Comprehensive Data Analysis Strategy:

TikTok Campaign Performance Case Study

For the Data Support Intern Application – TikTok Global Business Solutions (GBS)

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Introduction

This document outlines the strategic approach and end-to-end methodology I employed to analyze TikTok's campaign performance data. The objective is to demonstrate how I transform raw datasets into actionable insights using multiple tools and communicate findings in a structured, systematic, and business-oriented manner. This approach reflects not only technical and analytical capabilities but also alignment with TikTok's core values.

Chapter 1: Understanding the Business Problem

In this initial phase, I focused not on the technical aspects (coding or tooling), but on gaining a thorough understanding of the business goals and underlying challenges. This foundational

step ensures that the subsequent analysis is relevant, impactful, and aligned with stakeholder needs.

1.1 Position Applied: Data Support Intern – Client Solutions, GBS TikTok

- Responsibilities: Data Collection, Preparation, Reporting, Ad-Hoc Analysis, Data Visualization, Cross-Market Learnings, Collaboration, and Documentation.
- Qualifications: Technical skills (Excel, SQL, Python, Power BI/Tableau), analytical thinking, communication, problem solving, and teamwork.

1.2 Business Objectives of the Case Study

- Primary Goals: Assess campaign effectiveness, identify profitable campaigns/clients, detect clients with low ROI, and evaluate traffic quality.
- Expected Deliverables: Three core insights, metric recommendations for internal dashboards, and client profitability analysis with improvement strategies.

1.3 Target Stakeholders

- GBS Teams (Client Solutions, Sales, Marketing)
- Management & Strategic Planning Units

Chapter 2: Data Exploration & Initial Audit

2.1 Structural & Data Type Checks

- Performed initial data inspection using df.head(), df.info(), and df.isnull().sum() in Python.
- Identified that p_date needed conversion to datetime, while Cost (USD) and GMV needed cleaning and type conversion to float.
- Verified that Clicks, Impressions, and Sales columns were already in integer format.

2.2 Preliminary Data Quality Observations

- Detected monetary formatting issues, such as currency symbols ($) and thousand separators (,).
- Recognized the potential ambiguity of period (.) as either a decimal or thousand separator, requiring cautious handling.
- Confirmed no missing values were present in the dataset.

2.3 Key Metrics & Columns for KPI Analysis

- Identified Client Name, Cost (USD), Sales, and GMV as primary columns for profitability and efficiency analysis.
- Highlighted Impressions and Clicks as essential for calculating CTR.

- Defined Cost (USD) & Sales for CPS, and GMV & Cost (USD) for ROAS.

Chapter 3: Data Cleaning & Preparation

3.1 Data Type Conversion & Character Cleaning

- In Python:
    - Converted p_date using pd.to_datetime.
    - Cleaned Cost (USD) and GMV from $ and , using regex and converted to float.
    - Addressed any inf/-inf values from zero division by replacing them with NaN.
- In Power Query (for Native Power BI Version):
    - Similar cleaning steps were applied using Power Query Editor, showcasing adaptability across tools for consistent results.

3.2 Feature Engineering

Four key performance metrics relevant to business objectives were created as new columns in the DataFrame:

- CTR (Click-Through Rate): Clicks / Impressions
- CPS (Cost per Sale): Cost (USD) / Sales
- ROAS (Return on Ad Spend): GMV / Cost (USD)
- Conversion Rate: Sales / Clicks

Chapter 4: Exploratory Data Analysis (EDA) & Visualization

Tools Used: Python (Seaborn, Matplotlib), Excel Charts

Visualizations:

- Bar plots: CTR, ROAS, CPS per client
- Histogram: Distribution of Conversion Rate
- Correlation Heatmap between metrics

Findings:

- Significant variance across clients (especially in ROAS and CTR)
- Strong negative correlation between CPS and Conversion Rate (-0.63)

Chapter 5: Insights & Business Recommendations

Question 1: Create a deck that consists of tables or charts to represent your top 3 insights from this data.

To answer this question, I focused on insights that are most relevant to TikTok's business objectives (profitability, efficiency, and traffic quality) and that can be effectively visualized.

Insight #1: Client ABC demonstrates the highest ROAS (75.86) and a strong CTR, indicating an extremely effective and profitable campaign.

Detailed Explanation & Strategic Implications:

- ROAS (Return on Ad Spend) is the most direct metric of profitability, showing how much revenue is generated per dollar spent on advertising. A ROAS of 75.86 means every $1 spent generates $75.86 in GMV, an exceptionally high return.
- A strong CTR (Click-Through Rate) indicates that Client ABC's ads are highly engaging and successful in attracting audience attention.
- Strategic Implications: Client ABC is a "Champion Client" or "Best Practice Model." The Client Solutions team should:
  - Maintain & Scale: Prioritize support for Client ABC to ensure continued growth.
  - Internal Case Study: Analyze Client ABC's campaign strategy (ad creatives, targeting, placement, budget allocation) to identify success factors that can be replicated or adapted for other clients. This is a cross-client learning opportunity.

Supporting Visuals:

- Bar charts of ROAS & CTR by client: This visualization provides a clear comparison of ROAS and CTR performance across clients, with Client ABC standing out in both key metrics, offering strong, easy-to-understand visual evidence for non-technical stakeholders.

Insight #2: Client DEF has the lowest CPS ($0.24) and the highest Conversion Rate (7.42%), representing exceptional efficiency.

Detailed Explanation & Strategic Implications:

- CPS (Cost per Sale) is a cost-efficiency metric, indicating how much is spent to generate a single sale. A CPS of $0.24 is very low, highlighting Client DEF's ability to convert ad spending into transactions efficiently.
- The highest Conversion Rate further confirms that the traffic generated by Client DEF converts at a very high rate.
- Strategic Implications: Client DEF serves as an "Efficiency Model." Although their ROAS may not be as high as Client ABC (as highlighted in Insight #3), their operational efficiency in driving sales is commendable. The Client Solutions team can:

- Share Efficiency Best Practices: Study how Client DEF achieved their low CPS and high Conversion Rate, and share these insights with other clients struggling with cost efficiency or conversion performance.
- ROAS Improvement Opportunities: Since Client DEF is already highly efficient, the next focus could be on increasing Average Order Value (AOV) or Gross Merchandise Value (GMV) per transaction to further improve their ROAS.

Supporting Visuals:

- Bar chart of CPS: Clearly highlights Client DEF as the best performer in cost per sale.
- Histogram of Conversion Rate: Shows that Client DEF's campaign is concentrated in the highest conversion rate bin, visually affirming their conversion quality.

Insight #3: Strong negative correlation between CPS and both ROAS (-0.58) and Conversion Rate (-0.63), emphasizing the importance of cost efficiency.

Detailed Explanation & Strategic Implications:

- Strong Negative Correlation: These correlation coefficients indicate that as CPS increases (cost per sale rises), ROAS and Conversion Rate tend to decrease, signifying lower profitability and effectiveness. Conversely, low CPS is associated with higher ROAS and Conversion Rate.
- Strategic Implications: This is a fundamental insight that should guide the GBS team's principles.
  - Prioritize Cost Efficiency: Any effort to reduce CPS, such as better targeting, more relevant ad creatives, or optimized placements is likely to improve both profitability (ROAS) and conversion funnel performance (Conversion Rate).
  - Early Warning Signal: If CPS starts to increase for any client, it could serve as an early indicator of potential declines in ROAS and Conversion Rate.

Supporting Visuals:

- Correlation Heatmap: This visualization concisely shows the strength and direction of the relationship between metrics. The colors and numerical values make the correlations easy to spot and understand, even for non-technical stakeholders.

Question 2: What additional core metrics do you feel are important to monitor their performance?

In addition to existing metrics (CTR, CPS, ROAS, Conversion Rate), I propose the following supplementary metrics to gain a more holistic and deeper view of campaign performance, supporting more granular and strategic decision-making:

1. Cost per Click (CPC):
    - What it measures: Average cost paid for each ad click.
    - Why it matters: CPC indicates the cost-efficiency of generating traffic. High CPC may suggest high competition, poor targeting, or weak ad quality. Monitoring CPC supports optimization of bidding strategies.
2. Click-to-GMV Ratio:
    - What it measures: Effectiveness of clicks in generating gross revenue. Calculated as GMV / Clicks.
    - Why it matters: While Conversion Rate tracks how many clicks result in sales, this metric measures the value of each click. A campaign could have a high CR but low GMV if the product value is low. This helps identify high-value traffic.
3. Engagement Rate (if interaction data is available):
    - What it measures: User interaction with ads beyond clicks (e.g., likes, shares, comments, video watch time).
    - Why it matters: Engagement rate can serve as an early indicator of audience interest and content relevance before a click happens. Highly engaged audiences are likely to be more loyal and convert later, which is helpful for Marketing and Content teams.
4. Retention Rate (if repeat customer data is available):
    - What it measures: The proportion of customers who return and make repeat purchases within a defined period.
    - Why it matters: Acquiring new customers is costly. Retention rate is crucial for assessing long-term profitability. Clients who retain customers deliver more value over time, important for Account Management and CRM teams.
5. Time to Purchase (if timestamp granularity is available):
    - What it measures: The average time from first click to completed purchase.
    - Why it matters: This metric offers insights into customer journey and sales funnel efficiency. Long purchase times may indicate friction in checkout or hesitation. Useful for Ops and Product teams.

Question 3: Which clients drive the lowest profitability? What is your recommendation to improve their performance?

Identifying the Least Profitable Clients:

- In this dataset, no clients have an average ROAS below 1.0. This is a positive signal on average, ad spend yields at least break-even or profitable returns.
- Strategic Mindset: While the overall averages are good, it's essential to note that a more granular analysis (e.g., daily-level or campaign-specific) could uncover periods or campaigns where ROAS fell below 1.0. This demonstrates my awareness of the importance of data granularity.

Recommendations to Improve Performance (particularly for underperforming clients or those with growth potential):

1. Audit Ad Creatives and Targeting for clients with high CTR but low ROAS.
    - Why: Clients like DEF may have ads that attract clicks (high CTR), but the resulting traffic doesn't translate into proportional revenue (low ROAS). This could indicate poorly matched targeting or misleading creatives.
    - Recommendation: Conduct a comprehensive audit of ad visuals, copywriting, and call-to-action. Reassess targeting parameters (demographics, interests, behaviors) to ensure alignment with high-intent audiences.
2. Conduct A/B Testing to improve Conversion Rates.
    - Why: A low Conversion Rate means many clicks don't lead to purchases. A/B testing is a data-driven method for funnel optimization.
    - Recommendation: Test key variables such as:
        - Landing page (design, messaging, load speed)
        - Product/promotional offerings
        - Checkout process (steps, user-friendliness)
        - Call-to-action variations in both ads and landing pages
3. Evaluate Funnel Efficiency: Are clicks resulting in purchases?
    - Why: There may be leaks in the funnel between the click and the actual sale, beyond just ad effectiveness.
    - Recommendation: Conduct deeper funnel analysis. Track user journeys from ad click to final purchase. Identify drop-off points (e.g., product view, cart add, or checkout abandonment) and use insights to optimize each stage.
4. Use Lookalike Audiences or optimize ad placements.
    - Why: For clients struggling with traffic quality or cost-efficiency, expanding reach to audiences that resemble high-value customers can boost performance.
    - Recommendation: Leverage existing customer data to create lookalike audiences with similar traits to top buyers. Reevaluate ad placements (e.g., feed, stories,

explore pages) to ensure ads appear in high-performing locations for the target audience.

Chapter 6: Visualization & Dashboarding

6.1 Predictive Modeling – Sales Forecasting (Python)

- Methodology: Linear Regression to predict Sales based on Cost and Impressions
- Evaluation: MAE, R^2
- Visualization: Scatter plot of Predicted vs. Actual Sales

6.2 Client Segmentation – Clustering (Python)

- Methodology: KMeans based on performance metrics
- Visualization: Scatter plot of ROAS vs. Conversion Rate with cluster coloring
- Output: Saved as client_clusters.xlsx

6.3 Dashboarding (Power BI)

Two Dashboard Versions:

1. Native Power BI: Cleaning performed within Power Query
2. Python Processed: Pre-cleaned data from Python loaded directly

Main Visuals:

- KPI Cards
- Bar Charts by Client
- Conditional Performance Table
- Scatter Plot (Clustering)
- Slicers for interactive filtering

Chapter 7: Reflection & Real-World Application Potential

- Tool versatility demonstrates flexible analytical capabilities
- Structured documentation enhances cross-functional communication
- Analytical results can be directly integrated into TikTok Business Suite
- Predictive modeling and clustering can be extended for automated client recommendations

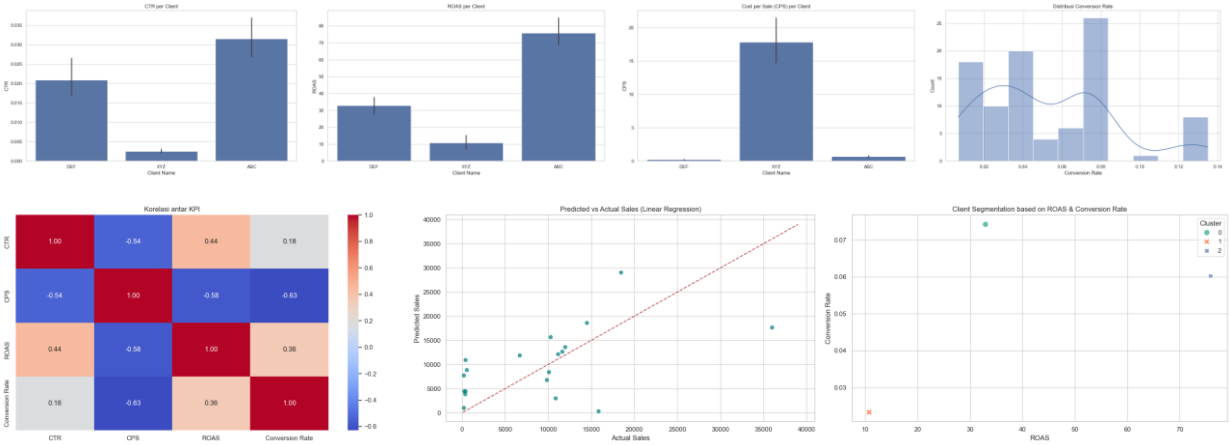
Appendices & Technical Documentation

Appendix 1: GitHub Repository

isauraqinthara/TikTok-Campaign-Performance-Analysis

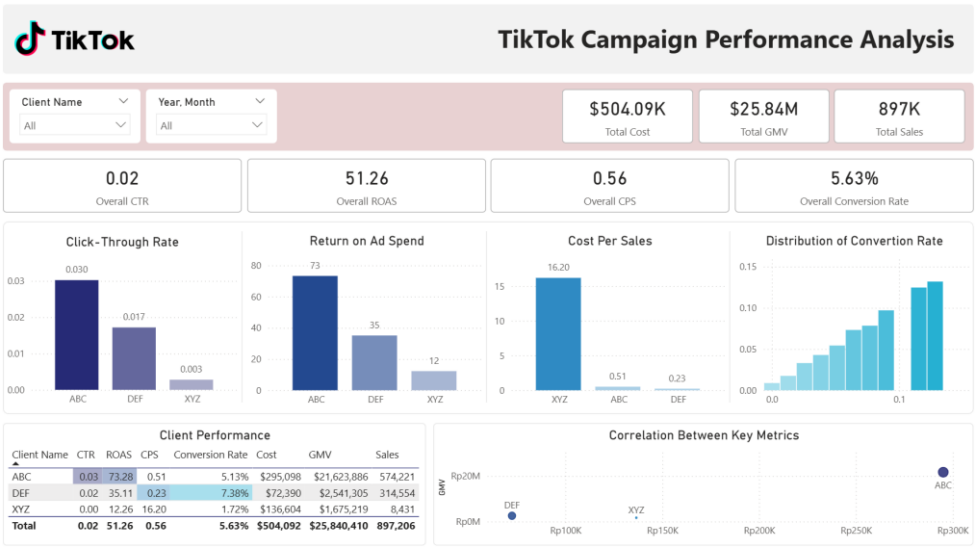
Appendix 2: Python Visualizations

(Included in the visualizations/ folder on GitHub)



Appendix 3: Power BI Dashboard

Native Version



Python-Processed Version