, indicating some campaigns perform exceptionally well while others underperform.
- **Presence of outliers** indicates campaigns that either exceeded or fell below expectations.



Recommendations for Target Audience Optimization:

1. **Segment further within demographic groups** for a more personalized approach.
2. **A/B test campaigns** to determine what works best for underperforming groups.
3. **Leveraging high-performing segments** by replicating successful strategies across broader campaigns.

Recommendations and Conclusions

Recommendations

- **Refine audience targeting** to improve CTR and reduce CPC.
- **Prioritize high-engagement campaigns** and analyze what contributes to their success.
- **Improve conversion rates** by optimizing ad creatives and messaging.
- **Reduce ad spend on low-performing campaigns** while doubling down on those with high ROI.

Conclusion

This report highlights the importance of optimizing key marketing metrics to improve cost efficiency and maximize ROI. By leveraging data insights, marketers can make informed decisions, improve engagement, and drive better campaign performance.

Next Steps:

- Conduct A/B testing on top-performing and underperforming campaigns.
- Optimize ad creatives based on engagement patterns.
- Implement personalized audience targeting strategies for improved results.