

# Google AdWords Performance Analysis

An End-to-End Marketing Analytics Pipeline for Keyword Performance, Cost Optimization, and Traffic Insights

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## 1. Abstract

This project analyses simulated Google AdWords data to evaluate keyword performance, traffic trends, and cost dynamics. A complete analytics pipeline was developed using Excel, Python, MySQL, and Power BI. Raw marketing data was cleaned, transformed, normalized into a relational database, and visualized through interactive dashboards. The project enables marketing teams to identify high-performing keywords, optimize advertising spend, and make data-driven campaign decisions.

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## 2. Introduction

- Importance of digital advertising analytics
- Why Google AdWords data matters
- Role of analytics in marketing decision-making

### Example:

Digital advertising generates large volumes of performance data, but without structured analysis, marketing teams struggle to optimize budgets and keyword strategies. This project simulates a real-world advertising analytics workflow to demonstrate how raw Google AdWords data can be transformed into actionable insights using modern analytics tools.

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## 3. Business Problem

Marketing teams face challenges such as:

- Identifying keywords that deliver high traffic at low cost
  - Detecting overspending on high-CPC, low-return keywords
  - Understanding how keyword difficulty affects performance
  - Monitoring seasonal and monthly traffic trends
  - Deciding which keywords to scale, optimize, or pause
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## 4. Project Objectives

- Analyse keyword-level traffic, CPC, and competition
  - Identify high-impact and low-efficiency keywords
  - Track search demand and cost trends over time
  - Build a normalized relational database
  - Create interactive dashboards for decision-making
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## 5. Tools & Technologies Used

**What this section is:**

Tool	Purpose
Excel	Initial data cleaning, aggregation, lookups
Python (pandas)	Data preprocessing and ID generation
MySQL	Relational database modeling
Power BI	Data modeling, DAX, dashboards
GitHub	Version control and documentation

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## 6. Dataset Description

- Source: Simulated Google AdWords export
- File: Raw\_data.xlsx
- Key variables:
  - Keyword
  - CPC
  - Traffic
  - Search volume
  - Competition
  - SERP results
  - Keyword positions

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## 7. Data Cleaning & Preparation

### 7.1 Excel Processing

- Aggregated search volume (SUMIF)
- Calculated average difficulty (AVERAGEIF)
- Created difficulty categories (IF)
- Built lookup tables (VLOOKUP)

## 7.2 Python Processing

- Loaded Excel data using pandas
- Generated unique keyword ID values
- Ensured referential integrity across tables

```
df['keyword_ID'] = df['keyword'].astype('category').cat.codes
```

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## 8. Exploratory Data Analysis (EDA)

### What to include:

- Distribution of traffic across keywords
  - CPC variation analysis
  - Relationship between keyword difficulty and traffic
  - Identification of outliers (high CPC, low traffic keywords)
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## 9. Data Modeling & SQL Schema

### Content:

- Star schema design
- Fact table: website\_traffic\_data
- Dimension tables:
  - keyword
  - keyword\_difficulty
  - search\_volume

### Explain:

The star schema ensures optimized query performance, accurate filtering, and scalable reporting.

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## 10. SQL Implementation

- Database creation
- Table creation
- Foreign key relationships

(Core SQL code)

```
CREATE DATABASE IF NOT EXISTS traffic_project;
```

```
USE traffic_project;
```

```
CREATE TABLE website_traffic_data (
    title VARCHAR(250),
    keyword VARCHAR(250),
    keyword_ID INT,
    positions INT,
    previous_positions INT,
    last_seen DATE,
    Search_Volume INT,
    CPC DECIMAL(10,2),
    Traffic INT,
    Traffic_Percent DECIMAL(10,2),
    Traffic_Cost INT,
    Traffic_Cost_Percent DECIMAL(10,2),
    Competition DECIMAL(10,2),
    Number_of_Results INT,
    Keyword_difficulty INT
);
```

```
CREATE TABLE keyword (
    keyword_ID INT PRIMARY KEY,
    keyword VARCHAR(250)
);
```

```
CREATE TABLE keyword_difficulty (
    keyword_ID INT PRIMARY KEY,
    avg_difficulty DECIMAL(10,2),
    difficulty_level VARCHAR(50)
```

);

CREATE TABLE search\_volume (

keyword\_ID INT PRIMARY KEY,

Search\_Volume INT);

ALTER TABLE website\_traffic\_data

ADD FOREIGN KEY (keyword\_ID) REFERENCES keyword(keyword\_ID);

The screenshot shows the MySQL Workbench interface with the following details:

- Schemas:** The current schema is "traffic\_project".
- Tables:** The table "website\_traffic\_data" is selected.
- Columns:** The columns for "website\_traffic\_data" are listed, including "title", "keyword", "keyword\_ID", "positions", "previous\_positions", "last\_seen", "Search\_Volume", "CPC", "Traffic", "Traffic\_Percent", "Traffic\_Cost", "Traffic\_Cost\_Percent", "Competition", "Number\_of\_Results", and "Keyword\_difficulty".
- SQL Editor:** The SQL code for creating the "search\_volume" table and adding a foreign key constraint to "website\_traffic\_data" is visible.
- Action Output:** The log shows the execution of the SQL statements, including the creation of the "search\_volume" table, the addition of columns to "keyword\_difficulty", and the creation of the "website\_traffic\_data" table with its foreign key constraint.

## Power BI Data Model & DAX

### 11.1 Data Model

- Star schema in Power BI
- Fact–dimension relationships

### 11.2 DAX Measures

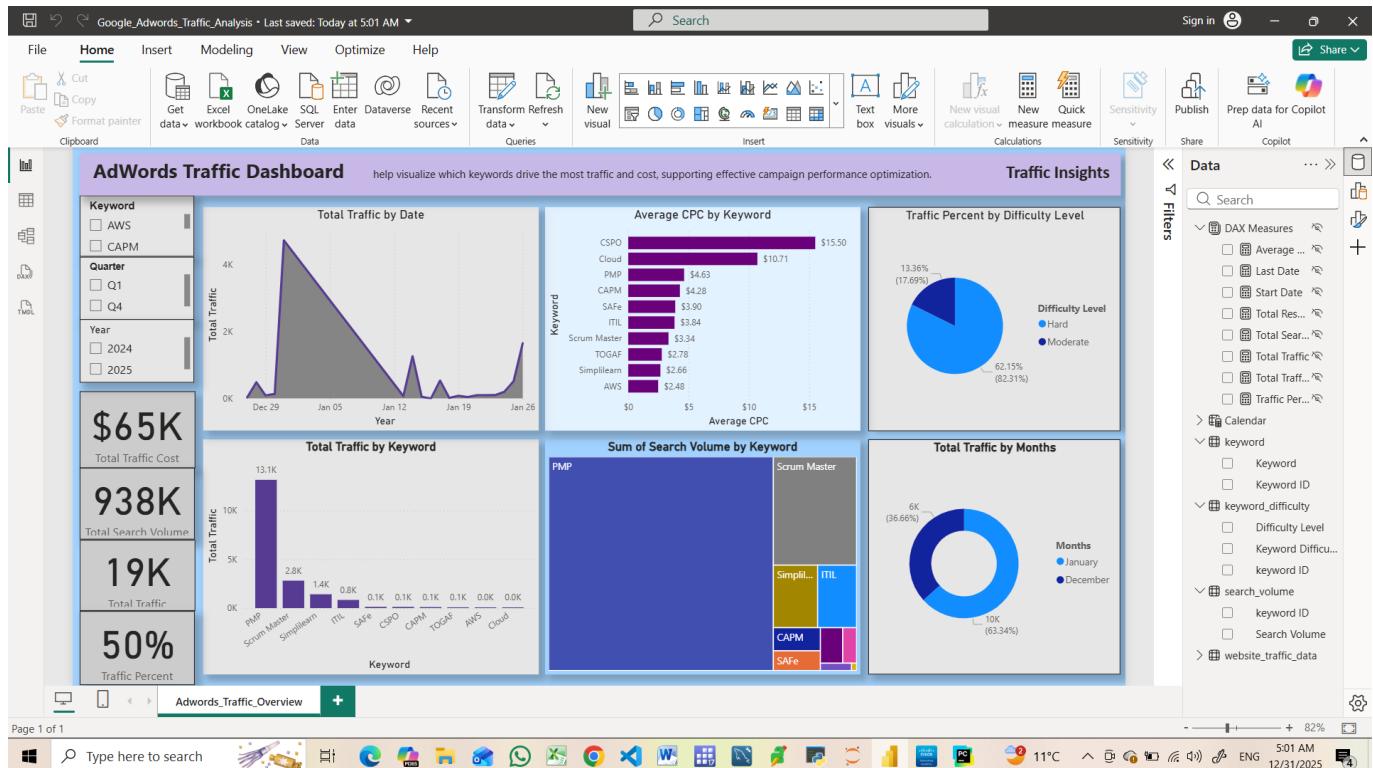
Explain key KPIs:

- Total Traffic
- Average CPC
- Total Cost
- Time intelligence (Month, Quarter, Year)

## 12. Dashboard Design & Insights

### KPI cards overview

- Traffic trend analysis
- Keyword performance ranking
- Difficulty-wise traffic distribution



Interactives slicers allow users to filter by time, keyword, and difficulty.

## 13. Key Findings

### Results.

- High-traffic keywords with low CPC identified
- Several high-CPC keywords showed low traffic efficiency

- Moderate-difficulty keywords contributed most traffic
  - Clear seasonal traffic patterns observed
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## 14. Future Improvements

- Google Ads API automation
  - Conversion & ROAS metrics
  - Forecasting models
  - Campaign-level analysis
  - Cloud deployment
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## 15. Conclusion

This project demonstrates a complete marketing analytics pipeline, integrating data cleaning, relational modelling, SQL analysis, and business intelligence visualization. The approach reflects real-world industry practices and highlights the value of structured analytics in digital marketing decision-making.

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## 16. Author & Contact

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