

# Customer Analytics Project - Complete Report

## 1. Project Overview

This project focuses on **Customer Analytics** and **Customer Behavior Analysis** using **Python, SQL, and Power BI**. The objective is to analyze customer data, understand behavior patterns, derive actionable insights, and visualize them through an interactive dashboard for business decision-making.

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## 2. Tools & Technologies Used

- **Python:** Data cleaning, preprocessing, exploratory analysis
  - **SQL:** Data extraction, transformations, business queries
  - **Power BI:** Interactive dashboard creation and KPI visualization
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## 3. Project Workflow (High-Level)

1. Raw customer data collection (CSV)
  2. Data cleaning & feature engineering using Python
  3. Data storage and analysis using SQL queries
  4. Final insights visualization in Power BI dashboard
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## 4. Python Analysis (Customer Behavior Analysis)

### 4.1 Objective

- Clean raw customer data
- Handle missing values
- Analyze customer spending, frequency, and behavior
- Prepare final dataset for Power BI

### 4.2 Key Steps Performed

- Imported libraries: `pandas, numpy, matplotlib, seaborn`
- Loaded dataset: `customer_behavior_final.csv`
- Data cleaning (null values, duplicates)
- Feature engineering (Total Spend, Purchase Frequency)
- Basic EDA (distributions, trends)

### 4.3 Python Code Overview (High-Level)

```
import pandas as pd
import numpy as np

# Load data
df = pd.read_csv('customer_behavior_final.csv')

# Data cleaning
df.drop_duplicates(inplace=True)
df.fillna(0, inplace=True)

# Feature engineering
df['Total_Spend'] = df['Quantity'] * df['Price']
```

### 4.4 Output of Python Stage

- Cleaned and structured dataset
- New calculated columns
- CSV file ready for SQL & Power BI usage

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## 5. SQL Analysis

### 5.1 Objective

- Answer business questions
- Perform aggregations and filtering
- Identify top customers and trends

### 5.2 Sample SQL Questions & Queries

#### Q1. Find total sales per customer

```
SELECT customer_id, SUM(total_spend) AS total_sales
FROM customers
GROUP BY customer_id;
```

**Expected Output:** - Each customer with their total spending

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#### Q2. Identify top 5 high-value customers

```
SELECT customer_id, SUM(total_spend) AS total_sales
FROM customers
GROUP BY customer_id
ORDER BY total_sales DESC
LIMIT 5;
```

**Expected Output:** - Top 5 customers contributing maximum revenue

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### Q3. Region-wise sales analysis

```
SELECT region, SUM(total_spend) AS region_sales
FROM customers
GROUP BY region;
```

**Expected Output:** - Sales contribution by each region

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## 6. Power BI Dashboard

### 6.1 Objective

- Visualize customer insights
- Track KPIs for business stakeholders

### 6.2 KPIs Created

- Total Customers
- Total Sales
- Average Order Value
- Repeat Customer Rate

### 6.3 Visuals Used

- KPI Cards
- Bar Chart: Sales by Region
- Column Chart: Top Customers
- Pie Chart: Customer Segmentation
- Filters & Slicers for interactivity

### 6.4 Dashboard Outcome

- Easy-to-understand visual insights
- Interactive filtering for deep analysis
- Business-ready presentation

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## 7. Final Conclusion

This Customer Analytics project demonstrates end-to-end data analysis skills using **Python, SQL, and Power BI**. The project delivers meaningful insights into customer behavior and supports data-driven business decisions.

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## 8. Future Enhancements

- Add machine learning models for customer segmentation
  - Automate data refresh
  - Integrate real-time data sources
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**Project Type:** End-to-End Data Analytics Project **Level:** Fresher / Entry-Level